

Health & Human Services Information Technology Systems & Solutions

System Type and Acquisition Selection Template Tool

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System Type and Acquisition Selection Template Tool

Introduction

Organizations looking to refresh their IT systems to garner more efficiency and cost effectiveness face many daunting and complex decisions. The purpose of this tool is to provide a broad and simplified overview of important considerations which will have sweeping impacts on the types of systems which are best suited for an organization and the acquisition process to obtain them.

Using this tool

A collection of key terms are presented as a preface to this tool to help establish a base line vocabulary. Please review it before going further into the tool or use it as a reference source should you find a topic confusing. While reading through flowcharts, any element which is outlined in yellow indicates that it hyperlinks to another chart. If you follow a hyperlink and wish to return to the previously viewed slide then right click and choose 'Last Viewed'

References

This tool assumes a basic working knowledge of the mentioned topics. However if more information is required or desired please see the below references for further reading.

For more information on the acquisition process please refer to the *FNS Handbook 901 - Advanced Planning Document (APD) Handbook* – Chapter 6.

Key Terms

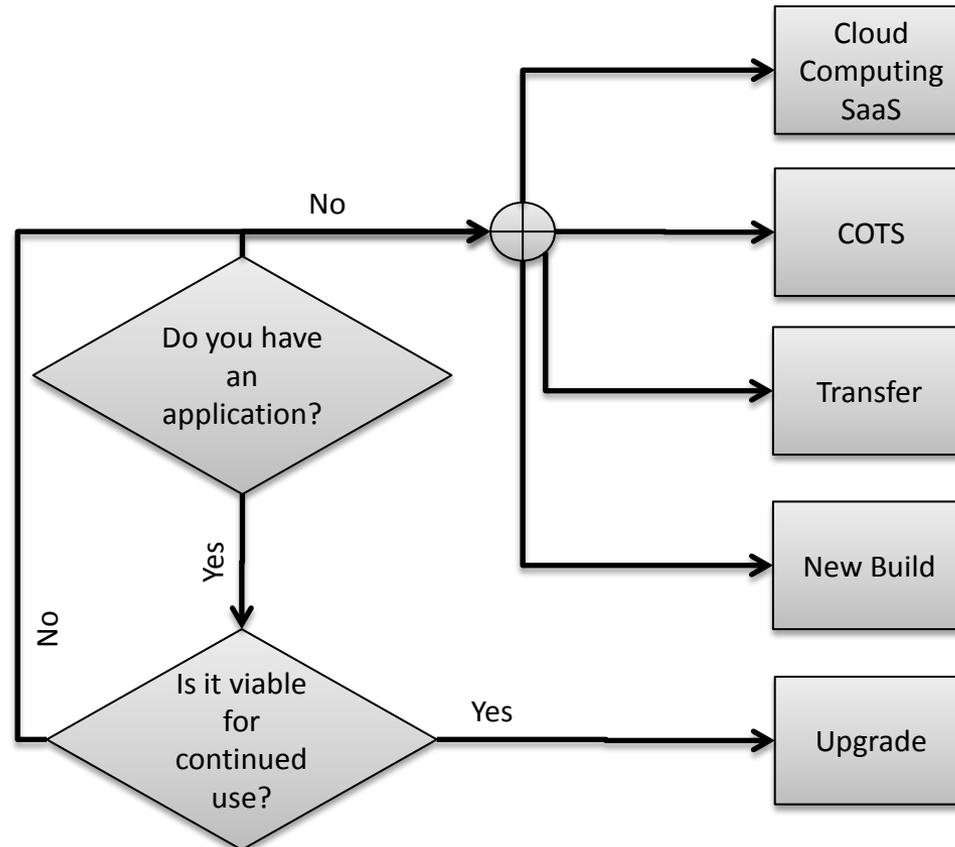
<u>Term</u>	<u>Abbreviation</u>	<u>Definition</u>
Enterprise Architecture	EA	Enterprise architecture is being used in this connotation to refer to the base network, servers, and clients internal to an organization. They are generally based on service oriented architecture (SOA) design principles and provide the base upon which systems run. For instance an acquired COTS-based or traditional transfer system would be placed on top of an agency's enterprise architecture. Throughout this document EA may be used to refer to a internally hosted system or solution and may or may not include COTS-based components.
Commercial-off-the-Shelf	COTS	<p>In general, COTS products are characterized by the following:</p> <ul style="list-style-type: none"> • IT solutions, systems, and/or software supplied from the private sector; offered and sold competitively in substantial quantities in the commercial marketplace; and prepared with the sole or chief emphasis on salability, profit, or success to yield or make a profit. • Comprised of a broad spectrum of functionality to meet requirements for a domain (e.g., financial management, case management, benefits and compensation management). • Is configured, rather than constructed from scratch, in order to implement a particular function or business solution. • Does not require customization through reprogramming to satisfy a particular functional capability; configuring software properties and options does not constitute programming. • <i>Is not synonymous with proprietary software.</i> • <i>Not all COTS is proprietary and not all proprietary software is COTS.</i>
Traditional Transfer	Transfer	This refers to an instance where an agency owns a system or application which is currently capable of being copied and distributed to another agency. Through out this document the term transfer will be used to indicate a solution which has been deemed to be stable and capable which is own by an agency who has consented to its the duplication and distribution.
System upgrade	Upgrade	This is used to refer to instances where an agency already owns a system or application and it is capable of being modified.
Cloud computing		Generally speaking, cloud computing is a broad term used to describe the delivery of computing needs and data storage capacity to a heterogeneous community of end-users, primarily delivered through networked systems. Cloud computing uses a collection of services, applications, information, and infrastructure comprised of pools of computing, network, information, and storage resources. These components can be rapidly orchestrated, provisioned, implemented and decommissioned, and scaled up or down. Cloud computing provides for an on-demand, utility-like model of allocation and consumption.

Key Terms continued

<u>Term</u>	<u>Abbreviation</u>	<u>Definition</u>
Public Cloud		The cloud infrastructure is provisioned for open use by the <u>general public</u> . It may be owned, managed, and operated by a business, academic, or government organization , or some combination of them. It exists on the premises of the cloud provider.
Private Cloud		The cloud infrastructure is provisioned for exclusive use by a single organization comprising multiple consumers (e.g., business units). It may be owned, managed, and operated by the organization, a third party, or some combination of them, and it may exist on or off premises.
Community Cloud		The cloud infrastructure is provisioned for exclusive use by a specific community of consumers from organizations that have shared concerns (e.g., mission, security requirements, policy, and compliance considerations). It may be owned, managed, and operated by one or more of the organizations in the community, a third party, or some combination of them, and it may exist on or off premises.
Hybrid Cloud		The cloud infrastructure is a composition of two or more distinct cloud infrastructures (private, community, or public) that remain unique entities, but are bound together by standardized or proprietary technology that enables data and application portability (e.g., cloud bursting for load balancing between clouds).
Software-as-a-Service	SaaS	The capability provided to the consumer is to use the provider’s applications running on a cloud infrastructure. The applications are accessible from various client devices through either a thin client interface, such as a web browser (e.g., web-based email), or a program interface. The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, storage, or even individual application capabilities, with the possible exception of limited user-specific application configuration settings. A prime example of a SaaS would be Microsoft Online Services and Google products such as Gmail and Google Docs.
Platform-as-a-Service	PaaS	The capability provided to the consumer is to deploy onto the cloud infrastructure consumer-created or acquired applications created using programming languages, libraries, services, and tools supported by the provider. The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, or storage, but has control over the deployed applications and possibly configuration settings for the application-hosting environment. A prime example of a PaaS would be a web hosting company such as Amazon or Go Daddy.
Infrastructure-as-a-Service	IaaS	The capability provided to the consumer is to provision processing, storage, networks, and other fundamental computing resources where the consumer is able to deploy and run arbitrary software, which can include operating systems and applications. The consumer does not manage or control the underlying cloud infrastructure but has control over operating systems, storage, and deployed applications; and possibly limited control of select networking components (e.g., host firewalls). A data center such as a state IT shop is a prime example of an IaaS.

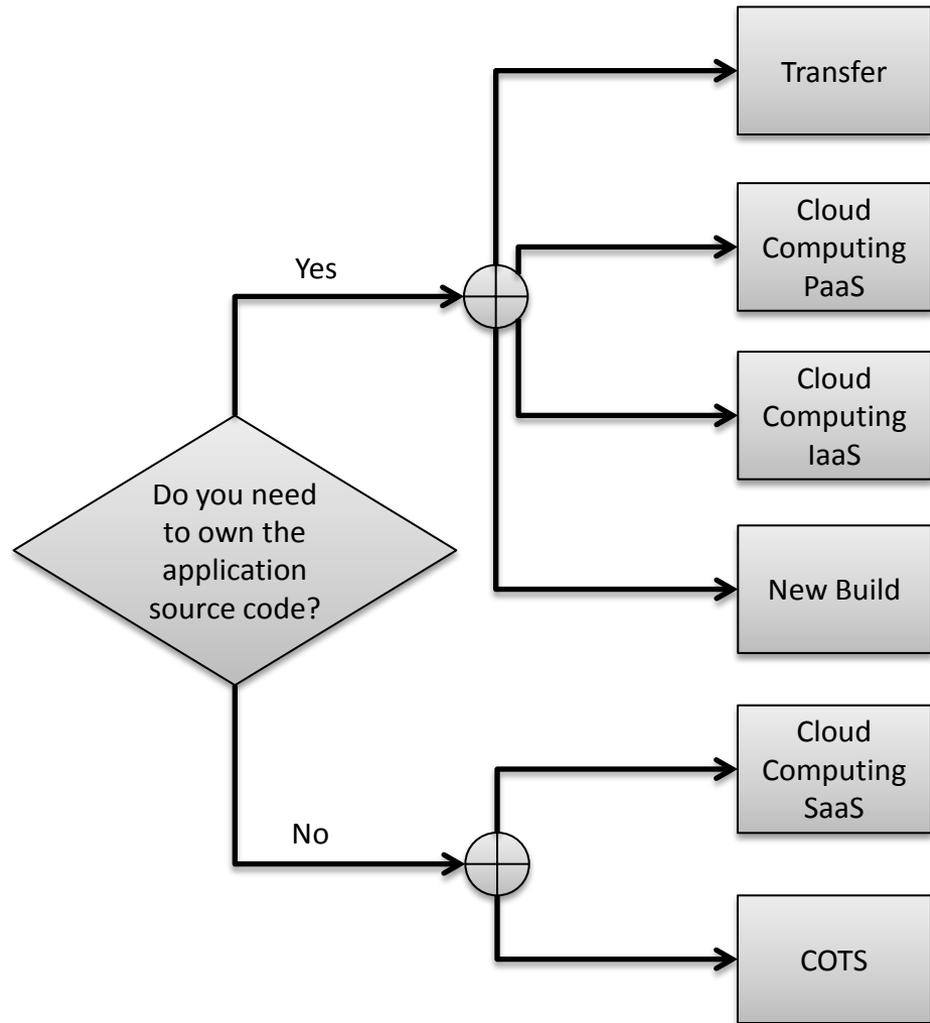
System type selection

The first basic step in refreshing an IT system is to take stock of what you have currently. You need to determine if there is an application already in place and if you own it. If you have nothing in place and are doing a clean acquisition, then this phase is very straight forward. If, however, you already have a system in place it becomes more complicated. The current system needs to be evaluated to determine if it is a viable option to keep in place. You must consider if it can either have its life extended either through upgrades or if it needs to be supplemented with additional applications or systems. Should the current system be deemed too deprecated to keep in service, then you can move forward as if it's a completely new acquisition, but data migration from the old system to the new one becomes a major concern.



