



CIS Cloud Decision

Introduction

If you're a Utility that is considering going down the Customer Information System (CIS) replacement path, have either already started on this journey, or have finished your project and are now looking back at it, then the following CIS Series is for you.

CIS projects are a considerable investment in time, money and effort. Using best practices, industry knowledge and insights found in the pages ahead will set you up for success, save you time and money during your process, and reduce your risk by using insights and learnings of others in the Utility industry.

Throughout this series, we'll provide insights to Utilities and open up a discussion and debate forum, where you can discover key aspects to consider when planning or delivering your CIS project.

Kaihen has worked on many CIS projects in Canada, and we will share our learnings and points-of-view, as well as the experiences of our Canadian clients to help you during your CIS journey.

Please join us in the CIS Series.

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CIS Cloud Decision Introduction

A key question that many Utilities are currently asking themselves is whether they want to stay On-Premise or go with a CIS application vendor's Cloud offering.

Until just a couple of years ago, this decision wasn't top of mind for most Utilities. But since then, many CIS applications have been offered through different deployment models, such as Software-as-a-Service (SaaS) or Platform-as-a-Service (PaaS). The CIS Public Cloud market is still in its infancy, but in a few more years, it will become commonplace to go with a Public Cloud CIS.

Our previous whitepaper, "CIS Procurement Options," addresses the three choices that Utilities have regarding **when** to make their Cloud versus On-Premise decision:

1. Decide before procuring for your CIS software.
2. Decide during the CIS software procurement process.
3. Decide during the project's Discovery Phase.

This whitepaper provides guidance to Utilities on **how best** to make their CIS Cloud decision.

Unique Utility Factors

Every Utility is different, including yours. This means that each Utility has its own unique factors to consider when deciding if it wants to go with a Cloud CIS. Some key, unique Utility factors include:

- Utility size
- geographic location (of Utility and Cloud vendor)
- IT Cloud strategy and road map
- IT maturity
- IT investment made in the On-Premise CIS
- IT competencies
- upgrading current CIS versus new CIS implementation
- culture and readiness to change
- regulatory policies
- risk tolerance
- financial flexibility
- corporate growth plans

Types of Cloud Services

To start, let's define what we mean by Cloud services, regardless of the industry sector. There are two main types of Cloud services referenced in this whitepaper:

PRIVATE CLOUD (or Platform as a Service, Single-Tenant Cloud or Hosted Cloud)

Private Cloud is when an outside vendor is responsible for runtime, middleware, database, operating system, virtualization, servers, storage and networking for its client's application(s). An outside company hosts the infrastructure for a single client to run one or more of their applications. Some examples of Private Cloud infrastructure hosting providers include Google Cloud Platform, Amazon Web Services, Microsoft Azure and IBM BlueMix. These examples are also known as hyperscalers.



PUBLIC CLOUD (or Software as a Service, Multi-Tenant Cloud or Full Cloud)

Public Cloud is most commonly when software applications are provided on a subscription basis. The applications are kept current by the Public Cloud vendor, so no major software upgrades should ever be required. All applications, middleware, database, hardware and disaster recovery are owned and managed by a third party, outside of the client's organization, and are shared among other client's technologies. However, in this model, the client still owns the data. Examples of Public Cloud software are Google Business, Microsoft Office 365, Workday and Salesforce.com.



Many organizations are using a hybrid Cloud approach, where some infrastructure is On-Premise and some is in the Cloud, while some of their applications are On-Premise and some are in the Private or Public Cloud.

When deploying software, organizations can choose between On-Premise, Private Cloud or Public Cloud.

Organizations can deploy their software using different models, depending on the application, resulting in a hybrid model across the enterprise.

