



Report

School of Computing

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## **Glossary**

**CLOUD APP-** A software application that is not installed on a local computer/desktop. It is only accessible via the Internet.

**CLOUD CLIENT-** A device used for cloud operation. Also known as a thin client.

**CLOUD PROVIDER-** A provider that makes storage, software, or an operating system available to others over a private or public network.

**CLOUD SERVICE ARCHITECTURE-** (CSA) a system of requisites in which applications and application components act as services on the Internet.

**PUBLIC CLOUD-** Cloud computing environments that are open for use to the entire public.

**UTILITY COMPUTING-** A measured service in which computing or storage is provided on a needed basis, much like the way public utilities (water, gas, and so on) are provided to homes and paid for on a similar basis. Utility customers pay for the service they use, rather than specific equipment.

**ICT-** Information and communication technology.

**IT-** Information Technology

**SLA-** Service Level Agreement

# **1 Introduction**

## **1.1 Background and context**

Rothchild incorporated has experienced downturns in recent years due to economic instability in several markets. The company specialises in financial services across all continents. Rothchild incorporated has twenty operating companies in ten countries with ten thousand employees, which is all affected by downturns in the market. In order to prevent financial losses, the company has to come up with solutions to stabilise the financial health of the entire company.

The companies IT functionality requires reassessment due to poor stability of current infrastructure. Also the company is experiencing problems with system functionalities which is affecting staff performance. Cost of maintainability of system is increasing due to high number of calls from staff in relations to technical problems. The company has no efficiency in IT functionality and requires solutions, in which value can be added for IT departments and reduce cost of services. In order to seek efficiency and compromises in technical solutions for IT functions, you would need to have a closer look at the structure of IT department. It is essential to solve problems resulting from structural inefficiencies of IT department. The actual condition of data centres and servers is that they have been reached a maximum capability and not able to deliver or react to changes, mainly because of hardware limitation nature. Where it is possible to follow the best practices to determine job conflicts and describe roles per title and function per role.

## 2 Rothchild IT Structure

### 2.1 IT Structure Model

Consider a multi-national company with decentralized IT systems in hundreds of locations. The structure is expensive and doesn't provide efficient functionality, it has highly customized legacy applications possibly running on different platforms for customer management, collections, pricing and distribution.

“Turning to innovative technology to fulfil a strategic mandate to cost effectively improve its services, the company invested in a solution that includes a CRM application, a centralized data repository, fleet routing, mobility and a customized demand-forecasting application” (Kearney, 2005).

The options between centralised or decentralised there is no correct or incorrect model. Most large businesses necessarily involve a degree of decentralisation when it starts to operate from several locations or it incorporates new business units and markets. On Figure 1 IT department of decentralised structure.

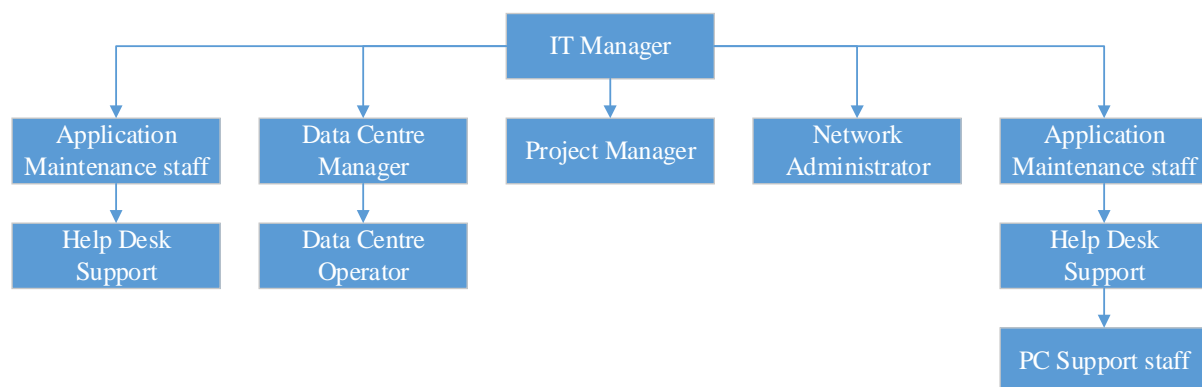


Figure 1 Organisational chart

## 2.2 Definition of Cloud Computing

“Cloud computing is model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction” (National Information Technology Laboratory, 2016).