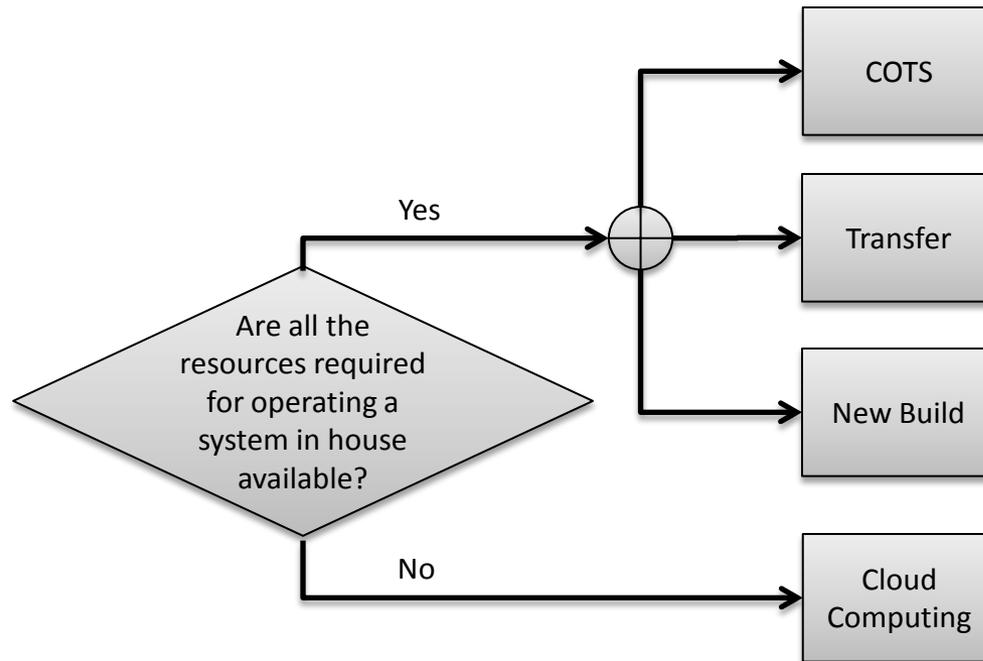
System type selection

Many government agencies have concerns over which aspects of a system they own when they make a purchase. Some organizations feel that actually owning their systems, or at least parts of their system, is very important to meeting security demands and their financial obligations to show a return on investment. For these organizations, it's important to see a tangible good for their money or to insure full control over certain aspects of operations. There is a big distinction, however, between owning an application in its entirety and simply owning the right to use it. Your agency's stance on this will determine how limited or open your solution selection is. In all cases the data associated with a system is owned by the organization.



System type selection

Another major consideration is how much and what kinds of resources are available during all phases of the process. All systems will require major resources during the acquisition, deployment, implementation, and migration stages. Depending on what system type is selected, you may also have to add development on top of that. Once a system is in place, however, the day to day operational consumption of resources becomes a major consideration. Depending on the system type selected, these operation costs may be burdensome or insignificant when compared to the initial costs. In most all cases, externally hosted solutions have a far lower resource cost associated with them than internally hosted systems.



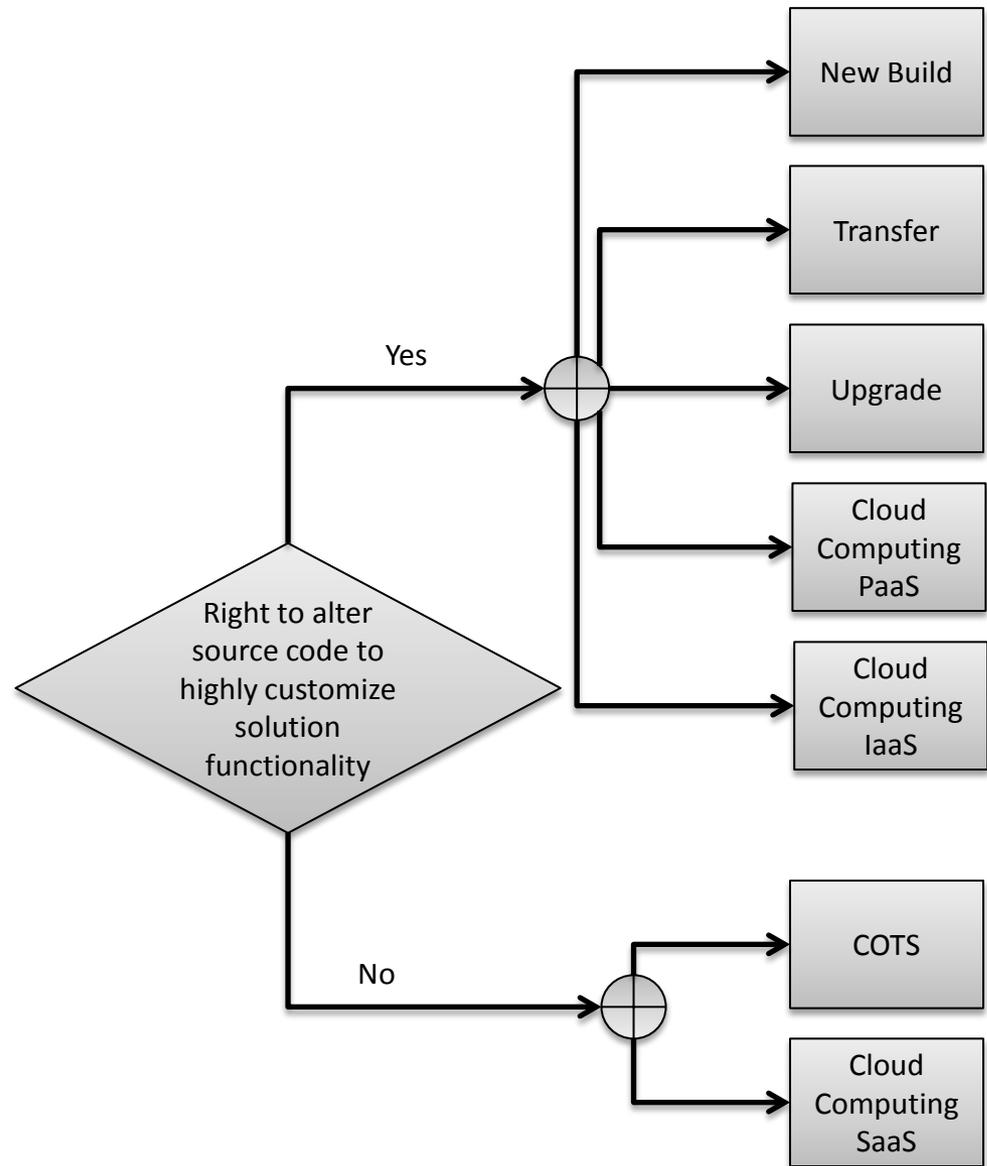
System type selection

Customization is also a big consideration. To some organizations the rights to some aspects of a system is very important:

- the right to alter the source code;
- the ability to make customizations to the functionality of applications; or
- the rights to manage other low level technical components.

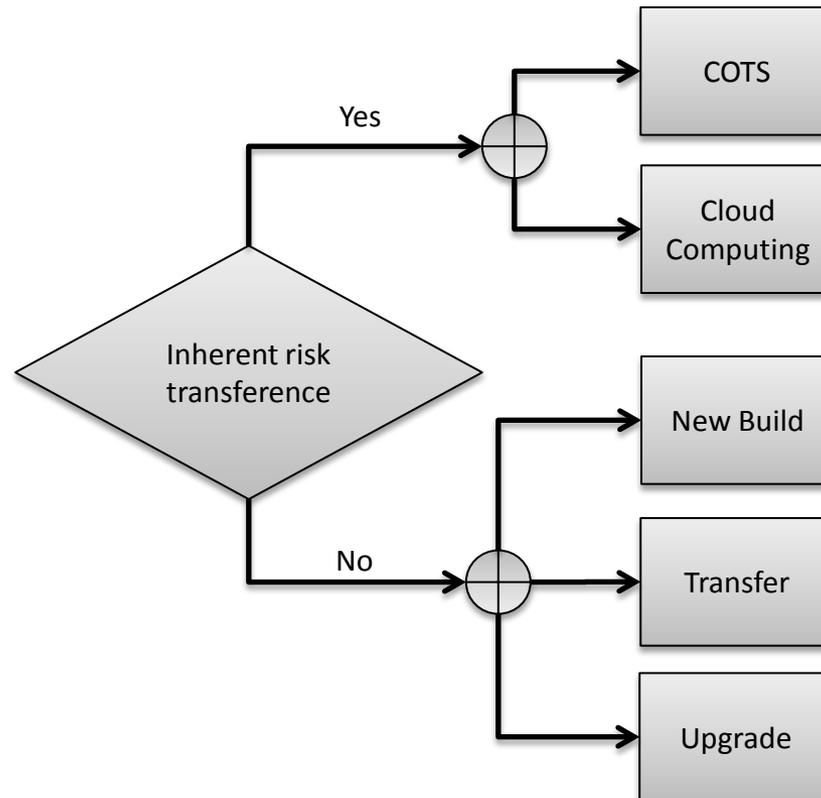
This ensures that the organization has the ability to add functionality as necessary and extend the life of a system. These types of operations require more resources.

Organizations must find the proper balance which suits their circumstances.



System type selection

It is well known that risk can never be eliminated, only mitigated or transferred. Managing risk to mitigate its effect takes a lot of resources, which makes transferring the risk to others very appealing. There are countless ways to implement various forms of risk transference and mitigation, but some system types naturally transfer some risk without the need for additional services or considerations. If reducing the resources consumed by risk management is a goal, then picking the system type with the appropriate degree of inherent risk transference will be important.



System type selection

One of the most valuable assets and largest potential liabilities any organization holds is data. Data is instrumental to the functioning of any organization. Incidents which affect the consistency and availability of data could cripple organizational operations. Organizations have legal obligations and standards that they must meet and comply with to insure that their data is appropriately protected. Failing to do so opens the organization to litigation from clients and possible sanctions from the government. This makes picking a system that has an appropriate security structure in place paramount. Different system types allow for different degrees of granular security control as well as shifting different responsibilities to different parties. Organizations need to assess if they have the proper in-house staff to meet their security responsibilities, or if there is an external trustworthy entity to whom it could be outsourced and then pick an appropriate system accordingly.

Organizations must understand how much control they must maintain internally and how much may be outsourced before determining the best system type.

System Type Selection Based on Security to Responsibility		
<u>Level of Security Control</u>	<u>Responsible Party</u>	
	In-House	Out sourced
Application Security	PaaS, IaaS, Enterprise Architecture	SaaS
Platform Security	IaaS, Enterprise Architecture	SaaS, PaaS
Hardware Security	Enterprise Architecture	SaaS, PaaS, IaaS
Data Security	Enterprise Architecture, SaaS, PaaS, IaaS (Private and hybrid cloud deployment)	SaaS, PaaS, IaaS (Public, Community, and hybrid cloud deployment)

System type selection

It's also very important to be aware of the standards a system is based upon, especially if it involves cloud-based elements. There are standards for every functional level and component of a system. There are standards from the high-level overall architecture of the system down to the way data itself is handled and stored, and every level of interface and manipulation in between. Each segment of the system should be investigated to see what kind of standard it is associated with. There are two basic types of standards.