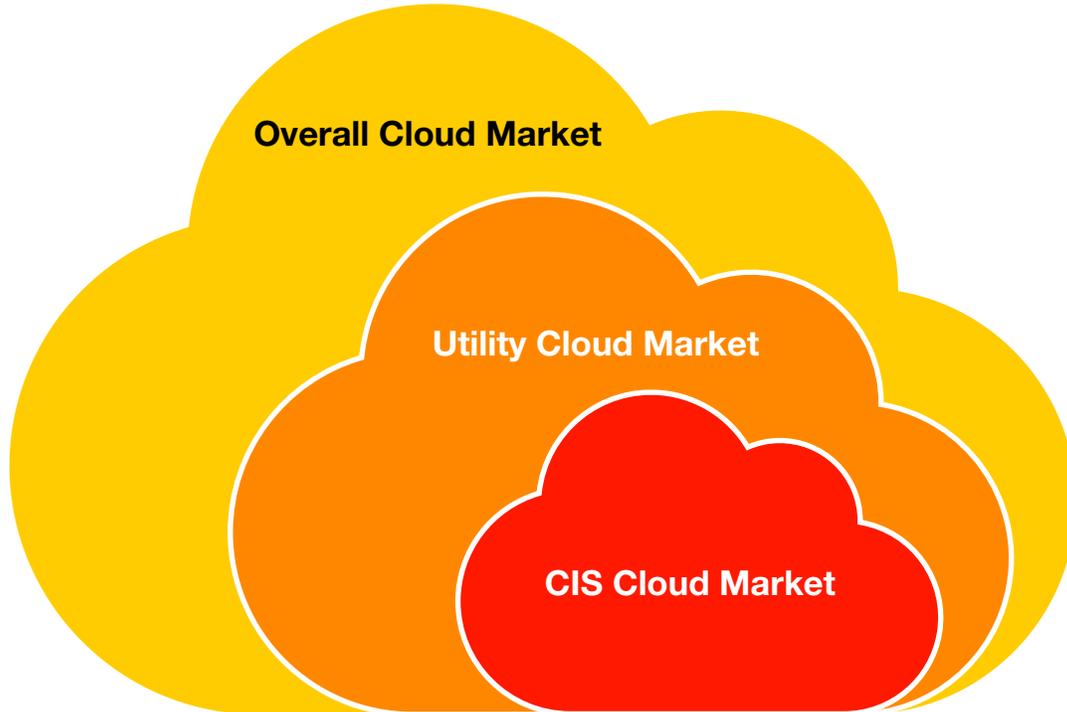


Figure 1 is a summary of the key advantages and disadvantages of these three types of software deployment models.

Figure 1: Advantage and Disadvantages of Software Deployment Models

Deployment Model	Advantages	Disadvantages
<p>On-Premise</p>	<ul style="list-style-type: none"> ■ Organization has control of application, environment, database and hardware. ■ Control over when patches are implemented. ■ Leverage existing On-Premise infrastructure and technical expertise. 	<ul style="list-style-type: none"> ■ Organization needs to manage application upgrades, patches and security. ■ Tendency for customization, which usually complicates upgrades and migrations. ■ Organization needs to keep track of compatibility between application and platform (operating system and middleware). ■ Organization responsible for disaster recovery. ■ Some solutions may move away from On-Premise infrastructure and become more compatible with Cloud-based technology (e.g., Microsoft Office 365).
<p>Private Cloud</p> 	<ul style="list-style-type: none"> ■ Application control. ■ Optimized shared infrastructure. ■ Latest operating system and underlying technology. ■ More flexible solution design. ■ Less internal IT infrastructure staffing than On-Premise. ■ Often offers more scalability compared to On-Premise infrastructure. ■ Organization can leverage internal application tier know-how and expertise. 	<ul style="list-style-type: none"> ■ Organization needs to manage application upgrades, patches and security. ■ Organization typically needs to keep track of compatibility between application and platform (operating system and middleware). ■ Organization is responsible for disaster recovery cost. ■ Need strong, reliable and consistent internet network access (additional third-party relationship for client, complicating support).
<p>Public Cloud</p> 	<ul style="list-style-type: none"> ■ Regular software updates required to stay current. ■ Benefit from new software features more quickly. ■ No hardware responsibility. ■ Guaranteed service level agreement (SLA). ■ Optimized environment. ■ High reliability — a vast network of servers ensures against failure. ■ Regular patching reduces vulnerability to security loopholes. ■ Elasticity and scalability when needed. ■ Business process standardization. ■ Less internal IT staffing than Private or On-Premise. ■ Best-in-class disaster recovery. ■ Benefit from economies of scale (price decreases with more clients). 	<ul style="list-style-type: none"> ■ Lack of control. ■ Lack of customization. ■ Lack of direct access to database. ■ Potentially more complex interface design. ■ Limited flexibility with accepting upgrades or new features. ■ Dependency on vendor viability and support. ■ Retooling of IT staff. ■ Requires strong, reliable and consistent internet network access. ■ Potential regulatory and financial impacts by moving to subscription model.

Cloud Market



Overall Cloud Market

With the rise of services powered by the Cloud, such as Amazon, Netflix, Gmail and Office 365, it has become widely accepted that Cloud technologies are used daily. **Cloud technologies are becoming more and more prominent across all industry sectors and applications.** Companies in many sectors are starting to move even their critical systems to the Cloud. Software companies are encouraging clients to consider their Cloud solutions.

Gartner's research shows a trend in increased Cloud spending and adoption worldwide, as seen in Figure 2 below¹. Its research also projects an increase in Cloud-based business revenue, as seen in the Figure 3 below². In addition, Statista predicts³ that, in Canada, spending on public Cloud computing is forecast to reach \$10.3 billion (CAD) in 2023, growing at a five-year compound annual growth rate of 16 per cent during the forecast period. These studies depict a clear trend in the broad industry market of a move toward Cloud-based technology and operation.