## 2.3 Characteristics of Cloud Computing

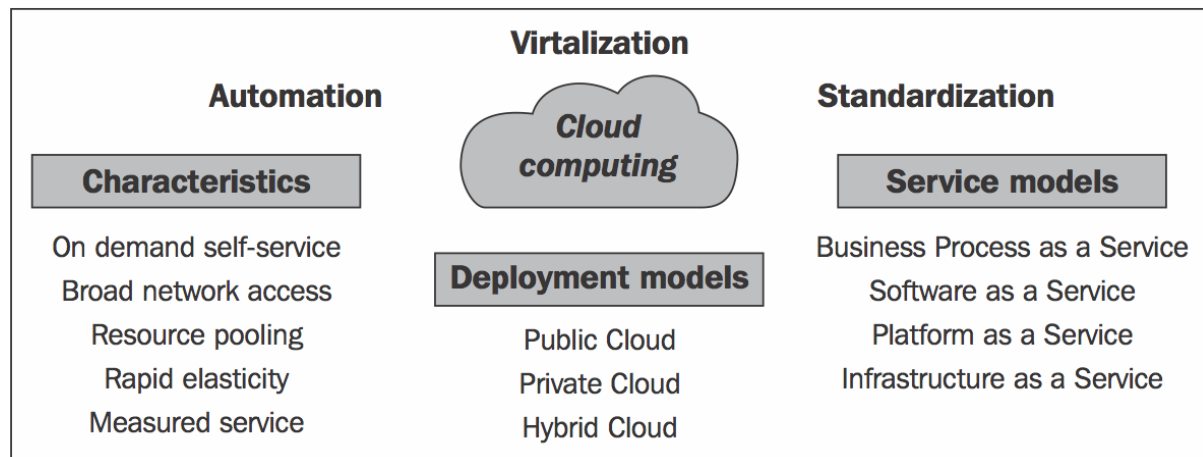


Figure 2 Cloud characteristics

According to IBM (Schouten, 2014) there are five essential characteristics which can be elaborated as follows:

1. **On-demand self-service:** Users are able to provide cloud computing resources without requiring human interaction, mostly done through a web-based self-service portal (management console).
2. **Broad network access:** Cloud computing resources are accessible over the network, supporting heterogeneous client platforms such as mobile devices and workstations.
3. **Resource pooling:** Service multiple customers from the same physical resources, by securely separating the resources on a logical level.
4. **Rapid elasticity:** Resources are provisioned and released on-demand and/or automated based on triggers or parameters. This will make sure your application will have exactly the capacity it needs at any point of time.
5. **Measured service:** Resource usage is monitored, measured, and reported (billed) transparently based on utilization. In short, pay for use.



## 2.4 Cloud Computing Benefits

The company would be needed to arrange their applications, so as to adopt the architecture models that Cloud Computing suggested. Benefits of Cloud Computing are listed below:

### *1. Reduced Cost*

There are a number of reasons to attribute Cloud technology with lower costs. The billing model is pay as per usage; the infrastructure is not purchased thus lowering maintenance. Initial expense and recurring expenses are much lower than traditional computing.

### *2. Increased Storage*

With the massive Infrastructure that is offered by Cloud providers today, storage & maintenance of large volumes of data is a reality. Sudden workload spikes are also managed effectively & efficiently, since the cloud can scale dynamically.

### *3. Flexibility*

This is an extremely important characteristic. With enterprises having to adapt, even more rapidly, to changing business conditions, speed to deliver is critical. Cloud computing stresses on getting applications to market very quickly, by using the most appropriate building blocks necessary for deployment.