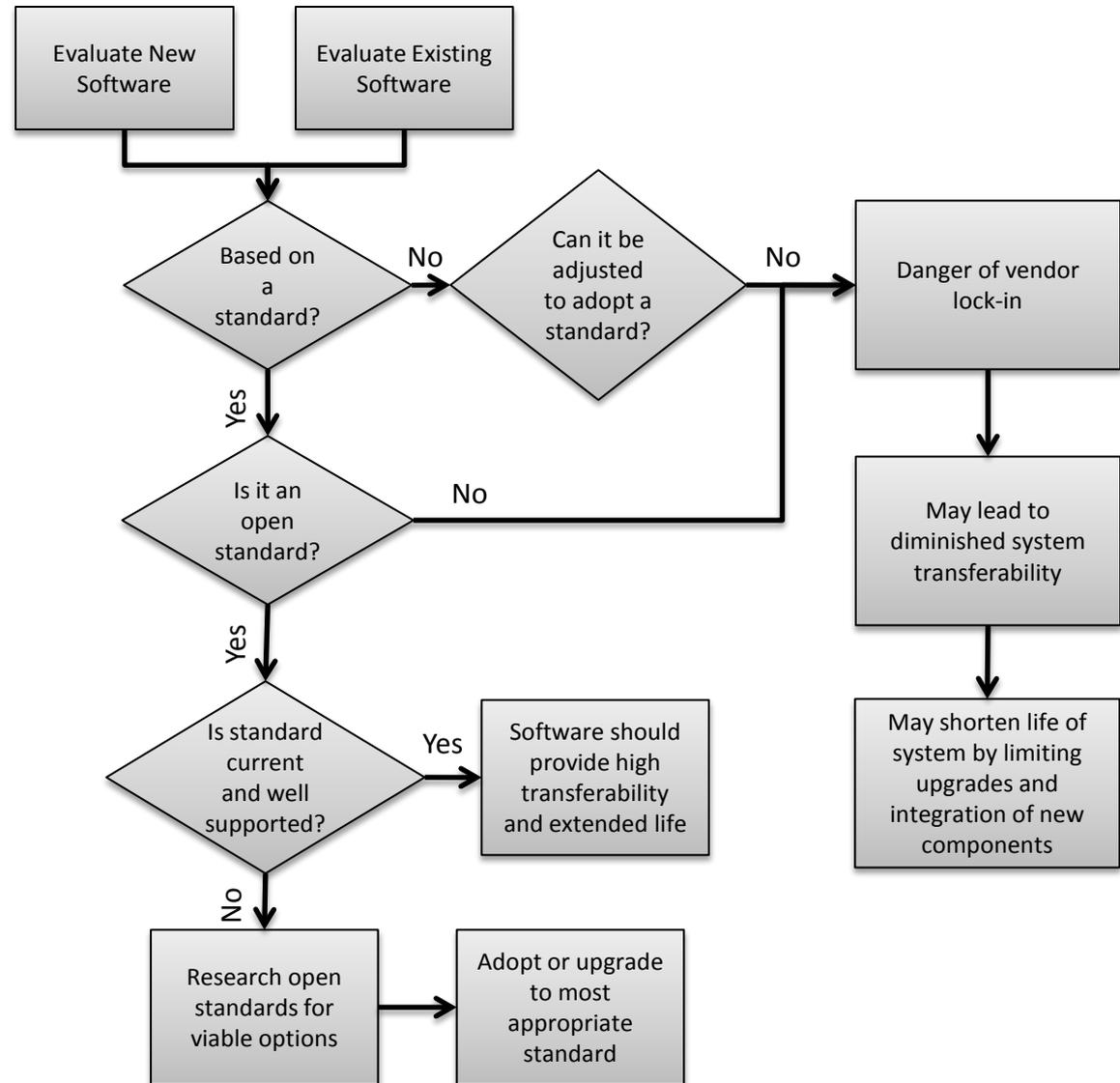
- 1) An open standard which is developed by many people from many organizations working in combination to produce a standard that is freely available and transparent.
- 2) A proprietary standard is the other form which is generally developed by a single organization who obfuscates the details of the standard in such a way to make it only useable by the developing organization.

Failure to understand the standards being accepted when acquiring a system could lead to vendor lock-in.

System type selection

When investigating a standard, make sure to research how the standard was developed, how well it's used in the industry, and what the future plans for the standard are. Highly utilized proprietary standards may be an indication of best practices. In rare circumstances, proprietary standards have been converted into open standards.

A standard with very little to no future development plans could either indicate a mature stable standard or could be a warning sign of impending obsolescence. The world of standards is usually very much in flux and must be considered on a case-by-case basis which can lead to some difficulty. It is, however, still a very important consideration which could have long lasting impacts on the operation and life expectancy of a system.



System type selection

The topics mentioned here are very broad with many important details. All of which will need to be considered in tandem and addressed fully and appropriately before a system type can be selected. The decision matrix on the next slide is a combination of the previously mentioned factors combined to easily compare the different system types and the implications they have on the broad topics discussed. A system type's handling of a topic, as related in this matrix (and in this document as a whole), is not prescriptive. Any combination of additional services and/or contract negotiations can come into play to dramatically alter the outcomes.

Decision Matrix	New Build	Upgrade	Transfer	COTS	Cloud Computing	Cloud Computing (SaaS)	Cloud Computing (PaaS)	Cloud Computing (IaaS)
Application Ownership	Yes	Yes	Yes	No	Yes/No	No	Yes	Yes
Supplement Existing System	No	Yes	No	Yes	Yes	Yes	Yes	Yes
Limited in-house resource usage during implementation	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Limited in-house resource usage during operation	No	No	No	Yes	Yes	Yes	Yes	Yes
Risk transference by default	No	No	No	Yes	Yes	Yes	Yes	Yes
Add custom functionality	Yes	Yes	Yes	No	Yes/No	No	Yes	Yes
Application Security (Default In-house responsibility)	Yes	Yes	Yes	No	Yes/No	No	Yes	Yes
Application Security (Default outsourced responsibility)	No	No	No	Yes	Yes/No	Yes	No	No
Platform Security (Default In-house responsibility)	Yes	Yes	Yes	Yes	Yes/No	No	No	Yes
Platform Security (Default outsourced responsibility)	No	No	No	No	Yes/No	Yes	Yes	No
Hardware Security (Default In-house responsibility)	Yes	Yes	Yes	Yes	Yes/No	No	No	No
Hardware Security (Default outsourced responsibility)	No	No	No	No	Yes/No	Yes	Yes	Yes
Data Security (Default In-house responsibility)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Data Security (Default outsourced responsibility)	No	No	No	No	Yes	Yes	Yes	Yes

System type selection

Custom Built System

A custom built system is the most expensive way to obtain a system; however, it allows for the highest degree of business process to technology matching while also providing all features and functionality demanded from the system.

Traditional Transfer

A transfer system is a good choice if another agency already has a system in-place that matches your requirements. Cost savings can be realized by not having to reinvent the system making migration, customization, and infrastructure the major concerns.

Upgrade Existing System

If you already have a functional system in place, perhaps the most cost effective option would be simply to maintain the current system. Utilizing internal resources or hiring third-party contractors to write updates and upgrades may be a much more viable option than acquiring a new system.

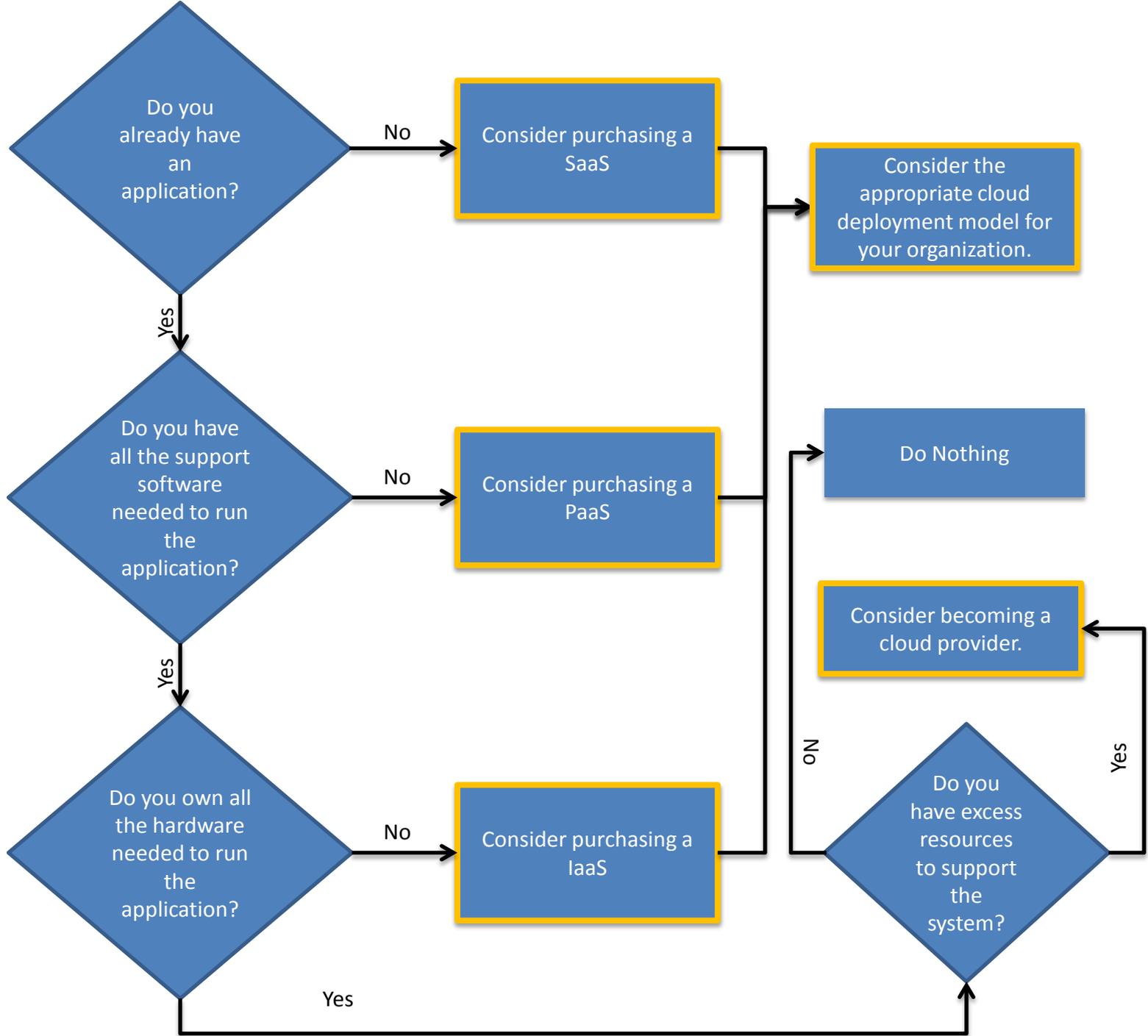
Purchase COTS

If you need an entirely internally supported system (an enterprise architecture) but can't deal with the overhead generated by system development, maintenance, and upgrades, COTS may be the best for you. COTS solutions transfer the life cycle management for software to the vendor, but at the cost of ownership and control of functional enhancement or changes.

