



# Application Modernization Guidance Workforce and Skills

Version 4.0



## Overview

Being able to effectively implement public cloud solutions means that it is increasingly important that today's GC workforce and the future workforce are prepared for new skills and new ways of working. Cloud not only presents a different way in which technology and business capabilities are delivered and supported, but it also presents ways that a skilled and knowledgeable workforce can leverage technology to do business better, faster and more cost-effectively and in more innovative ways.

A skilled and knowledgeable workforce is an effective security risk migration and also allows the organization to scale its use of cloud services.

## Developing Your Workforce's Skills

Modernizing applications depends upon a workforce with the skills necessary to deploy and operate modern cloud platforms while employing modern delivery methods such as DevOps.

Modernization often focuses on mitigating the risks associated with legacy technology, however not addressing legacy skills and methods leaves an organization vulnerable to re-accumulating technology risks as time passes. Modernization should be continuous, not only a periodic event to address accumulated risks.

**This guidance document is meant as an introduction to key concepts, but is not comprehensive enough to cover the topic in its entirety. This document will focus on four themes:**

1. *Determining the skills you need.* It is useful to understand that there are varying degrees of skills and knowledge that staff require in order to be successful in a Cloud environment. Not all staff need the same type and same level of training and professional development. The following diagram illustrates a possible way to view the categorization of staff and their training needs. Note that the diagram includes only internal GC staff

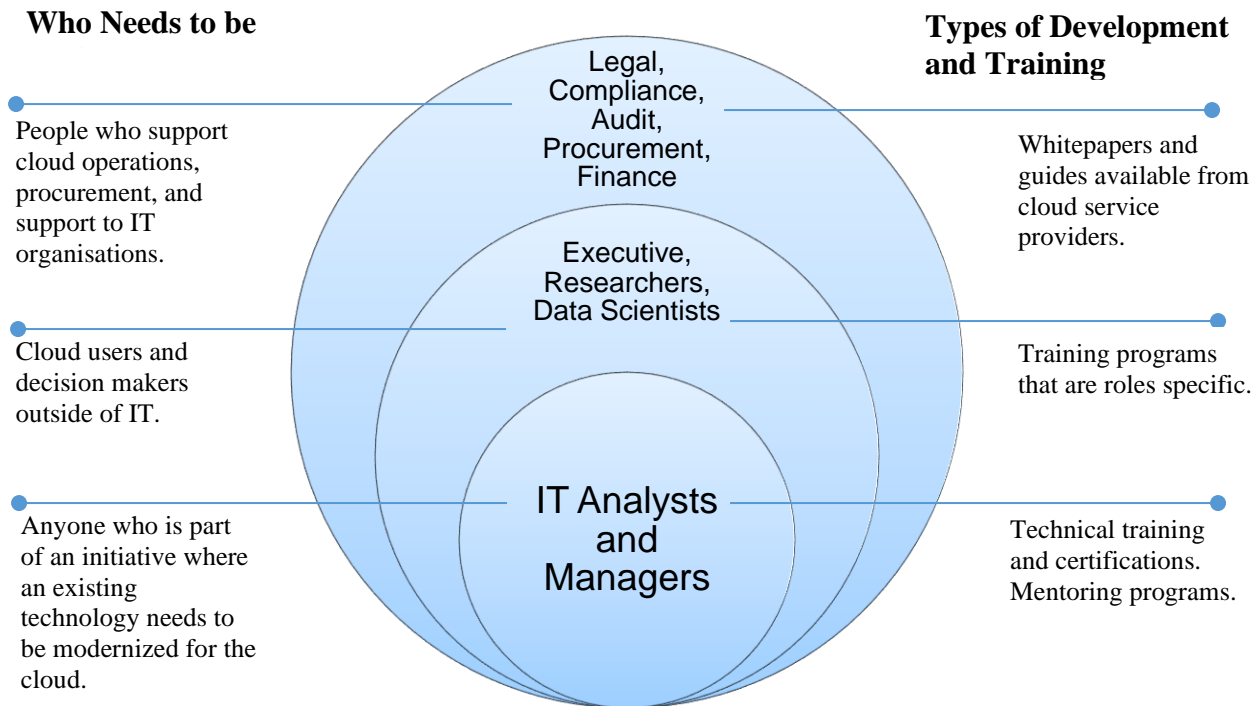


Figure 1 Categorization of Roles To Be Trained

2. *Scaling skills with cloud adoption.* The people and skills you require at the onset of your cloud journey is limited, but with time will scale with your adoption of cloud. Initially very few people may undertake many responsibilities, but over time, the number people responsible for the cloud environment will grow.
3. *Optimizing Your Teams for Speed of Delivery.* As people and skills scale, how the organization is structured will impact the level of benefits obtained from cloud adoption. While cloud brings the technology platforms sought by organizations, the people and process components are equally important. Adopting DevOps methods and structures will position your organization to continuously modernize its applications over time and lower technical debt.
4. *Methods of gaining skills.* While traditional classroom training is often thought of as the method of acquiring skills, the Government of Canada maintains a community of practice for sharing lessons learned and tools.