What that means for Rothchind Incorporated, is that this organization will be able save money by using cloud computing. The company will be able to reduce the cost of operations and the IT budget. The difference is that this could be used to increase productivity, focus for on clients, investments in marketing or in research for possible new fields of business. This allows for no need to worry about updates, hardware, datacentre, software installation, updates and patching. There is no more plan, prepare, test and deploy since it will take few minutes to add new server.

## 2.5 Type of Cloud

Cloud computing is based on two distinct types which is Private cloud and Public cloud. Since we are dealing with a company whose operations and functions are under high security measures, it is out of scope to analyse Public cloud sector.

**Private cloud:** A private cloud is restricted to one organization. “Most often that organization is the single tenant—that is, unless the organization might want to host a private, multi-tenanted cloud for various internal segments or units of the organization. The data centre for private clouds is managed by the organization. This can also be called an *internal cloud*” (Douglas K. Barry, 2013).

### 3 Implementation of New Solutions

Clarifying process steps as it is applied by possible solution. Moving from generic to specific software applications and consideration of open source or free applications. The term ‘Free Software’ has been adopted by many different interests in the software community and beyond, and is commonly misrepresented either accidentally or deliberately (Stallman, 2009).

From the GNU Operating System homepage ([www.gnu.org/](http://www.gnu.org/), 2016): “Free software” means software that respects users' freedom and community. Roughly, the users have the freedom to run, copy, distribute, study, change and improve the software. With these freedoms, the users (both individually and collectively) control the program and what it does for them. When users don't control the program, the program controls the users. The developer controls the program, and through it controls the users. This non-free or “proprietary” program is therefore an instrument of unjust power. Thus, “free software” is a matter of liberty, not price. To understand the concept, you should think of “free” as in “free speech,” not as in “free beer”.

Reduction of capital expenditures and cost while maintaining quality of service is possible by implementing Cloud computing solutions Figure 3. Type of models from Cloud computing solutions such as: Software as a Service, Infrastructure as a Service and Platform as a Service. Cloud computing is able to add new capabilities, that is not available otherwise for a big corporations. There are many other service models all of which can take the form like **XaaS**, i.e., **Anything as a Service**. This can be **Network as a Service**, **Business as a Service**, **Identity as a Service**, **Database as a Service** or **Strategy as a Service** (tutorialspoint.com, 2015).