Cloud Computing

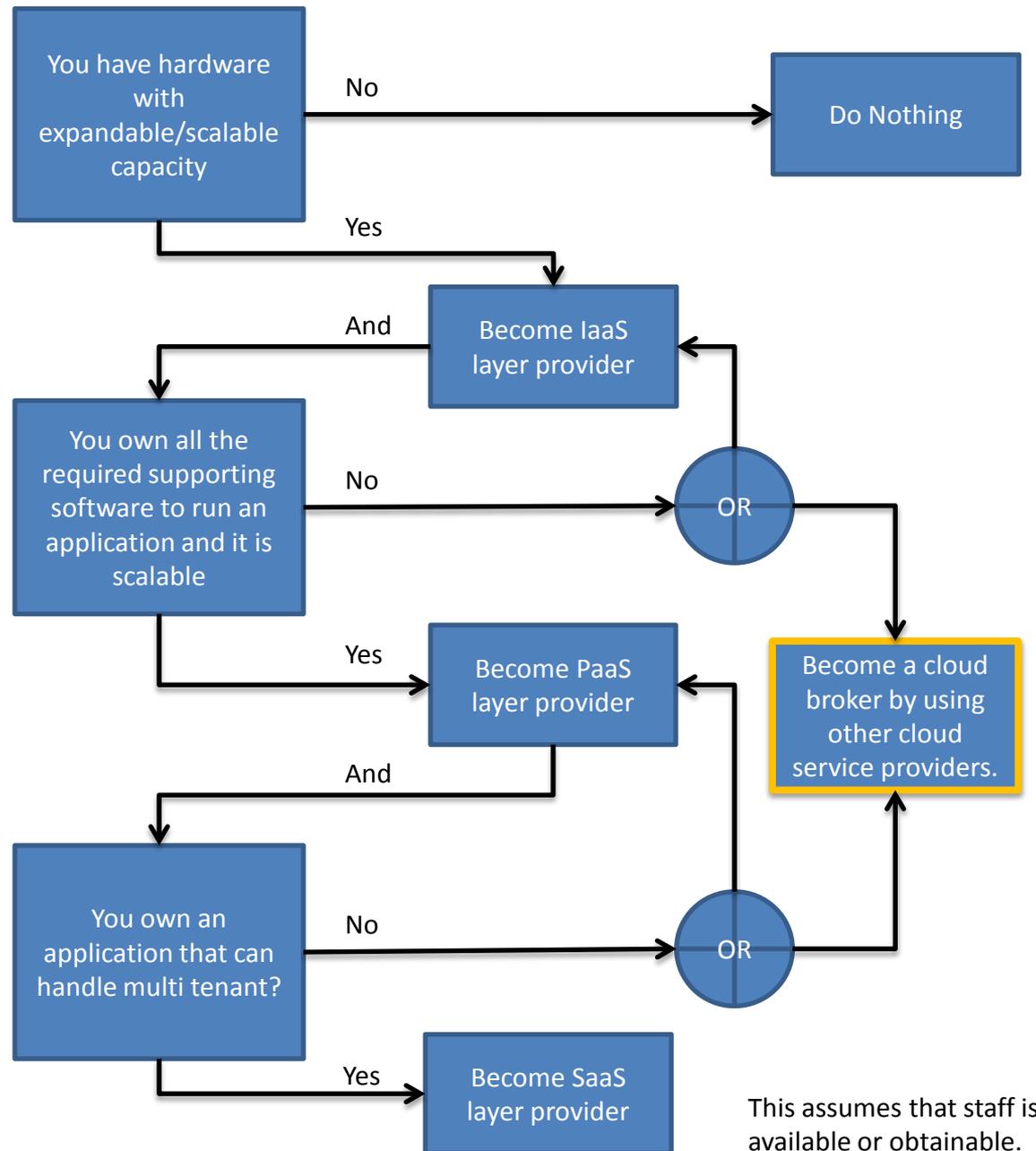
Cloud computing is a scalable solution which can provide a complete system from hardware to application or just portions of a solution. This flexibility may provide tight control of resources and costs without sacrificing operations. At the very least, cloud computing can provide stability to costs and other resource utilization.

Cloud Service Selection



Becoming a cloud provider

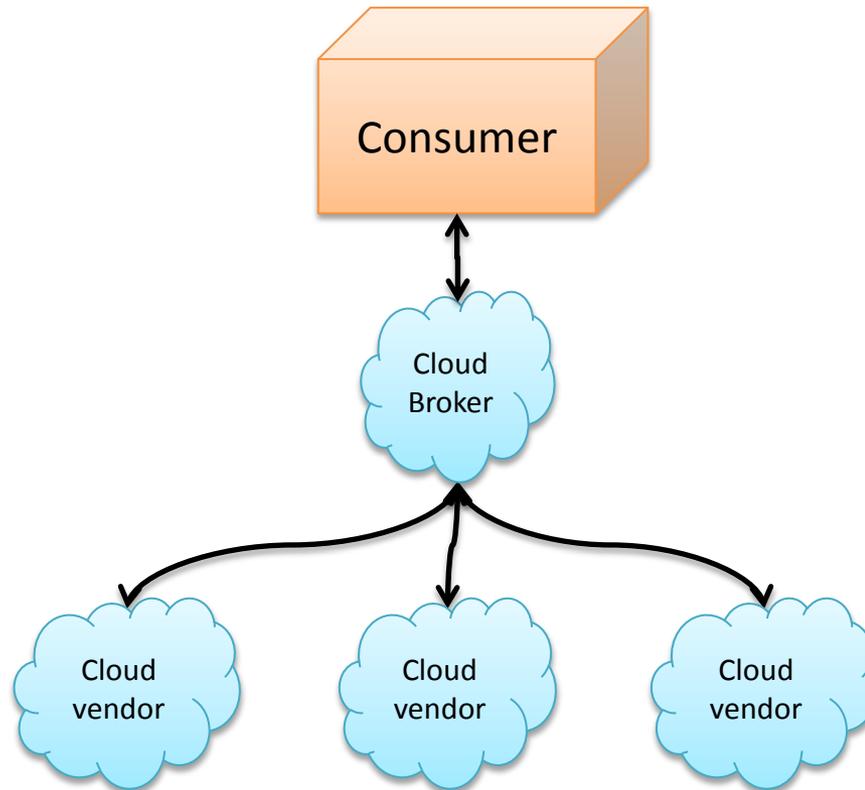
If an organization has a highly mature and stable IT solution in place which is based on an EA with ample resources, then it may be possible for the organization to reconfigure those assets in such a way that the organization may become a cloud provider itself. Becoming a cloud provider would allow the organization to spread the costs of its infrastructure in the same way that commercial vendors do, giving them a source of revenue to dramatically lower overhead expenses.



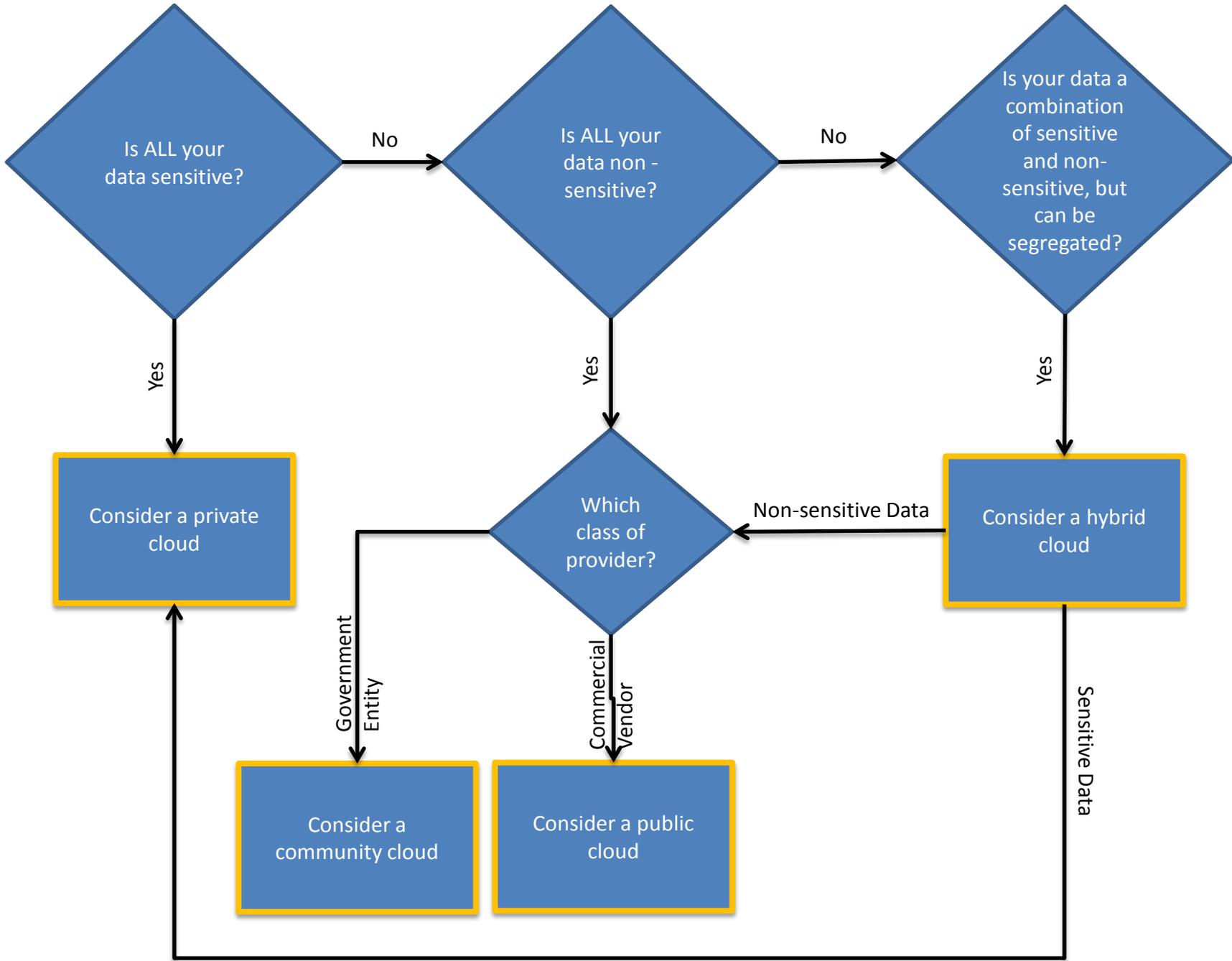
This assumes that staff is available or obtainable.