Providing an environment for continuous learning and professional development not only makes good business sense but it makes economic sense. By focusing on training and professional development of your staff, you will gain efficiency in the performance of work, reduce the cost of failures, and reduce the cost of outsourcing. And as employees gain knowledge and skills (by practicing that knowledge), the IT workforce will enable the ability to maximize the benefits of implementing Cloud solutions. This type of environment needs to be built from a foundation supported by HR and senior management and cultivated by champions who are passionate about Cloud technology and what it can do for GC. While formal training and certification is required for some roles, there are numerous ways besides formal

courses to supplement an individual's skills and knowledge.

Cloud is a broad domain; it cannot be learned all in a day. However, there is an immediate need for organizations to start with foundational training. Based on foundational skills and knowledge, staff can apply this immediately to gain experience through doing the work.

### Assessing Your Organization's Training Needs

To understand what skills your organization requires, you need to understand the responsibilities they will be undertaking. In the cloud's shared responsibility model the cloud service provider is responsible for a specific scope of activities, varying with each service model, leaving the remainder to the consumer. In the Government of Canada, the consumer role is further shared across multiple organizations. Some responsibilities are those of central agencies such as SSC, TBS, and CCCS, while the majority of responsibilities belong to departments and agencies. The GC Public Cloud Roles and Responsibilities document provides a RACI matrix mapping each consumer responsibility to a GC organization. This document can be used as a framework for determining your organization skills requirements and gaps.

Keep in mind the depth of technical skills you will require is impacted by the service model of your initial cloud use cases. For example, the skills required for a Software-as-a-Service CRM implementation are typically less technical than those required to migrate existing applications to P/IaaS.

It is particularly important to ensure that technical skills are addressed in order to ensure that the staff who are responsible for the implementation are well-equipped to do their jobs and thus enable your organization to maximize its benefits from Cloud.

Shown is a small extract from section 13 of the GC Public Cloud Roles and Responsibilities RACI matrix and are the responsibility of departments.

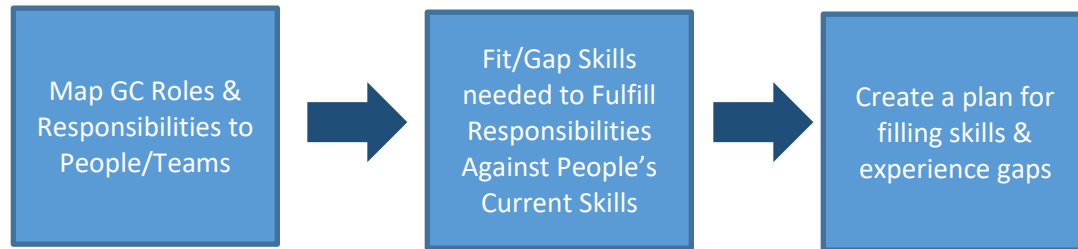
<b>13.0</b>	<b>Operate and maintain cloud-based services</b>
13.1	Manage cloud application access
13.2	Perform image management and compliance
13.3	Perform cloud workload administration
13.4	Perform resource pool administration
13.5	Apply software patches and updates
13.6	Conduct backup and recovery operations
13.7	Perform day-to-day operational processes
13.8	Monitor health of cloud applications

This list of responsibilities is assigned to departments to undertake. They are aligned with responsibilities in traditional IT environment where departments perform these activities for their applications.

1. These responsibilities should be mapped to the team operating the cloud environment and

applications hosted within.

2. The skills required to carry out these responsibility should be fit/gapped against the skills of the team assigned to these responsibilities.
3. The results of that fit/gap analysis should be used to create a training plan.



*Figure 2 Determine the skills you need & fit-gap against actual skills*

### Scaling Skills and Knowledge with Cloud

Based on your organization's Cloud strategy, you can start small – train the resources that have an immediate need for Cloud skills. These people are typically those that are immediately involved in a Cloud implementation (the inner-most circle as illustrated in Figure 1 Categorization of Roles To Be Trained). Knowledge is reinforced through practice. Therefore, it is important that the staff that you train are able to apply their newly gained knowledge shortly after receiving training. As your cloud technology landscape grows, you will also need to increase the number of people trained.