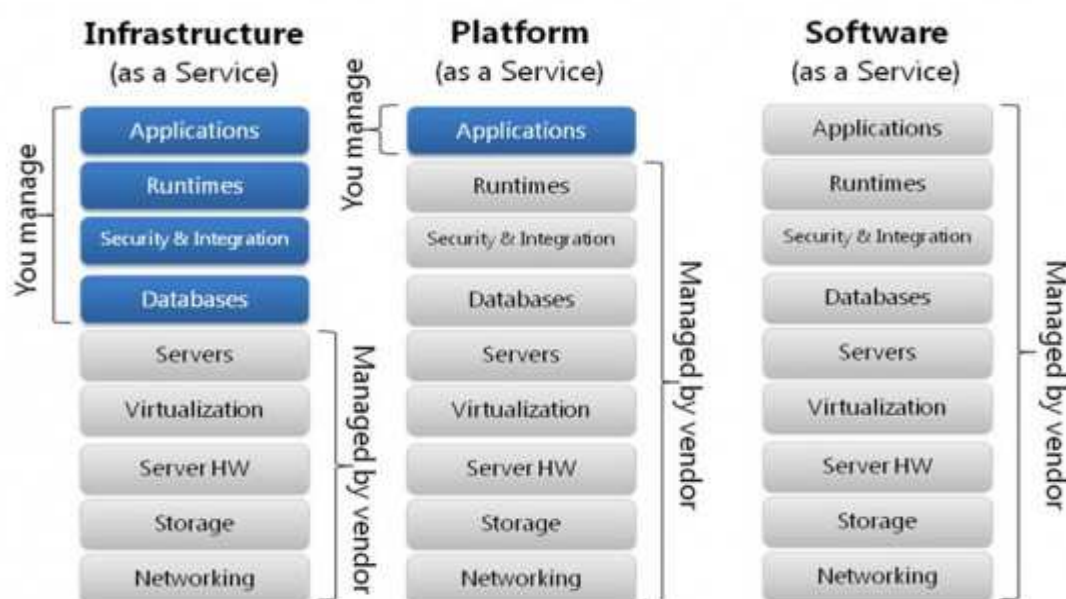


Figure 3 Cloud Solutions

**Software as a Service-** This provides complete software systems. SaaS is a common way to provide applications such as email, calendars, CRM, social networks, content management, documentation management, and other office productivity applications. SaaS is also known as “on-demand software.” Pricing is often on per user basis, either monthly or yearly (Douglas K. Barry, 2013).

**Platform as a Service-** offers the runtime environment for applications. It also offers development & deployment tools, required to develop applications. PaaS has a feature of point-and-click tools that enables non-developers to create web applications. Google's App Engine, Force.com are examples of PaaS offering vendors. Developers may log on to these websites and use the built-in API to create web-based applications. But the disadvantage of using PaaS is that the developer locks-in with a particular vendor. For example, an application written in Python against Google's API using Google's App Engine is likely to work only in that environment. Therefore, the vendor lock-in is the biggest problem in PaaS (tutorialspoint.com, 2015).

**Infrastructure as a Service-** The Infrastructure as a Service layer offers storage and computer resources that developers and IT organizations can use to deliver custom business solutions. A cloud provider wants the provision capability associated with the IaaS to be designed as a modular service with published interfaces so it can be used for many different situations (Hurwitz, et al., 2010).

We are going to have a closer look at Software as a Service, because SaaS is a complete application delivered as a service to the service consumer. The service consumer has only to configure some application-specific parameters and manage users. The service provider handles all of the infrastructure, all of the application logic, all deployments, and everything pertaining to the delivery of the product or service. In this case service customer is Rothchild Incorporated who is will implement and adopt Service as a Software.

### **3.1 Software as a Service**

SaaS services are delivered as a one-to-many model where a single instance of the application can be shared by multiple tenants or customers (Chandrasekaran, 2015). It means that as single model SaaS suitable for Rothchild Incorporated because it is able to deliver services in different geographical locations and act as a single point of access for Europe, The Americas and Asia headquarters. Functions and services are under centralized management: Since SaaS services

are hosted and managed from the central location, management of the SaaS application becomes easier.

Normally, the SaaS providers will perform the automatic updates that ensure that each tenant is accessing the most recent version of the application without any user updates. The features of SaaS will simplify IT department operations, reduce cost, eliminate complexity of hardware and software, maintain the quality of service and deliver high level of scalability. Since SaaS is on high demand it puts most traditional software vendors move to SaaS business as it is an emerging software delivery model that attracts end users.

### 3.2 IT Department

In this section CIO is assigned to establish clear guidelines and descriptions on roles and areas of responsibility. Clarifying uncertainty regarding the hierarchy and distribution of work and responsibilities. The IT manager conduct the IT department processes at strategic and tactical levels. Identification of processes to change the current IT department structure for more suitable by characteristics purposes like vision, strategy or new implementations within department. As an input will be management decision. The output is a plan of action to implement the change. The following Table 1 will display pattern of IPO model:

| Input                    | Process  | Output                   |
|--------------------------|--|--------------------------|
| Initiate from IT manager | <ol style="list-style-type: none"><li>1. Validation of the possibility of transformation.</li><li>2. Identify design factors</li><li>3. Transform into actual design</li><li>4. Plan of implementation</li></ol> | New department structure |

*Table 1 IPO IT Department*

The price of renting a server could initially appear to cost more than purchasing, but the finance director has to consider the cost of power and cooling, the cost of staff, the maintenance costs, accounting for backup and disaster recovery and various other costs (Cooter, 2011).