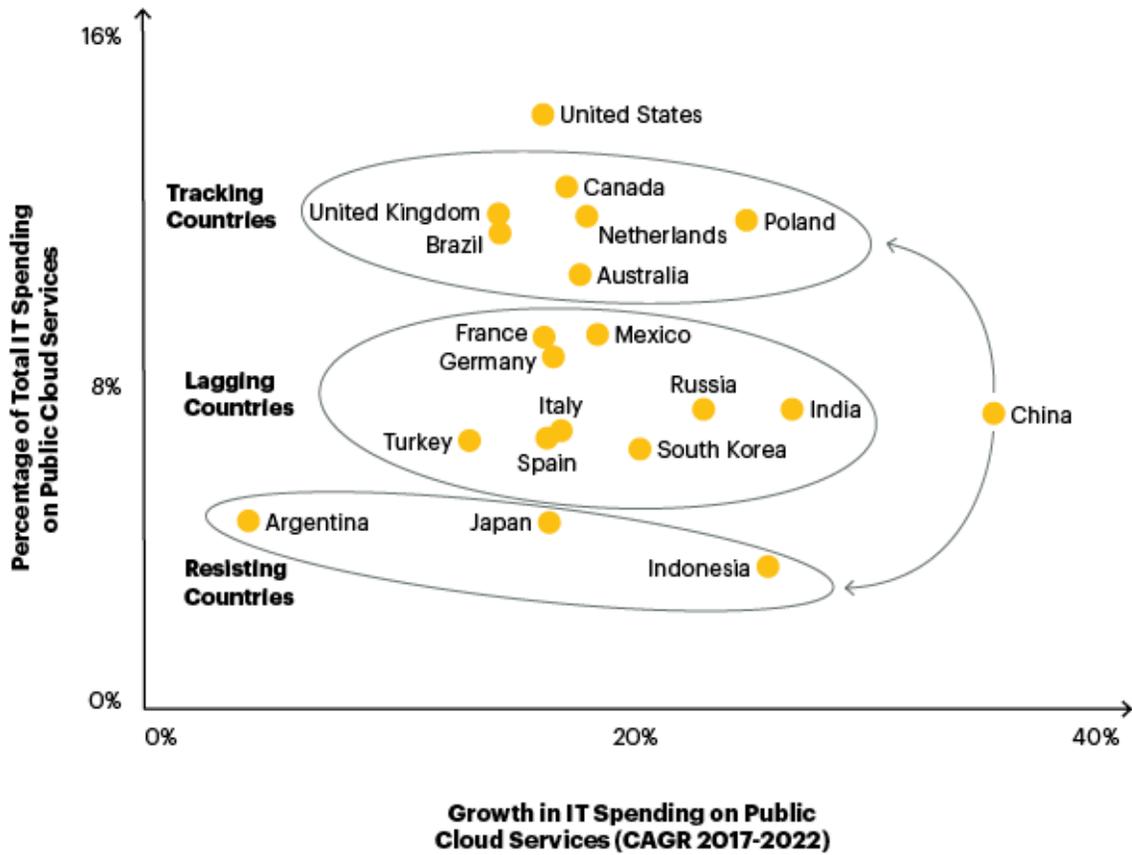
1 Source: <https://www.gartner.com/smarterwithgartner/cloud-adoption-where-does-your-country-rank>

2 Source: [Gartner Forecasts Worldwide Public Cloud Revenue to Grow 6.3% in 2020](#)

3 Source: <https://www.statista.com/statistics/761720/canada-spending-on-public-cloud/>

Figure 2: Cloud Spending Rates and Growth Tracking

Cloud Spending Rates and Growth Highlight Tracking, Lagging and Resisting Countries, 2022



gartner.com/SmarterWithGartner

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Figure 3: Worldwide Public Cloud Service Revenue Forecast (Millions of U.S. Dollars)

	2019	2020	2021	2022
Cloud Business Process Services (BPaaS)	45,212	43,438	46,287	49,509
Cloud Application Infrastructure Services (PaaS)	37,512	43,498	57,337	72,022
Cloud Application Services (SaaS)	102,064	104,672	120,990	140,629
Cloud Management and Security Services	12,836	14,663	16,089	18,387
Cloud System Infrastructure Services (IaaS)	44,457	50,393	64,294	80,980
Desktop as a Service (DaaS)	616	1,203	1,951	2,535
Total Market	242,697	257,867	306,948	364,062

BPaaS = business process as a service; IaaS = infrastructure as a service; PaaS = platform as a service; SaaS = software as a service

Note: Totals may not add up due to rounding.
Source: Gartner (July 2020)

Utility Cloud Market

Focusing more specifically on the Utilities sector, some of the same Cloud trends are occurring here as in other sectors. A recent Oracle study⁴ found that 71 per cent of Utilities are currently using some Cloud software, compared to just 45 per cent in 2016. So, clearly, more and more non-critical Utility applications are moving to the Cloud.

implementations are also now starting to move to the Cloud.

Miguel Gaspar Silva, vice-president, global head SAP industry business unit utilities, notes a similar trend: “Utilities were initially cautious in their adoption of Cloud solutions, but over the last three years the market and thinking has evolved, and Utilities are realizing the benefits and value that Cloud solutions can deliver for their businesses. Today, we see Utilities around the world using cloud solutions for most if not all of their business, commercial and administration processes. The question is what specific Cloud solutions to adopt at what point in time.”

“For many Utilities, the decision is not so much if we move to the Cloud as exactly how. If the application in question is available as a mature SaaS offering then it likely is a simple decision, but that is not yet true for many core Utility applications, including CIS. So Utilities have to decide which activities they want to perform themselves and which they want to outsource, including infrastructure provision and management, the maintenance and operation of the application itself (production and dev/test), as well as future enhancements, integrations etc. It is unlikely that any Utility is going to do all of those things in house, in my opinion.”
John Lawson, VP Transition Management and IT, Liberty Utilities

In the past, even vendors considered CIS too complex, too important to the business and too risky to move to the Cloud. Both Utilities and their vendors deem the billing engine and meter-to-cash type functionality within their CIS as mission critical to the Utility business. For several years, though, other Utility functionality has been provided using Cloud-based tools, such as customer web portals, outage management systems, enterprise resource planning (ERP), customer relationship management applications or other types of customer experience-focused applications. However, CIS

Kaihen recommends that Utilities begin by moving to established Cloud applications first to build their internal capabilities and gain experience with various Cloud technologies before assessing Cloud CIS solutions.