Again, using the GC Public Cloud Roles and Responsibilities document as a framework, where, initially, one person may have been assigned across many responsibilities when the level of cloud adoption was low, as adoption scale, responsibilities may start to map to multiple people. As you scale, resist traditional IT models of building teams based upon functional affinities, but instead create multi-disciplinary teams focused on delivery of a service, or product consumed by end-users. This will facilitate the transition towards DevOps methodologies. For example, responsibility 13.5 apply software patches and updates should be the responsibility of developers in each product team, however operations may provide centralized self-service tooling and playbooks to make that responsibility easier for each product team.

It is recommended that you regularly review the staff skill set in relation your organization's cloud adoptions on a periodic basis. As the organization's cloud landscape scales, the number of people who need to be trained scales accordingly. By reviewing the assessment regularly, you can adjust your organization's training needs based on its priorities at that time.

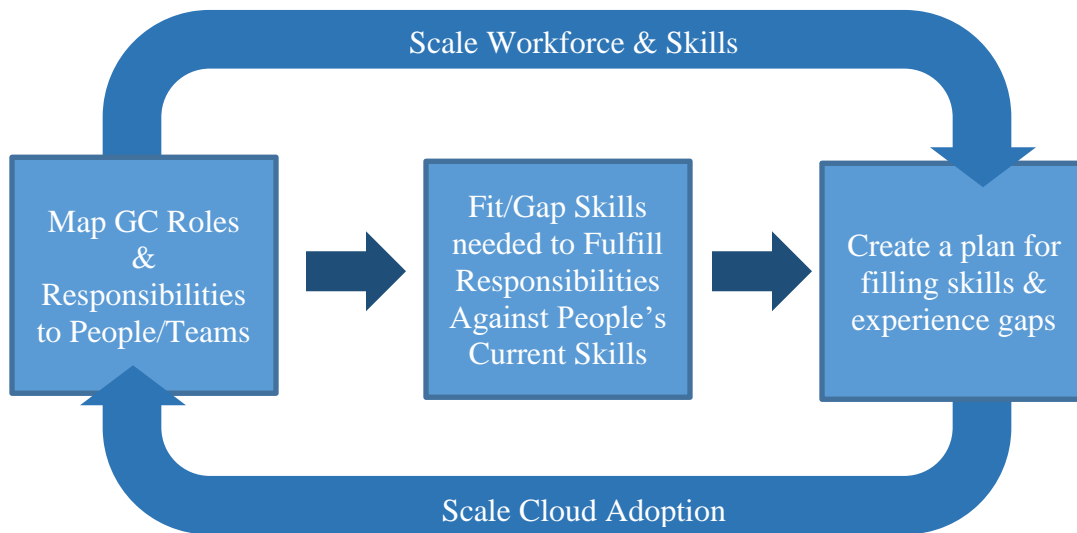


Figure 3 Iterating Skills Gap Assessment Based on Scale

### Organizing Teams for Delivery

Adopting roles and responsibilities for cloud is an opportunity to redefine traditional roles to bring them in line with modern DevOps practices. For example, traditional technical team include application developers, by contrast in a DevOps model, application developers are now expected to become full-stack developers. The once rigid division of responsibilities between development and operations, silos created to optimize for functions, shifts to creating multi-disciplinary teams focused on delivering a product or service. In a DevOps model, developers are expected to operate the applications they build and the resources those applications consume. Operations provides a self-service platform to enable developers. Using the previous example of section 13 of the GC Cloud Roles and Responsibilities matrix, in a traditional IT model those responsibilities may have belonged to different operations teams. In a DevOps model, each application team becomes responsible for those responsibilities for their respective application(s). Operations may provide self-service tools, playbooks, and platforms for developers to help them complete those responsibilities in a more consistent way across all applications and with less time and effort. For this reason, organizations should avoid implementing traditional IT silos, focused on functions, when adopting cloud and take the opportunity to shift towards multi-disciplinary teams focused on the delivery of a product or service. *The DevOps Handbook* illustrates the contrast between traditional, function-based, IT organizations versus those that are optimized for delivery.