Becoming a cloud provider

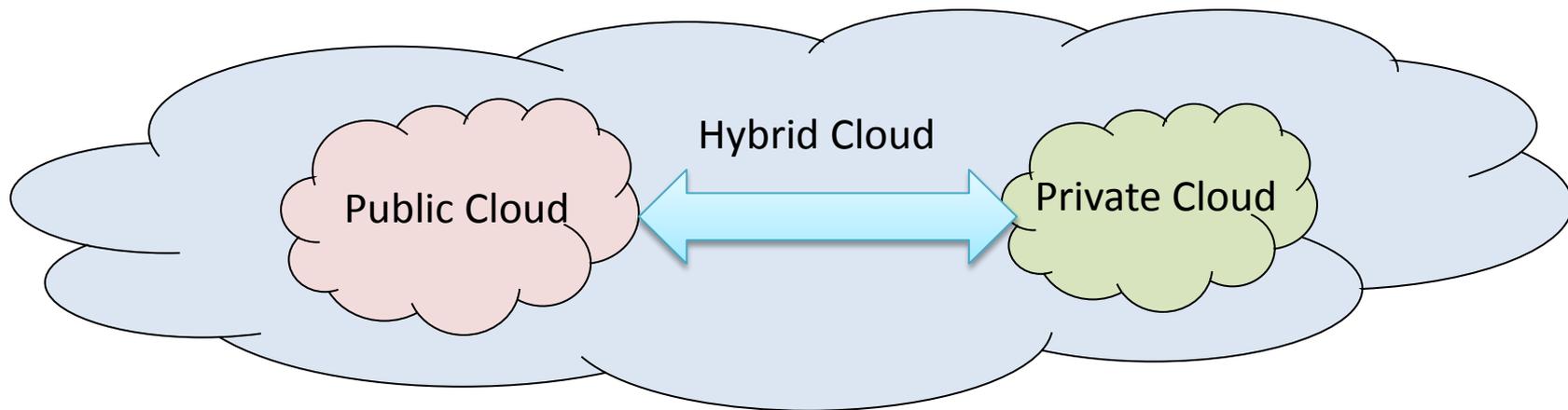
Cloud Broker. An entity that manages the use, performance, and delivery of cloud services, and negotiates relationships between Cloud Providers and Cloud Consumers. The integration of cloud services can be too complex for cloud consumers to manage. A cloud consumer may request cloud services from a cloud broker, instead of contacting a cloud provider directly. A cloud broker is an entity that manages the use, performance and delivery of cloud services and negotiates relationships between cloud providers and cloud consumers. Cloud brokers typically do not own the assets or services they are providing.



Cloud Deployment Selection

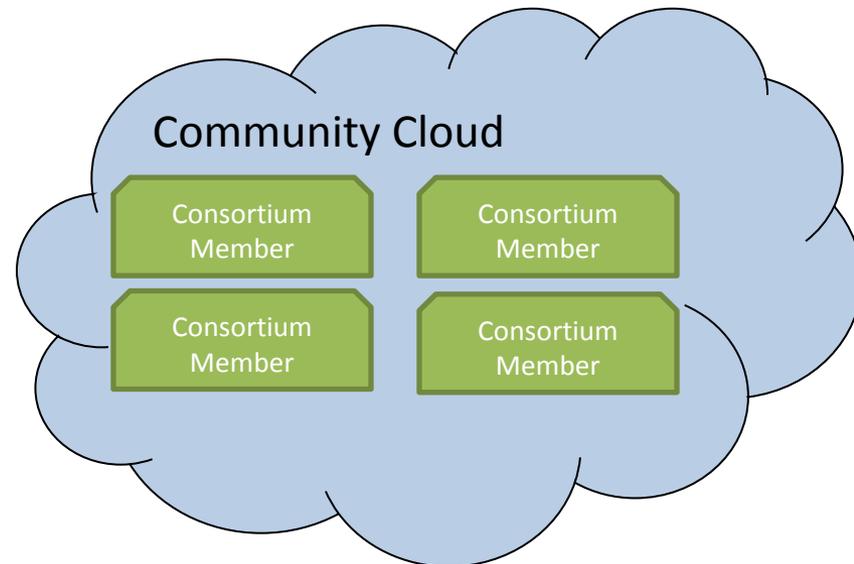
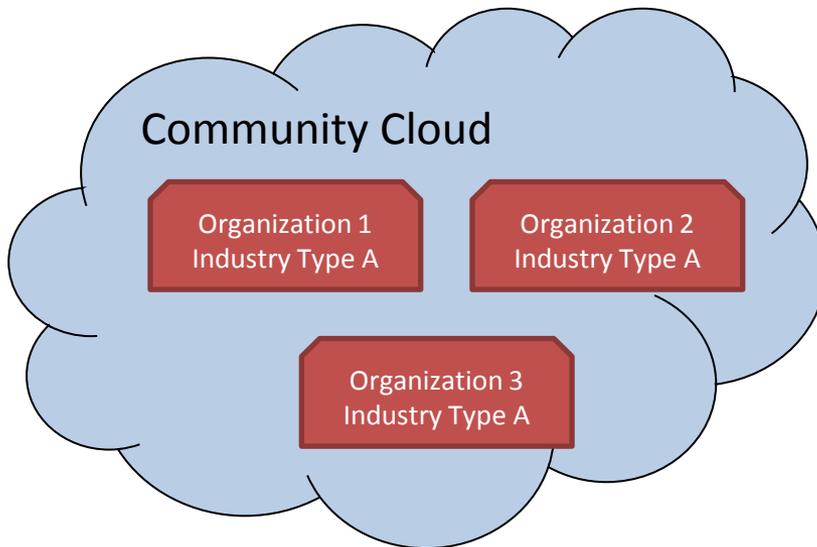


A hybrid cloud is a combination of the two other types of cloud. Hybrid clouds can be used in a multitude of ways. For instance, a hybrid cloud could be used to segregate data based on sensitivity. In such a case, non-sensitive data could be placed in public clouds to realize costs savings while sensitive data is placed in private clouds for security purposes. A hybrid cloud may also be utilized to overcome bandwidth issues. In cases where large amounts of data are being transferred or queried back and forth from the organization's facility to the cloud providers' location, limitations on internet connections between the two locations may cause performance to degrade. Appliances may be placed in the consumer's location creating a kind of mini-private cloud which performs caching and batch processing functions to the external cloud in order to keep performance within acceptable levels. Hybrid clouds may also be used for redundancy purposes. For example, an organization may make use of a local/onsite private cloud in conjunction with a public or community cloud to ensure continuity of operations during an internet outage which disables communications to the public/community cloud.

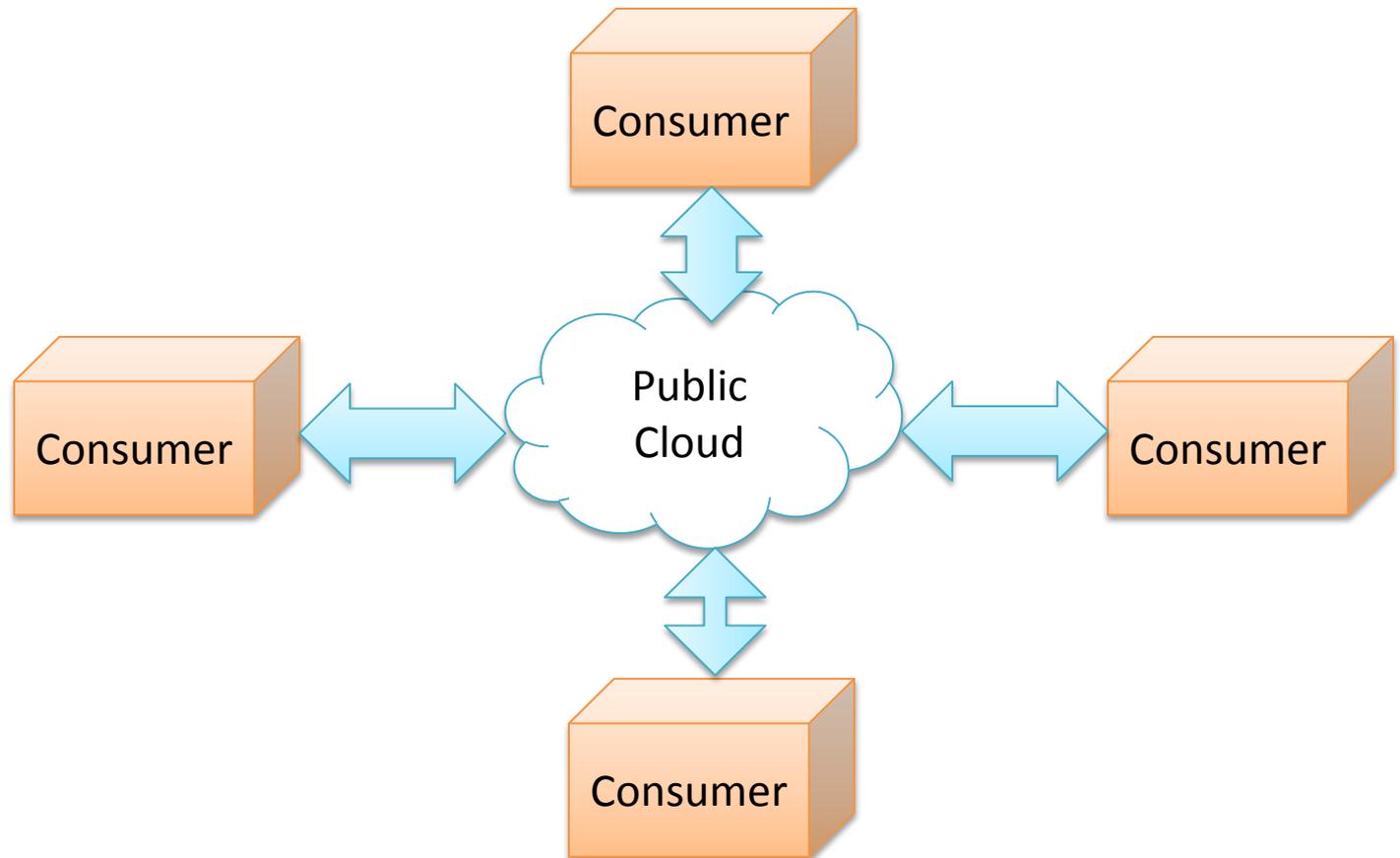


A community cloud is a middle ground between a public cloud and a private cloud. In a community cloud, the cloud provider has configured its assets in such a way as to cater to a more select niche of consumers who have the same operational needs and/or requirements. In some instances, vendors create a specialized cloud which is targeted at a specific industry, such as the medical or legal industry, by insuring that the security features and performance metrics are in-line with the industry norms.

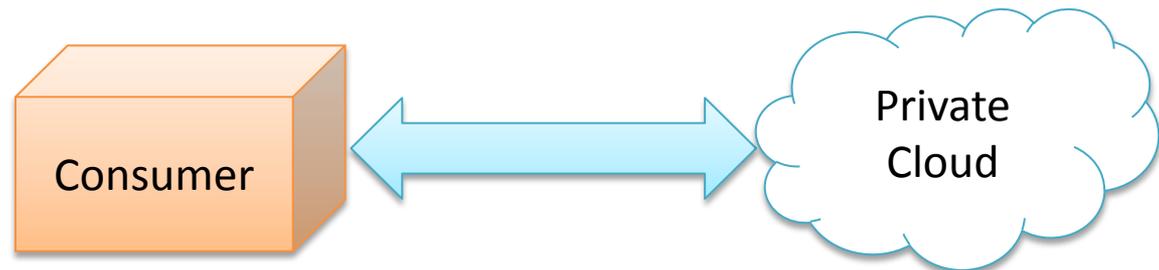
A community cloud may also be a consortium of consumers who have teamed together for the sole purpose of cost sharing to reduce the overhead associated with clouds. In these ways, the community cloud offers increased security by limiting the user base to something much smaller than a public cloud and yet increased cost efficiency by spreading costs over a larger user base than a private cloud.