⁴ Source: <https://www.oracle.com/corporate/pressrelease/utilities-accelerating-move-to-cloud-110619.html>

CIS Cloud Market

Utilities across North America are now assessing whether they should move their CIS to the Cloud. CIS application vendors' road maps, including their CIS offerings, are based

on various Cloud technologies. The following table is a snapshot of some of the leading CIS applications and their currently available software deployment models:

Figure 4: CIS Software Vendor Deployment Models

CIS Software Vendor	On-Premise	Private Cloud	Public Cloud
Hansen	Yes	Yes	Yes
Harris NorthStar	Yes	Yes	No
Itineris	Yes	No	Yes
Oracle	Yes	Yes	Yes
SAP	Yes	Yes	Coming in 2021

Several of the CIS software vendors listed above rely on hyperscalers, such as Amazon, Google or Microsoft, to provide the required infrastructure for their Private Cloud and/or Public Cloud offerings.

Kaihen expects there to be a significant increase in Public Cloud CIS implementations and upgrades over the next three to five years.

“Hansen has a long history of providing Hosted Platforms, both in PaaS and SaaS, across both the Telecommunication and Utility industry verticals. While the Utility market has been cautious about adopting Cloud technology in the past, positive experiences from Cloud-based applications, coupled with a growth in awareness of Cloud technology in general, will present exciting opportunities for our CIS customers. We expect demand for as-a-service contracts to be increasingly favoured over traditional software licensing models as new investment cycles commence.” *Guy Tennant, Chief Technology Officer, Hansen Technologies*

Oracle has over 250 Utility CIS customers running On-Premise or on PaaS, and over 500 successful major upgrades have gone live among these customers. Oracle has 10 customers deploying Public Cloud (CIS or Meter Data Management) currently, and two have already gone live.

Itineris has a similar early Cloud market presence. It has a total of seven Utility customers subscribed to its Cloud CIS solution, some of which are in-production and others that are in the process of implementing.

System integrators (SI) that support CIS Cloud solutions are learning from these early implementations. ***The belief is that CIS Cloud implementations may become shorter and less complex than similar On-Premise CIS implementations. However, that has not materialized yet.*** SIs are grappling with their lack of experience, the immaturity of CIS Cloud solutions, complex Utility integrations and unique business requirements. SIs are still optimizing methodologies to implement CIS solutions in the Cloud and establishing best practices and lessons learned. As the Cloud CIS implementations and upgrades grow, they will provide SIs the opportunity for more experience with CIS Cloud solutions. Kaihen expects this to result in Utilities becoming more comfortable with implementing/migrating their CIS to the Public Cloud.

In some cases, CIS vendors' salespeople are incented to sell Cloud instead of On-Premise solutions. Most CIS vendors, though, have committed to supporting all deployment models for the foreseeable future. For example, Hansen has stated that they “will continue to support all deployment models because of the sizable investments its clients have made in its existing solutions. Its CIS solutions are focused on Public Cloud as well as Hansen datacenters or On-Premise deployments, based on the conviction that some combination of these models will exist among its clients for years to come.”

Kaihen's assessment of CIS Cloud maturity shows that nominal Utilities had a CIS Cloud solution in production by the end of 2020. ***It is evident that the CIS Public Cloud market is still in its infancy stage. However, Kaihen does expect there to be a significant increase of CIS Cloud implementations over the next three to five years.***

CIS Cloud Decision Factors

The following are four categories of factors that Utilities need to assess when making their Cloud CIS decisions:

- operational
- change management
- technical
- financial and regulatory

According to Hansen, some of the reasons why Utilities choose to move to the Cloud is “the perceived need for greater agility/responsiveness to changing market conditions. Concerns about depth of cybersecurity expertise and system resilience can also be a factor. Whilst elasticity/dynamic scalability is not generally a major concern for the relatively stable Utility market, some segments (e.g., deregulated energy market retailers) see it is a consideration.”

Operational Factors

CIS Functionality

Utilities must assess the ability of their chosen CIS solution to provide equal or better features and functionality in the Cloud compared to the On-Premise version. Generally speaking:

- Cloud solutions are the priority for future product road map releases of new functionality.
- New functionality will be released on a vendor Cloud solution before it is released on its PaaS or On-Premise solutions.
- Some Cloud offerings include additional products that otherwise will need to be acquired separately.
- Products and functionality provided with Cloud solutions are typically tested and deployed in an integrated manner, minimizing potential integration issues.

For Itineris, its’ “Cloud solution primary differentiators are realized by leveraging the Microsoft Cloud Ecosystem to provide functionality that extends the Itineris UMAX focused CIS offering. The Microsoft Cloud Ecosystem includes services like a Common Data Platform, Cyber Security protection, and no-code/low-code application development solutions through Power Apps.”

SAP’s solutions for the Utility industry are “designed to enable the end-to-end business processes for any Utility regardless of their role in a market (vertically integrated, distribution company, retailer, etc.) and to allow them their choice of Cloud or On-Premise solutions. Therefore, SAP provides support for the same business processes in both their Cloud and On-Premise portfolios.”

Reporting

Reporting and analytic capabilities with a Cloud-based solution are important factors to assess for Utilities. On-Premise solutions have been well established in numerous deployments where out-of-the-box reporting, database access and extracts are provided to enable the business operation to use different levels of reporting and analytics. Some Cloud-based solutions come with limited to no-access to the back-end database, which limits the ability of the Utility to build its own analytics solution, and some Cloud solutions do not come with enough reporting to satisfy business needs.