There is a number of benefits for people in the department when application will be shifted to the cloud. For the most of the staff daily tasks should be easier with the ease and convenience cloud computing offers. SaaS offload a lot of the maintenance operations to your cloud providers. So potentially, the IT department doesn't required same among of employees as before transformation. The IT department will be more flexible about installing new services and scaling up and down. Previously the IT department would have installed an infrastructure that would not always be able to handle the peaks of the business. This was a grossly inefficient

way of organising IT services. Since buying software and hardware is not taking place anymore, the project will not require to include them into approval, so it makes it faster to spin a project. Sometimes or periodically the company is experiencing busy periods, so rest of the time servers not using same amount of computation power, so the vendor can identify when company needed an extra resources and can instantly offer them. When it is peak-off time vendor scale back what the company was using before, which is will meet short-term needs. Cloud infrastructure that is geared up to handle peaks of traffic – perhaps around the end of financial quarters, or around Christmas for retailers.

As a part of cloud adoption staff reassessment is one of the most important part, which will trigger job redundancy. Need to decide is such-and-such a person is necessary.

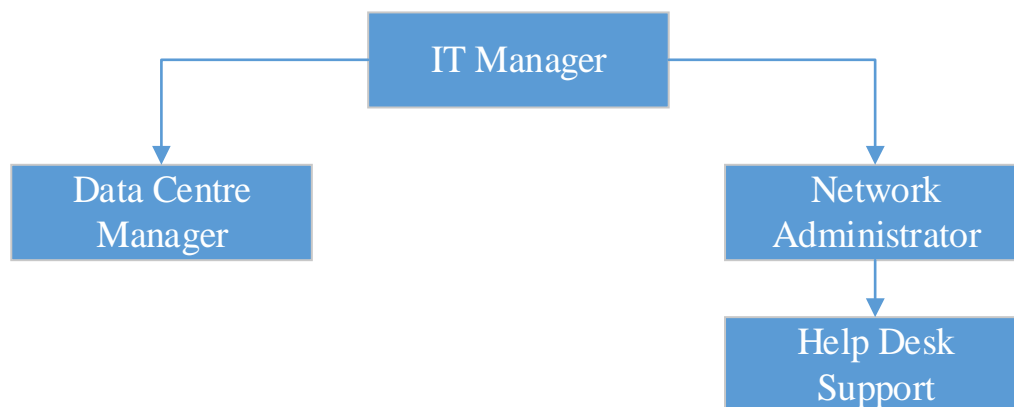
Here on Table 2 is a job description of IT department and summarized service tasks:

| Position                  | Description   |
|---------------------------|---|
| Project Manager           | Business process support<br>Tools and utilities<br>Office tools<br>Applications                             |
| Help Desk/Desktop support | Hardware<br>OS<br>Office tools and applications support<br>Personal applications<br>User training           |
| IT Manager                | Coordinating<br>Advise<br>Adjust plans<br>Evaluate  |
| Data Centre Manager       | Maintain corporate database<br>Installing custom updates<br>Coordinate with customers<br>Drawing schematics |
| Data Centre Operator      | Daily backups   |

|                               |   |
|-------------------------------|---|
|                               | Monitor media usage<br>Secure data<br>Installation of hardware/software   |
| Network Administrator         | Installing network/computer system<br>Maintaining, repairing and updating network<br>Diagnosing, fixing problems with software and hardware. Cabling, wireless. |
| Application maintenance staff | Help desk support<br>Improve application stability<br>Applications overall health monitoring  |
| PC Support staff              | Maintenance and repair services HW/SW<br>Administration   |

*Table 2 Job descriptions*

Since company is outsourcing variety of functions and services the IT department will utilise new structure as shown on Figure 4:



*Figure 4 Organisational chart*

### 3.3 Service Level Agreement

Service Level Agreement is an agreement between the provider and client, guaranteeing a certain level of performance from the system (Velte, et al., 2010).

SLAs are critical for cloud-based services because the Cloud Service Providers take on responsibilities on behalf of the consumer. Consumers need assurance that the Cloud Service Providers will provide services that are reliable, secure, scalable, and available (Kavis, 2014).

Companies who require services in a regulated industry require much stronger SLAs than those in a non-regulated industry. Health care, banking, insurance, government, retail, and other

industries require strong SLAs around performance, uptime, security, privacy, compliance, and more. Mainly because of among of personal data and type of personal information that is carried by datacentres is requite a stronger SLAs.