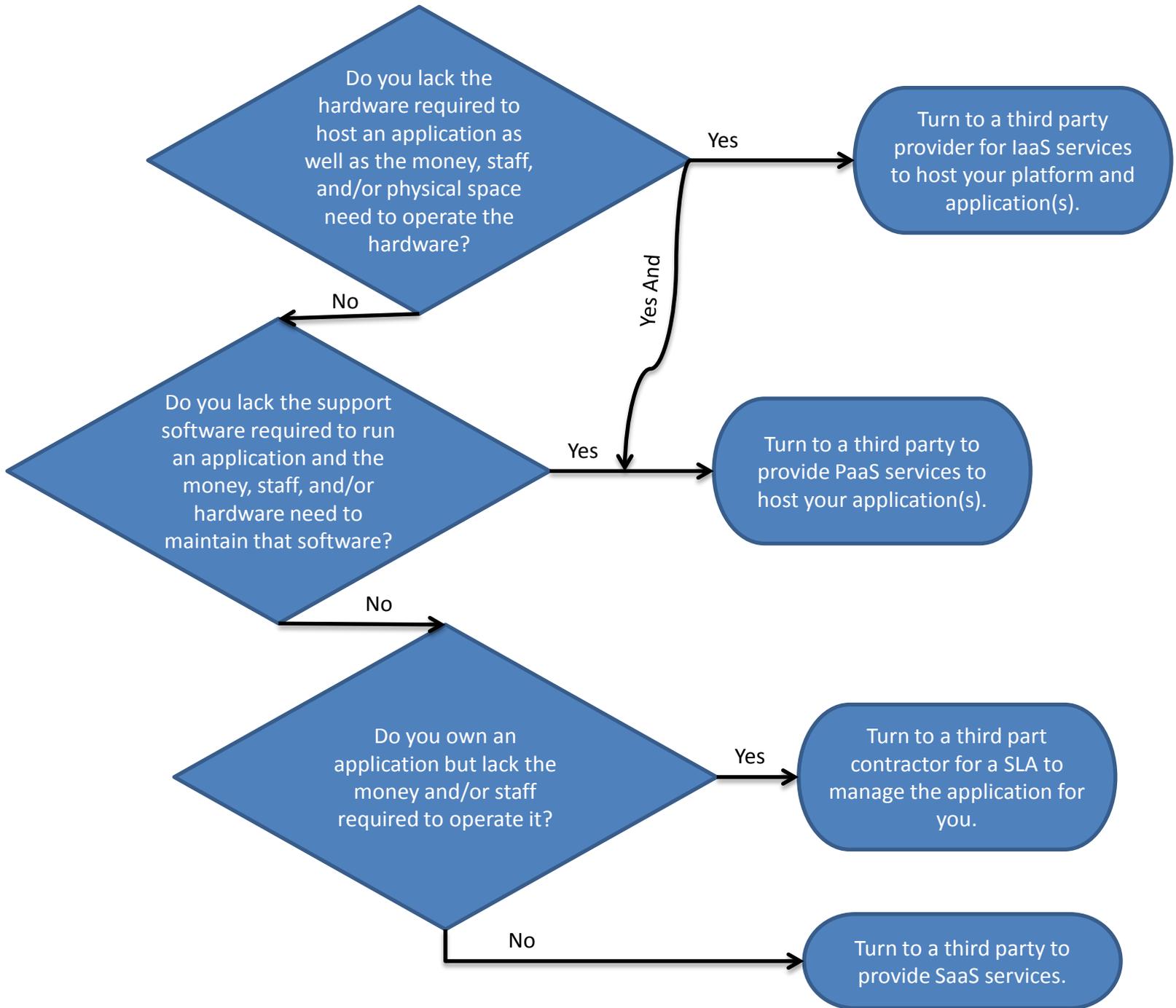
In a public cloud, the cloud provider's assets are readily consumable by any organization or individual. A public cloud has the largest potential set of users and thus can achieve the highest degree of cost savings. This larger user-base, however, also translates into a higher security threat. This is because public clouds are designed so that many organizations and/or large groups of individual users make use of the same application and/or set of hardware at the same time. This is known as a multi-tenant instance.



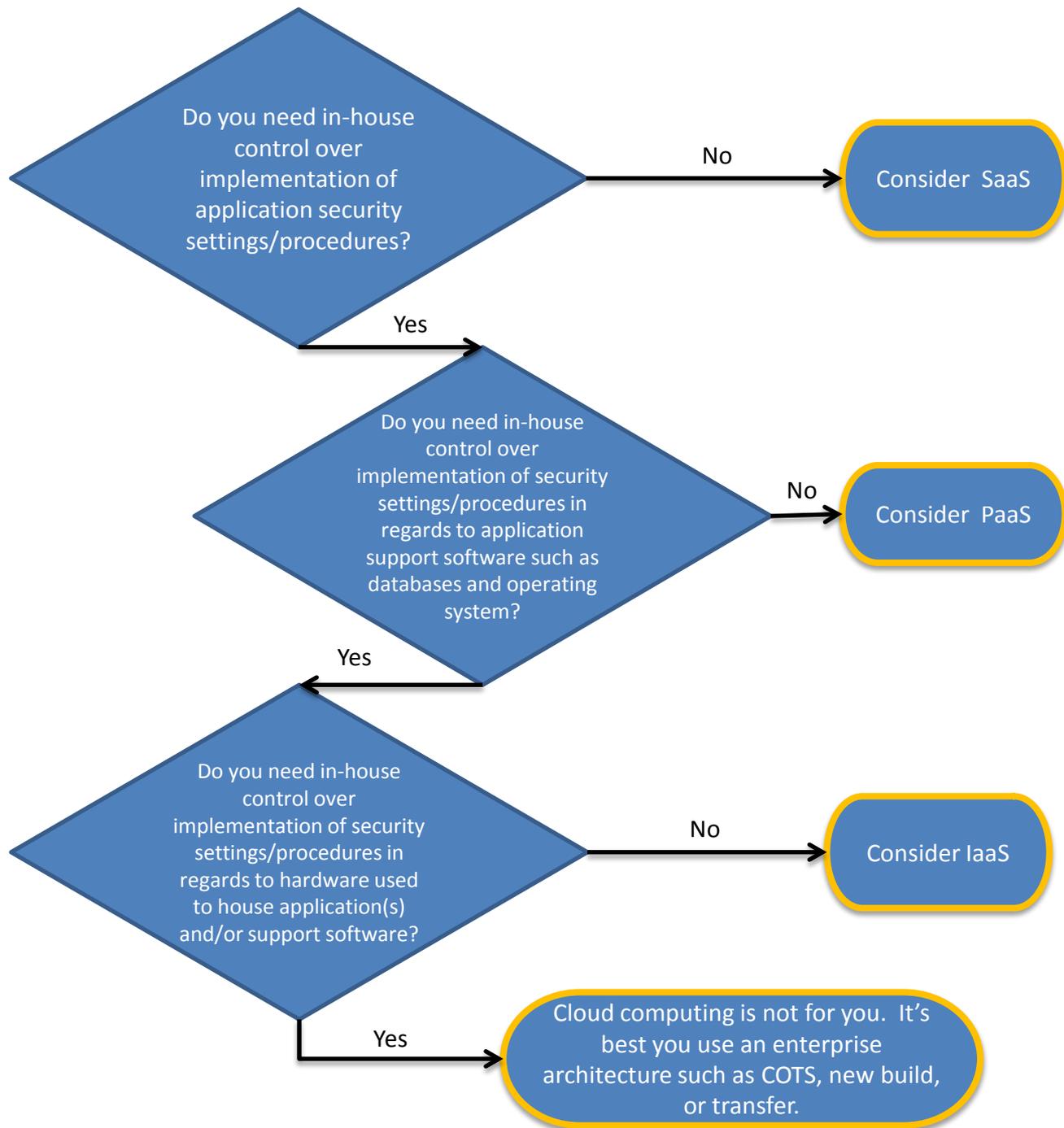
A private cloud is designed to support only one consumer or limited user community, which lowers the cost saving strategy of cloud computing of cost distribution when compared to a public cloud. A private cloud can be internal or external to an organization. In an internal private cloud, the organization provides all the hardware and software itself which it houses in a facility controlled entirely by the organization. This gives the organization greater control over the security of the system. Even though the system is housed inside the organization, third party contractors and vendors may be hired to help manage the system. In an external private cloud, an organization enters into a contract with a third party contractor to build a cloud from scratch, hardware to software, which is housed in the contractor's facility, but can only be used by the soliciting organization. While this is more costly for contractors to construct, they are willing to engage in these arrangements because it ensures long term management contracts from the organization to maintain the systems. Private clouds can be the most costly form of cloud deployment, but also the most secure.