Best Practice Adoption

Vendor-based CIS solutions, whether Cloud-based or On-Premise, are generally meant to be adopted by a Utility with limited customization, based on what is offered through configuration and add-on algorithms and Application Programming Interfaces (APIs). However, traditionally, On-Premise solutions have the tendency to deviate slightly from that principle due to full accessibility of the database and source code in many cases, and lack of evidence from vendors that less customization would lead to a simpler upgrade. Cloud-based solutions have resolved that deviation by *eliminating access to the database and source code altogether and limiting the customization* to available channels that are not intrusive to the platform architecture.

Cloud-based solutions have proven to have more streamlined upgradability than their On-Premise counterparts.

“One of our guiding principles for Metergy’s Cloud CIS implementation is to stay aligned with the base CIS solution as much as possible. This concept is important for all major software deployments, but for a Cloud deployment it is critical because we will be forced to stay current with all software patches and upgrades, and that will be very difficult to manage with too many customizations.” Kevin Neild, Chief Customer Officer & SVP IT, Metergy Solutions

An important aspect of any vendor-based solution is the requirement to apply regular patching that is released by the vendor for defects and vulnerability resolutions. Cloud-based solutions have an advantage of keeping their platforms up to date with those patches, in collaboration with the Utilities. For On-Premise, this is mainly the responsibility of the Utility, and falling behind is a well-known risk, which eventually leads to costly upgrades and a significant gap between the operational version of the platform and the latest release from the vendor.

Another consideration to keep in mind is the overall technology stack of the platform (operating system, database, middleware and other software libraries). This concern is minimal in the Cloud-based environment as it’s taken care of by the vendor. But in the On-Premise environment, the Utility will need to pay attention to the end-to-end stack versioning compatibility. This can be a reason for major upgrades of CIS platforms where the underlying technology stack reaches out-of-life support, pushing the overall solution into a complete refresh.

So, it is important to note that while the On-Premise CIS itself might remain supported by the CIS vendor, the underlying technologies might end up forcing an upgrade.

Economies of Scale and Elasticity

Computing power elasticity is known as the tactical computing resource allocation necessary to meet temporary processing power demand, such as database backup, complex analytics algorithms or an off-cycle large billing calculation. This is usually achieved by temporarily allocating computing powers, such as disk, memory or processing cores. This is different than scalability, which is known to be a strategic expansion of computing resources to meet growth demand, and it is usually a permanent expansion.

Scalability is usually achieved by permanently adding physical computing elements, such as disks, memory cards, CPU or full servers if existing servers reach their expansion limit. An On-Premise solution could achieve the elasticity provided by the Cloud environment by deploying the appropriate computing resource management tools; however, it will not be able to maintain an economy of scale model at the same time.

The economy of scale advantage of a Cloud-based solution lies with the number of Utilities sharing resources (facility, infrastructure and personnel), where the allocation of resources can be adjusted without incurring unnecessary overhead. The disadvantage of this model would be the inherit premium incurred if a particular client ended up not benefiting from the enhanced environment of the Cloud. The adoption of elasticity and economies of scale needs to be carefully considered in order to understand whether the value obtained is justifiable for the premium that will be incurred.

Change Management Factors

Organizational Change Management

Generally, Utilities' business and IT groups will experience significant change management when implementing a new CIS because of the new technology platform, user training, business rules and workflow processes. ***Moving to a Cloud CIS would introduce even more change as Public Cloud CIS vendors release patches and upgrades three to four times a year.*** This requires Utilities to have a robust internal process to assess, test and accept CIS application changes on a regular basis. Utilities may need to consider how their business and IT groups are structured in order to manage these changes to their working environment. They will require a new level of nimbleness to incorporate regular CIS enhancements.

Utilities will also require retraining and retooling if moving to the Cloud. A Cloud solution will require personnel who are fairly strong in network engineering and IT operational support. This will be necessary in order to support the initial setup, implementation and post-go-live maintenance of deployment, technical updates and technical integration between the On-Premise systems and the Cloud CIS. Ongoing cloud vendor management will be required to navigate complex Cloud contracts and manage SLAs.

Cultural Readiness

A Utility's cultural readiness can be assessed based on an understanding of its organizational structure, culture, IT capacity and capability, and its overall readiness to support a direct move to a CIS Cloud solution. ***A Utility should also consider how a Cloud CIS aligns with its internal IT strategy and IT road map.*** Is the Utility already using other Cloud applications to support its business? Are there any other critical applications already in the Cloud or planned to move to the Cloud? Are there any lessons learned from previous Cloud implementations? What is the maturity of the current On-Premise CIS infrastructure and operations?

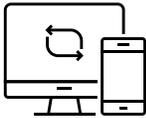
Technical Factors

Listed below are the many technical factors that must be considered when a Utility is contemplating whether to go On-Premise, Private Cloud or Public Cloud.

Kristi Honey, former Water Billing CIS (WBCIS) Project Sponsor & Director, Financial Information Management Services, states that "As part of our WBCIS procurement process, the Region of Durham based its assessment for moving to a Cloud solution on these top three factors: a secure Canadian data centre, high reliability and availability, and exceptional support that could meet our needs."