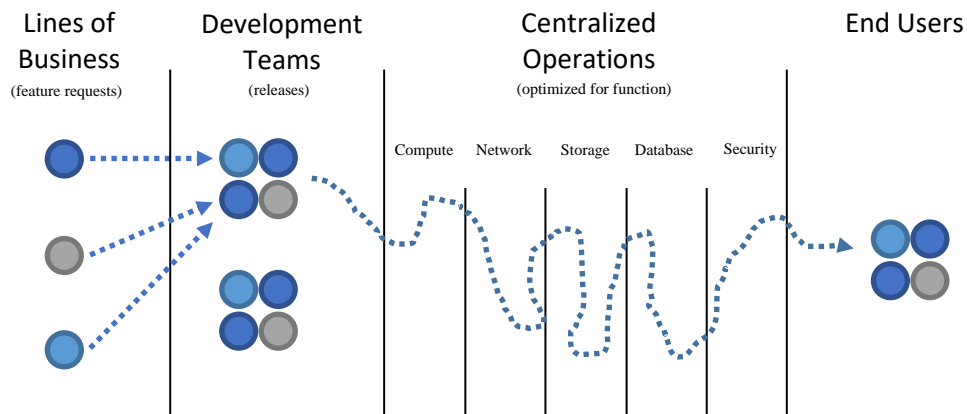


Figure 4: Traditional IT organized based on functions and optimized for those functions

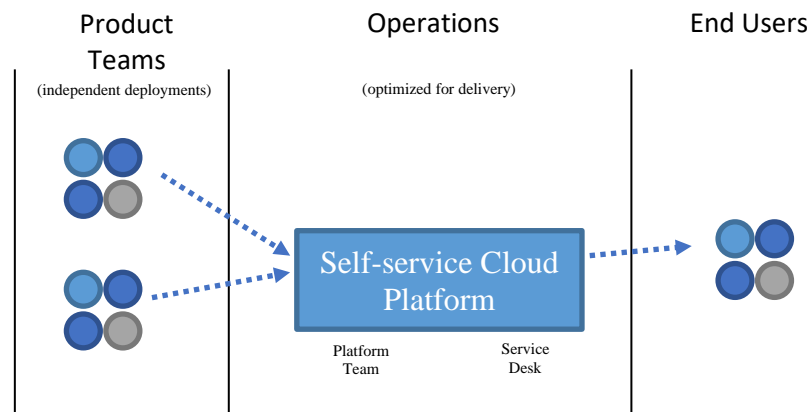


Figure 5: Organized around product and services teams optimized for speed of delivery

## Methods of Acquiring Cloud Skills

There is variety of ways that your workforce can acquire skills necessary to be productive in a Cloud environment. Depending on your needs and your Cloud strategy, it may be useful to use multiple forms of training and professional development. Below are some examples of way to acquire Cloud skills.

Note that Cloud service providers or their partners may also be able to help with these assessments for individuals who are candidates for the Cloud certification path. There are also many training institutions

that have curricula focused on Cloud technologies.

### **Certification**

Roles that are required to build, implement and support Cloud solutions must attain certification. Whichever Cloud solution(s) your organization chooses, the Cloud service provider(s) will provide the training and certification that is necessary based on the particular role and tasks that the individual will need to perform.

### **Training Providers**

Training providers also offer a wide range of Cloud courses for individuals who need knowledge on Cloud technologies. Some of these courses may be delivered both in-class or online.

### **Webinars**

Cloud webinars are available to individuals to take at their own pace. Webinars provide an easy way to refresh one's knowledge and stay up on the trends. However, the individual should use judgment on the relevancy of the webinar to their needs.

### **Conferences**

Conferences offer many sessions and you can pick the topics that are useful to you. Some of the conference providers also provide materials online as livestream events or for later download. Conferences are a good opportunity to meet the vendor community.

### **Cloud Centres of Excellence**

Cloud Centres of Excellence are useful for knowledge sharing. However, they may only supplement the knowledge that individuals require. They should be viewed as being focused on governance and creating common tools and artefacts to help other application development teams.

It is recommended to avoid the risk of a cloud centre of expertise becoming a silo within your IT organization. As your usage of cloud scales, the number of teams involved in Cloud should grow.

Knowledge-sharing within Cloud Centres of Excellence and working groups is key to helping individuals stay current and to learn from first-hand experience.