Bridging resource gaps with cloud

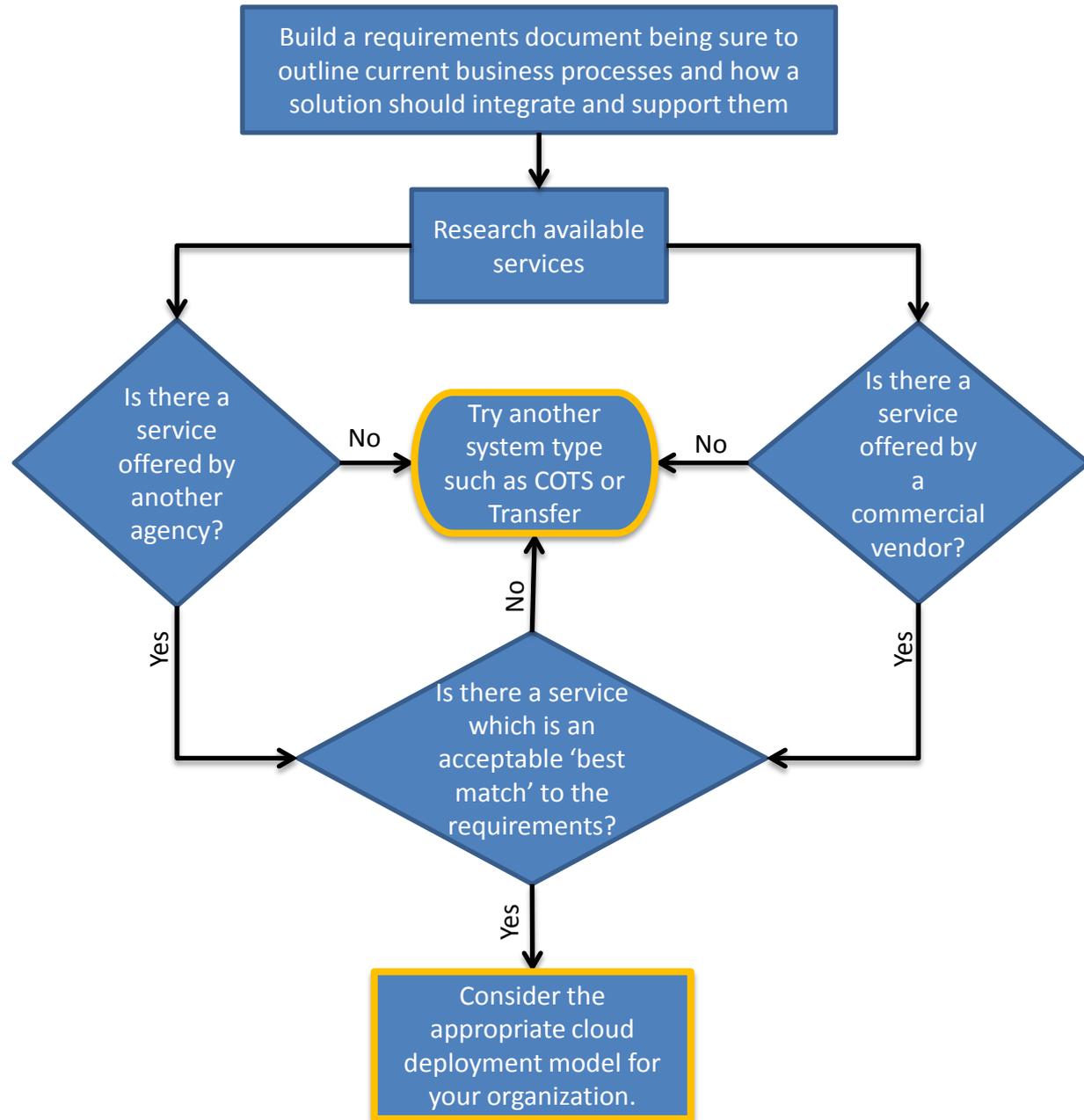


Cloud Security Control Level

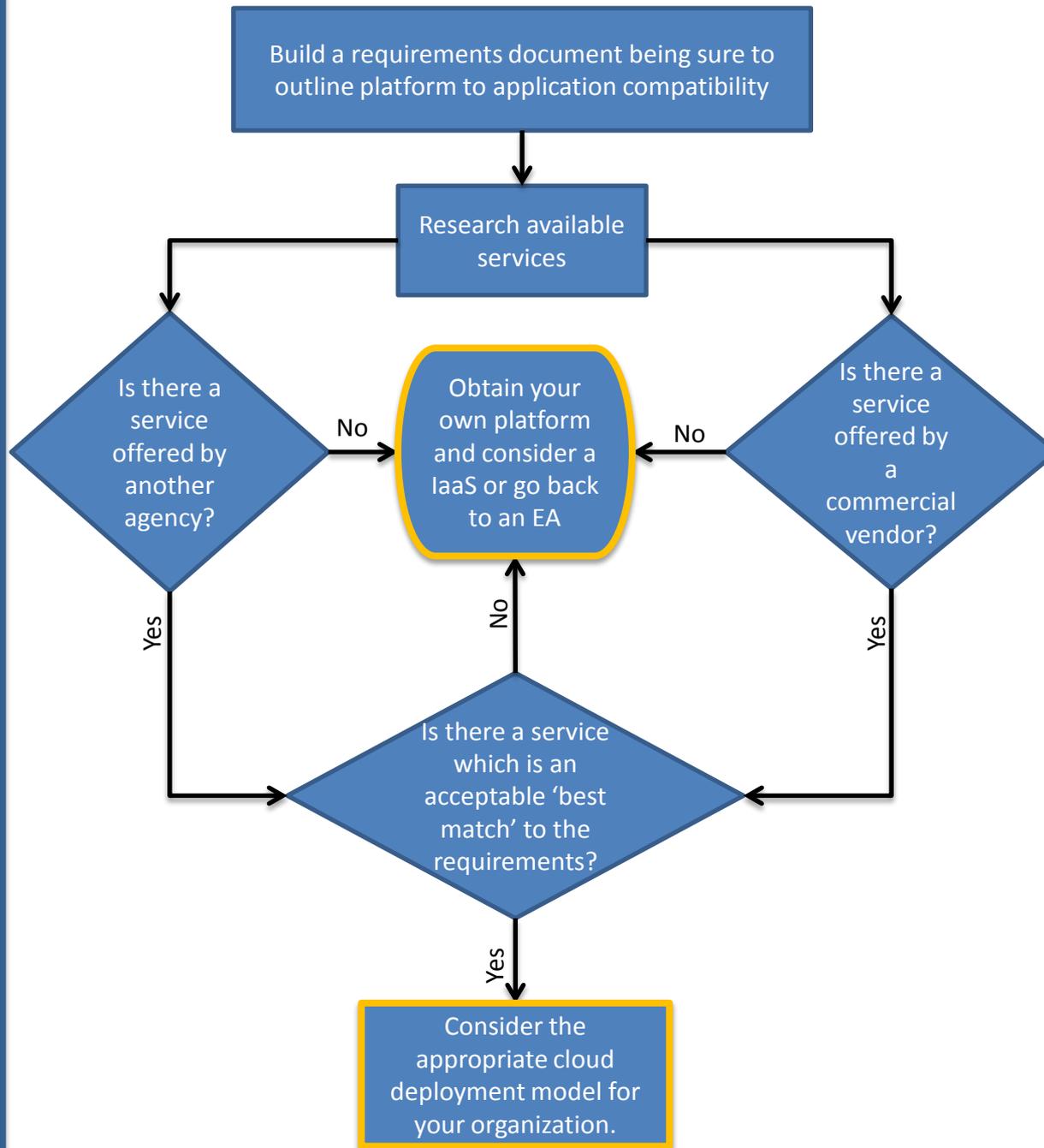


Purchasing a SaaS

SaaS, sometimes referred to as “on-demand software,” is a software delivery model where a business application is hosted. The consumer provides and owns only the data. SaaS products are meant to support multiple tenants (consumers) with a single instance of an application.



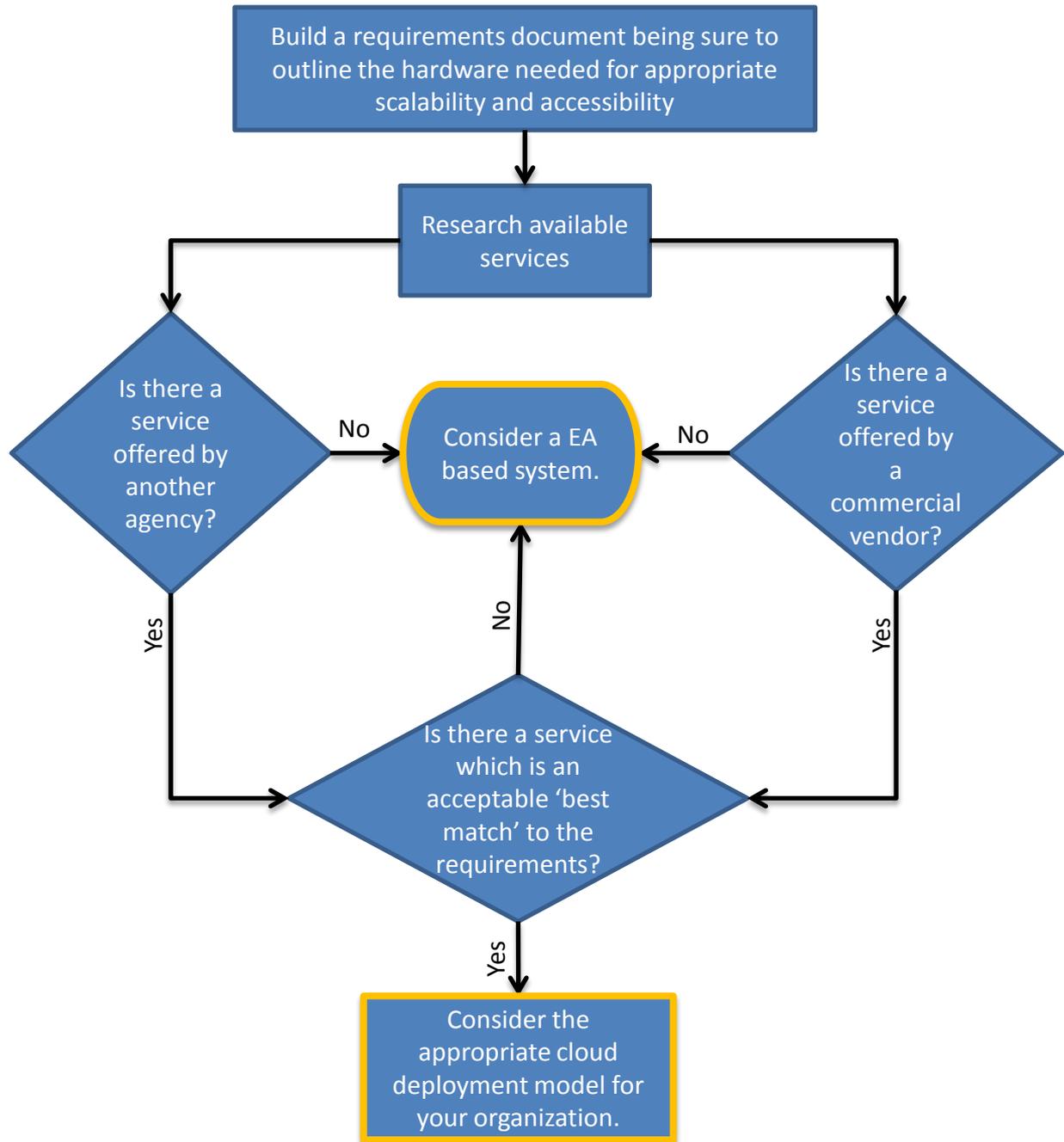
Purchasing a PaaS



In Platform as a Service (PaaS) the cloud provider supplies the hardware as well as the basic software, such as the operating system and other basic libraries needed to host and execute applications. The PaaS model allows the burden of providing and managing basic IT overhead to be carried by the cloud provider while still giving the consumer the flexibility to design, build, and deploy their own applications. PaaS services are ideal for organizations which have an application they have purchased or had custom developed, but do not have the resources to purchase or maintain the hardware and base software needed to host the application.