Technical Factors

<p>1 Compliance and Security</p> 	<p>Compliance and security considerations are based on the suitability of a Cloud-based solution to meet compliance requirements, and the level of security consideration that will either be resolved by a Cloud-based solution or exposed as a result.</p> <p>Despite the high security standard of most Cloud vendors, it is important to note that the transition from an On-Premise environment to a Cloud environment will result in additional security considerations. Moving from a setting that has all data contained within the Utility's closed perimeter to a setting that has external personnel accessing the data (vendor support staff) and data travelling through public internet (despite being encrypted and secured) will be an additional risk to maintain and assess on a regular basis.</p>
<p>2 Network Agility</p> 	<p>It is worth noting that using public internet for CIS in any Cloud model carries two main risks:</p> <ul style="list-style-type: none"> ■ Bandwidth sharing with other Utilities could result in performance degradation. ■ The potential vulnerability of the published APIs used for integration, given their accessibility through the public internet. <p>Kaihen would recommend that Utilities further assess these two risks if they decide to move their CIS to the Public Cloud.</p>
<p>3 Serverless Computing</p> 	<p>Serverless computing is offered by Cloud providers through the management of the servers and the dynamic allocation of computing resources, such as memory and processors. While this enables faster scalability and elasticity, it could also result in a variable cost component, depending on the actual use of computing power.</p> <p>Cloud vendors often assess actual or historical computing usage and offer a “true-up” approach to bill the Utility for computing consumption if it goes beyond the original contracted customer levels. This approach will eliminate the need for the Utility to procure infrastructure tailored to accommodate the peak use of platforms, which leads to a significantly underused infrastructure most of the time and results in an overcharge for its operation.</p>
<p>4 Integration</p> 	<p>Cloud-based deployment requires a higher level of integration maturity, as there needs to be decoupling between the Cloud platform and integration points. Accordingly, this level of maturity will require a layer of abstraction in integration, either by providing a middleware tier or exposing integration through standardized APIs, web services or VPNs.</p> <p>Cloud platforms that continue to rely on file-based integration have the tendency to be point-to-point in nature, sometimes through a private VPN tunnel. This will result in complexity in future maintenance and support, in a setting that is supposed to offer simplified integrations.</p> <p>Another aspect of integration that needs to be examined by Canadian Utilities when considering any CIS vendor is their Canadian market presence. The vendor will need to provide assurance that critical third-party integrations, such as with the banking sector, are proven through previous deployments.</p> <p>Another challenge that the vendor will need to address is compatibility with third-party tools and applications, such as monitoring, reporting and scheduling, or providing an alternative replacement for these types of tools within the vendor Cloud environment.</p>
<p>5 Operational Support</p> 	<p>Utilities that are accustomed to having their solution supported and maintained internally usually experience a challenge in transitioning to a Cloud-based support model. To adapt with a CIS Cloud-based support model, Utilities will need to have a concrete incident management process, preferably Information Technology Infrastructure Library based, that is consistent and in-line with the Cloud vendor support mode.</p>

<p>6 Performance</p> 	<p>Generally, Cloud-based CIS solutions offer satisfactory performance for the front end. The term satisfactory is being noted here as Cloud-based performance is slightly inferior to On-Premise. The degree of inferiority is highly dependent on the network bandwidth between the Utility and the software vendor, and the infrastructure computing power deployed by the vendor.</p> <p>Traditionally, Cloud vendors will offer a guaranteed uptime and SLA, but it is uncommon for clients to receive a guaranteed front-end response time. This is an area where the Utility will need to work collaboratively with its vendor right from project initialization to production and ensure that the vendor maintains an optimal performance to meet the Utility's expectations.</p>
<p>7 IT and Business Agility</p> 	<p>According to Bernard Golden from CIO.com⁵, Cloud Agility means the rapid provisioning of computer resources using Cloud computing. Golden always believed the two major purposes of Cloud computing are: it helps organizations get started immediately and they pay only for what they use.</p> <p>These two reasons are always at the top of a CIO's priority list when making any decisions in this modern IT world. So, from Golden's point of view, Cloud Agility means adopting secure Cloud services and managing an organization's IT infrastructure on the Cloud to support faster application delivery and drive business agility.</p>
<p>8 Disaster Recovery</p> 	<p><i>One of the most obvious advantages of a Cloud-based solution is disaster recovery.</i></p> <p>An On-Premise solution will require the Utility's internal team to maintain two or three different deployments (main deployment, fail-over deployment and disaster recovery deployment).</p> <p>Ideally, the Utility's disaster recovery deployment would be geographically distanced from the primary location. Disaster recovery will be managed for the Utility by the vendor in the case of a Public Cloud solution and will follow industry best practices, such as full annual testing, regular synchronization verification, and seamless activation of fail-over and/or disaster recovery, when needed.</p> <p>The Utility's geographic location can be an important factor to assess. For example, given the uniqueness of Newfoundland's geography as an island and subject to potential communication interruption with the mainland, the overall disaster recovery offering that comes with a Cloud provider will pose more risks than benefits to a Utility in the province. The risk stems from the potential loss of connectivity between the island and the mainland. If that were to happen, the Utility would have no access whatsoever to the vendor's Cloud CIS. This would render the disaster recovery provided by the Cloud CIS unusable due to the presence of both primary and secondary data centres likely outside of Newfoundland.</p>
<p>9 Location of Data</p> 	<p>Many Canadian Utilities are required to retain their customer data in the country, for consumer privacy, regulatory and/or corporate policy reasons. Most of the leading CIS vendors have solutions that can accommodate this Canadian data location requirement.</p> <p>Oracle Cloud CIS is hosted within Oracle Cloud infrastructure in its own data centres. Currently, Oracle Canadian data centres are in Montreal, Quebec, and Toronto, Ontario.</p> <p>Itineris Cloud CIS is hosted by Microsoft Azure Cloud infrastructure and is also available in Canada (Canada East and Canada Centre).</p> <p>Hansen's North American instances of Hansen Public Cloud offerings are currently within USA Availability Zones (AZ), but these can easily be extended into any of three AZs within Canada either as primary, fail-over or both.</p>