## **Guidance**

1. Determine your training needs:
  1. Use the GC Public cloud Roles and Responsibilities document to determine the responsibilities your organization will need to undertake  
  
Map existing IT workforce roles to cloud roles.
  2. Perform a skills & knowledge gap assessment, being mindful of the service model(s) that your organization wishes to use (e.g. SaaS, PaaS, IaaS).
  3. Leverage your existing workforce by providing them with Cloud skills and experience. Upskill your resources to be able to apply DevOps as an IT approach, including how to leverage DevOps to automate routine implementation tasks.
4. Scale your skills needs as your adoption of cloud scales



- a. As your cloud adoption scales, periodically, perform an iterative review of your organization's workforce and skills needs.
- b. Schedule training and professional development by need – what knowledge and skills are needed first in order to achieve the target operating model. Also consider the time necessary to attain any necessary certifications. Get started early.
- c. It takes time to ramp-up Cloud skills and experience. Even if your organization doesn't foresee adopting Cloud at-scale, having a team who is experienced with deploying Cloud-based applications is an asset.
- d. Make continuous training and professional development part of the culture. Encourage professional development through a variety of formats, in addition to classroom training. Giving employees time and autonomy to do PD is important.
- e. Set milestones for knowledge and skills required by specific roles.

## Other Reading and Resources

Government of Canada Cloud Adoption Strategy: 2018 update

<https://www.canada.ca/en/government/system/digital-government/modern-emerging-technologies/cloud-services/government-canada-cloud-adoption-strategy.html>

Toronto Cloud Business Coalition "CLOUD SKILLS REQUIREMENTS AND DEVELOPMENT, A TCBC Best Practices Document"

[http://businesscloud.to/resources/Library/Best%20Practices/TCBC\\_Cloud\\_Skills\\_Best\\_Practices\\_Final.pdf](http://businesscloud.to/resources/Library/Best%20Practices/TCBC_Cloud_Skills_Best_Practices_Final.pdf)

Business 2 Community - "Trends in Cloud Jobs in 2019"

[https://urldefense.proofpoint.com/v2/url?u=https-3A\\_www.business2community.com\\_human-2Dresources\\_trends-2Din-2Dcloud-2Djobs-2Din-2D2019-2D02207606&d=DwMFaQ&c=EdSgJoS8igo01XnekBu\\_azVXoUPxJkwz9O2AzwhBbE&r=gK3YU5eL9HKYWTsAhwVRXN3B3q-8GT8IUkSYEPtYwCM&m=VYGkTg35o5RhWQDCTDjkocvlioVcsCoSmbw8Sj\\_89EQ&s=7pvliAbCJbw1DQfjcc6pOSI3eyqSxOL5Fv07PqzITLk&e=](https://urldefense.proofpoint.com/v2/url?u=https-3A_www.business2community.com_human-2Dresources_trends-2Din-2Dcloud-2Djobs-2Din-2D2019-2D02207606&d=DwMFaQ&c=EdSgJoS8igo01XnekBu_azVXoUPxJkwz9O2AzwhBbE&r=gK3YU5eL9HKYWTsAhwVRXN3B3q-8GT8IUkSYEPtYwCM&m=VYGkTg35o5RhWQDCTDjkocvlioVcsCoSmbw8Sj_89EQ&s=7pvliAbCJbw1DQfjcc6pOSI3eyqSxOL5Fv07PqzITLk&e=)

AWS - "Learning Paths for Training and Certification"

<https://aws.amazon.com/training/learning-paths/?nav=tc&loc=4>

AWS - "The People Model and Cloud Transformation | AWS Public Sector Summit 2016"

[https://www.slideshare.net/AmazonWebServices/the-people-model-and-cloud-transformation-aws-public-sector-summit-2016?qid=4901dc2b-c273-45f7-ae25-3e720ca001ef&v=&b=&from\\_search=13](https://www.slideshare.net/AmazonWebServices/the-people-model-and-cloud-transformation-aws-public-sector-summit-2016?qid=4901dc2b-c273-45f7-ae25-3e720ca001ef&v=&b=&from_search=13)

Google Cloud – "Google Cloud Certification"

<https://cloud.google.com/certification/>

Microsoft Azure – "Certification Overview"

<https://www.microsoft.com/en-us/learning/certification-overview.aspx>

Cloudreach – “Cloud Competency Framework: 5 Week Assessment”  
<https://azuremarketplace.microsoft.com/en-us/marketplace/consulting-services/cloudreachinc.4c13c356-3c39-4b6b-9cec-87f9bf5dc8cc>

The DevOps Handbook, November 28, 2016 by Gene Kim

## Acronyms

CCCS	Canadian Centre for Cyber Security
CRM	Customer Relationship Management
GC	Government of Canada (department or agency)
IaaS	Infrastructure as a Service
IT	Information Technology
P/IaaS	Platform/Infrastructure as a Service
PaaS	Platform as a Service
PD	Professional Development
RACI	Responsible, Accountable, Consulted, Informed (matrix)
SaaS	Software as a Service
SSC	Shared Services Canada
TBS	Treasury Board Secretariat