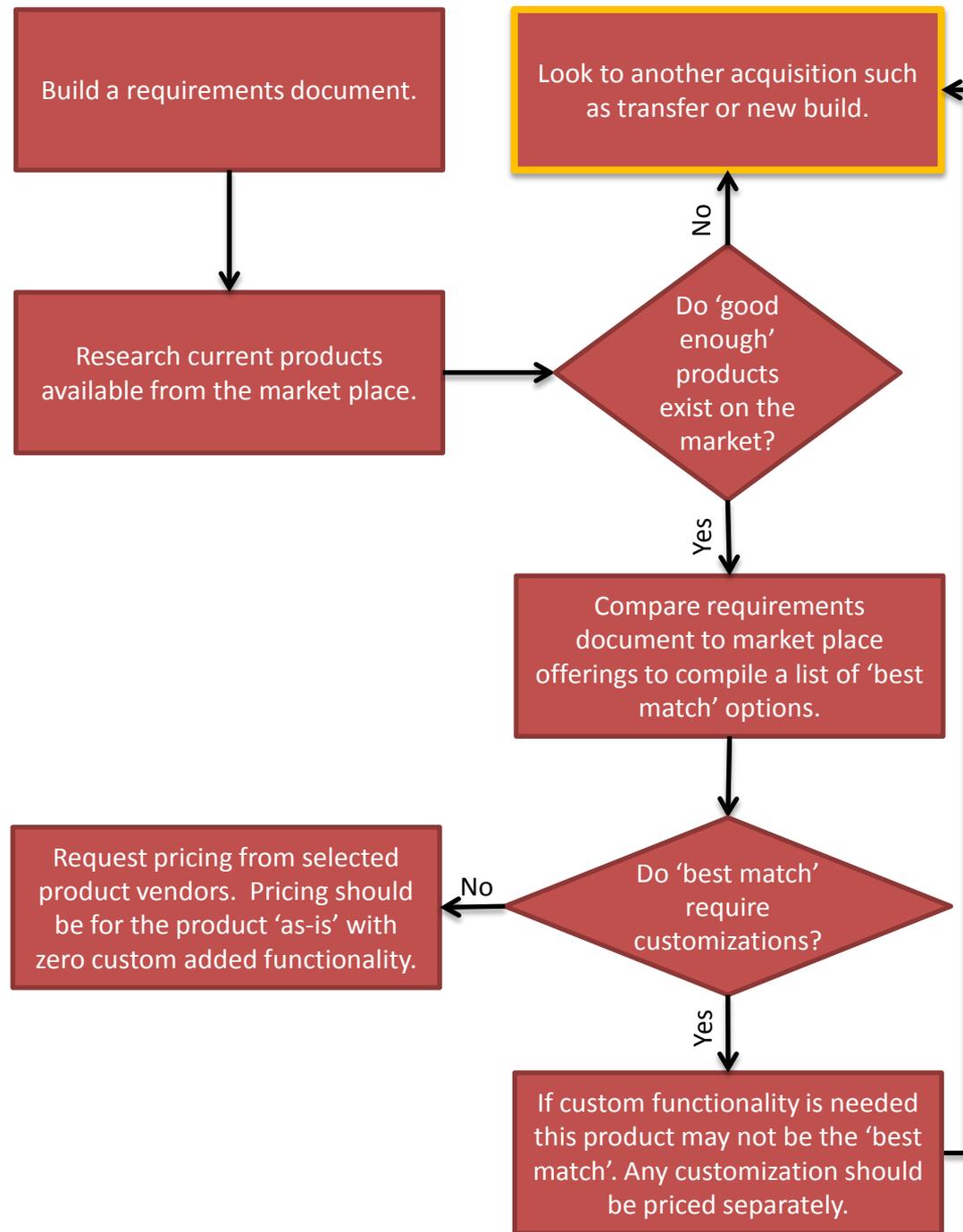
Purchasing a IaaS

In IaaS, a cloud provider primarily supplies the use of hardware with no software. It is up to the consumer to acquire, install, and maintain any software to run on the hardware. IaaS services are great for organizations that want to maintain full control over all software aspects of their system but do not have the resources to meet the electrical, physical storage space, internet connection, and/or other requirements or perhaps cannot afford to purchase and maintain such systems.



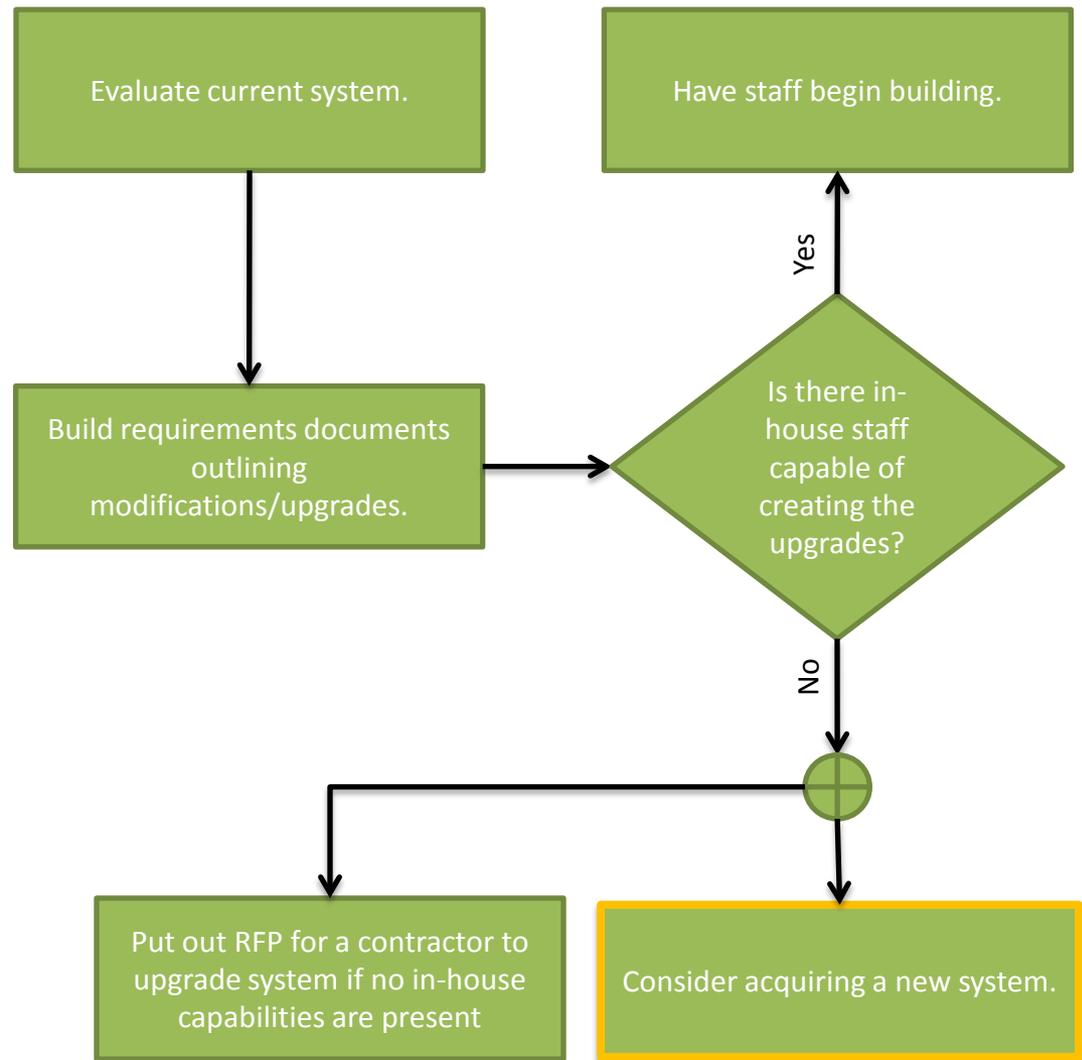
Purchasing COTS

If you need an internally supported system (such as an Enterprise Architecture) but can't deal with the overhead generated by system development, maintenance, and upgrades then COTS may be best for you. COTS solutions transfer the life cycle management for software to the vendor but at the cost of ownership and control.



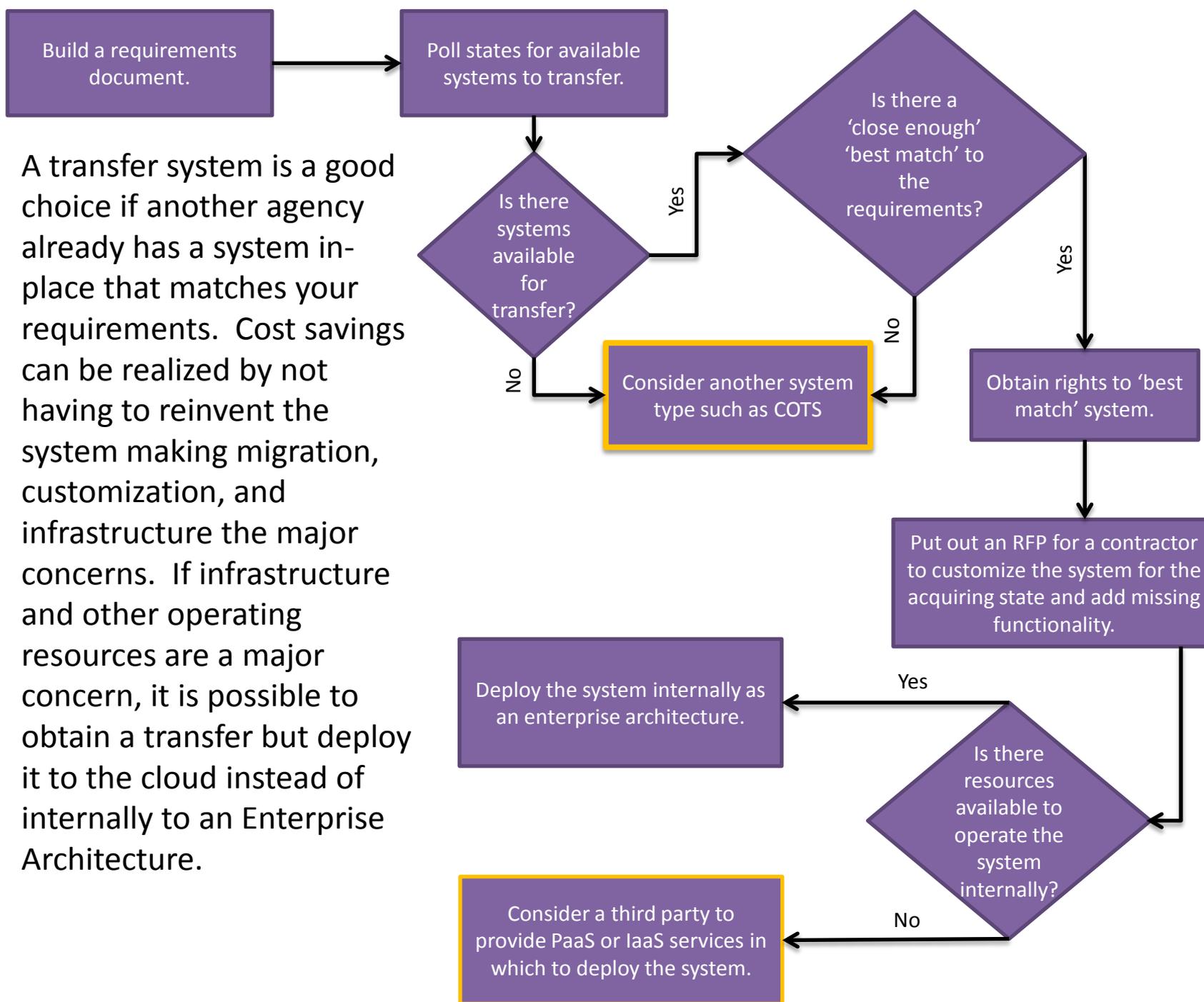
Upgrade Current System

If you already have a functional system in place, perhaps the most cost effective option would be to simply maintain the current system. Utilizing internal resources or hiring third-party contractors to write updates and upgrades may be a much more viable option than acquiring a new system.



Transfer an existing system

A transfer system is a good choice if another agency already has a system in-place that matches your requirements. Cost savings can be realized by not having to reinvent the system making migration, customization, and infrastructure the major concerns. If infrastructure and other operating resources are a major concern, it is possible to obtain a transfer but deploy it to the cloud instead of internally to an Enterprise Architecture.



Custom Built System

A custom built system is the most expensive way to obtain a system, however it allows for the highest degree of business process to technology matching while also providing all features and functionality demanded from the system.