5 Source: <https://www.cio.com/article/2416812/cloud-computing--two-kinds-of-agility.html>

Financial and Regulatory Factors

Total Cost of Ownership

A common difference between Cloud and On-Premise costs is the mode in which the software is contracted with the vendor. On-Premise and Private Cloud software are typically based on an upfront one-time licence purchase, plus an ongoing annual support fee (which is typically 20 to 25 per cent of the licence cost). Database licences and annual support may also be required. ***In the Public Cloud model, software is purchased via an annual subscription, which typically includes all costs related to the total solution.*** Utilities are advised to sign longer-term contracts, such as five to 10 years, for price certainty.



In Kaihen's experience, the expectation is that the Public Cloud model will have the lowest total cost of ownership (TCO), followed by the Private Cloud model and then the On-Premise model.

The reason that the Public Cloud model is expected to be the most cost-effective is because the software vendor takes responsibility for all hardware, software, infrastructure and database costs and includes these in its subscription fees. Market-leading application disaster recovery is also included. This decrease in operating and capital spend, plus the reduction in Utility IT staffing required for ongoing maintenance, typically provides savings.

The Public Cloud approach to IT resourcing does present a change to regulated entities from their traditional rate-based review of CIS capital and operating expenditures.

In the Public Cloud model, software upgrades are released in regular increments multiple times per year. "Metergy conducted a thorough TCO analysis of the financial impacts of going with an On-Premise versus PaaS versus SaaS CIS solution. We found that the SaaS model was the most financially feasible option primarily because of the savings in hardware investments and major software upgrades required." Kevin Neild, Chief Customer Officer & SVP IT, Metergy Solutions

As CIS Cloud solutions become more mature, it is expected that vendor Public Cloud pricing will continue to decrease due to the economies of scale realized by the software vendors. Vendor Public Cloud pricing should decrease over time as more Utilities join and, therefore, savings per Utility

will be realized in infrastructure, hardware, operations and support costs.

Vendors will become more efficient in their Public Cloud models and release cycles. Vendors will also have more flexibility in employing cost-efficient models of operation through multiple regional distribution channels, such as data centre deployment across North America.

Kaihen recommends that Utilities use a TCO model to assess their business case, measuring the financial aspects of a Public Cloud versus Private Cloud versus On-Premise CIS solution over a 10-year period. The TCO model should evaluate alternative approaches on an apples-to-apples basis that satisfies both management and regulatory scrutiny. The TCO model should include internal Utility budgetary data, project cost data and software vendor data.

Capital Versus Operational Expenditures

"The roadblocks to Cloud that our customers experience are related to regulatory limitations and finance impacts (Capex vs. Opex). The bottom line is, other than those regulatory and budget decisions, Cloud is ready for Utilities and Utilities are ready for the Cloud." Miguel Gaspar Silva, Vice-President, Global Head SAP Industry Business Unit Utilities

Differentiating between CIS-related capital expenditures (Capex) and operating expenditures (Opex) is critical for Regulators and Utilities because Capex can be amortized over many time periods versus Opex, which is expensed in the year. Regulators and Utilities continue to find the balance between Capex and Opex expenditures to minimize customer bill impacts.

“The predominant reason why EPCOR chose to stay On-Premise with its new CIS was related to the regulatory treatment of capital investments in Alberta at the time. We do foresee the possibility of moving to a PaaS solution, though, in the future, but only if the data centre is located in Canada.” Jay Baraniecki, Project Sponsor and Director, Energy Services, EPCOR

Total cost of ownership for CIS Public Cloud is typically split evenly between Capex and Opex because the ongoing subscription fees are usually deemed to be Opex. Private Cloud and On-Premise costs are closer to 80/20 Capex/Opex. This heavier weighting toward Capex has allowed Regulators and Utilities to amortize the recovery of most of the cost of their CIS investments. At this time, Kaihen has noticed that Utilities and their Regulators across Canada are inconsistent in their rulings but are generally still categorizing SaaS subscription fees as operating expenses and, therefore, their CIS Cloud investments have an immediate in-year impact on Utility customer rates. As the implementation of CIS Cloud solutions increases, financial standards organizations are taking note and providing updates to their accounting guidance.

On August 29, 2018, the Financial Accounting Standard Board issued new guidance: a Utility customer will apply the same criteria for capitalizing implementation costs of a Cloud Computing Arrangement (CCA) as it would for an On-Premise software licence. Key accounting considerations include:

- Effective date of the guidance (ASU 2018–15): 2020 for public business entities, 2021 for all other entities.
- Capitalization requirements for CCA implementation costs aligned with ASC 350-40 internal-use software guidance.
- Capitalize implementation costs (coding, testing, etc.) and amortize over the term of hosting arrangement.

This new guidance provides balance sheet, income statement and cash-flow classification of the capitalized implementation costs and their related amortization expense. The guidance aimed to clarify the existing standard by addressing the accounting for implementation costs related to a service contract.

Utilities and Regulators asked themselves: What can be capitalized where CCAs are concerned? The guidance suggests that external direct costs of materials, third-party service fees to develop the software, the cost to obtain software from third parties, and programming and testing fees directly related to software product are all capitalizable.

Some financial regulations will allow Utilities to capitalize ongoing subscription fees if their Cloud CIS vendor contract includes an option to convert the software to an On-Premise solution. Most CIS software vendors have a very different payment model for SaaS versus On-Premise, so they may be reluctant to provide this assurance in their contract. It is worth investigating, however, if this financial regulation is applicable to the Utility.

In March 2020, the Canadian Electricity Association and the Canadian Gas Association commissioned KPMG to study regulatory capitalization of Cloud computing services by Canadian Utilities. The report is not focused on CIS specifically, but rather all Utility Cloud applications. The findings, however, can still be applied to this discussion.

The study assessed six rate-making approaches that have quite different impacts on the allocation of costs to consumers over time, on Utility funding requirements and on the profile of cost recovery⁶:

1. defer payments over remaining term;
2. defer payments over fixed term;
3. prepayment;
4. treat as a capital lease;
5. provide an earnings uplift; and
6. defer implementation costs.

6 KPMG, *Capitalizing the Cloud*, Final Report, April, 2020

CIS Cloud Implementation Considerations

For the longer term, Utilities may find that Cloud CIS implementations are quicker and less expensive because they are choosing to adopt best practices with fewer customizations. The Cloud solution is prebuilt and pretested, shortening the timeline.

If Utilities need to add customizations or make major changes to the preconfigured solution, development, configuration and testing cycles will increase. Therefore, *the most critical element for a Public Cloud CIS implementation is for Utilities to minimize customizations and adopt the best practices provided by the vendor.* Utilities may need to revise their business processes and existing workflows to align with the application.

Some Public Cloud solutions offer additional self-service tooling for testing and conversion, and these are features that the implementation team can take advantage of.

Another factor to consider is that an On-Premise deployment depends on the availability of the hardware for deploying environments. The lead time for hardware delivery is a project milestone. Under normal circumstances, this can take approximately three months and has the potential to increase the overall On-Premise delivery timeline versus a Cloud deployment. On-Premise deployments have the tendency to manage numerous environments for development and testing, which significantly complicates environment management and code deployment, and, therefore, may increase costs.

As mentioned previously, organizational change management is an important activity for every CIS implementation because of the impact on people and processes. Some Utilities are moving from a legacy system that they have been using for



20+ years. In these cases, user acceptance is critical for the success of the project.

For Cloud CIS implementations, the operational and IT organizations within the Utility need to prepare for additional changes. The organization needs to be prepared for regular patches and releases that impact its Cloud CIS. Utility procedures need to be in place to prepare for these releases, understand their potential business impacts, regression test the release to ensure the application still works as before, and communicate to and possibly train users for new release functionality.

CIS Cloud Decision Key Takeaways

- 1 Cloud solutions are prominent in the marketplace today.
- 2 CIS Public Cloud market is still in its infancy. However, Kaihen does expect there to be a significant increase of CIS Cloud implementations and upgrades over the next three to five years.
- 3 Kaihen recommends that Utilities begin by moving to established Cloud applications first to build their internal capabilities and gain experience with various Cloud technologies before assessing Cloud CIS solutions.
- 4 Cloud-based deployment requires a higher level of integration maturity.
- 5 A Utility should consider how a Cloud CIS aligns with its internal IT strategy and IT road map.
- 6 One of the most obvious advantages of a Cloud-based solution is disaster recovery.
- 7 Cloud-based solutions eliminate access to the database and source code and limit the customization to available channels that are not intrusive to the platform architecture.
- 8 Moving to a Public Cloud CIS will introduce ongoing operational and IT change as Cloud CIS vendors release patches and upgrades three to four times a year, keeping Utilities up to date with product fixes, enhancements and best practices.
- 9 Utilities will require retraining and retooling of IT staff if moving to the Cloud.
- 10 A common difference between Cloud and On-Premise costs is the mode in which the software is contracted with the vendor. In the Public Cloud model, software is purchased via an annual subscription, which typically include all costs related to the total solution.
- 11 The belief is that CIS Cloud implementations may become shorter and less complex than similar On-Premise CIS implementations. Although that has not yet materialized, it is expected, given what has been observed in Cloud ERP implementations so far.
- 12 The most critical element for a Public Cloud CIS implementation is for Utilities to minimize customizations and adopt the best practices provided by the vendor.
- 13 Kaihen suggests an intermediate stage if a Utility isn't "Cloud ready." Utilities should move from the legacy On-Premise CIS to a Private Cloud CIS first before deciding if a move to the Public Cloud is warranted.

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About Kaihen

Kaihen helps electric, gas and water utilities prepare for the kinds of fundamental business changes that improve operations and customer service.

Our name is a word meaning change, or innovation, or transformation. It embodies everything we do for our clients.

Our core competency is business readiness—ensuring that our clients’ people, processes and systems are well-prepared to adopt the change we help to implement. And we do so by managing projects, designing and improving business processes, training users, solution testing, and implementing powerful change management initiatives.

As a proudly Canadian consulting firm, our service offerings revolve around five key business functions of our clients’ businesses: Customer Operations, Smart Metering, Outage Management, Utility Data & Analytics, and Asset & Work Management.

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