What types of metrics-based SLAs that are common in contracts between cloud providers and enterprise cloud consumers?

Overall uptime of application/service, page-load times, transaction processing times, API response times, reporting response times, incident resolution times, incident notification times.

From a security perspective and privacy regulations, the following requirements in return from cloud solutions providers are expected:

Security and privacy safeguards, published incident response plan (incident retainer also requested on occasion), web vulnerability scans and reports, published disaster recovery plans, safe harbour agreement, data ownership declarations, backup and recovery processes document, source code escrow.

The following process cycle on

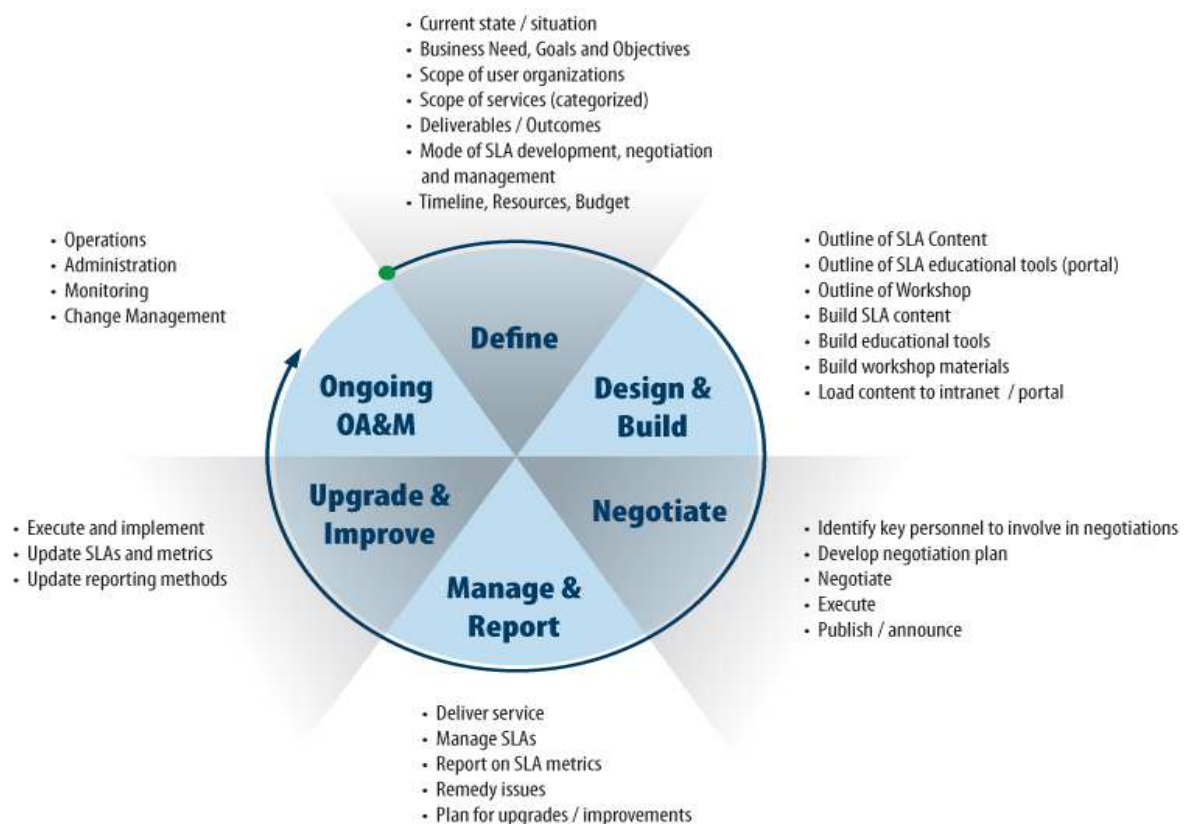


Figure 5 provides a sample approach to follow to define, build, negotiate, manage, measure and monitor an SLA. Sample is referenced to (Defense, 2016)

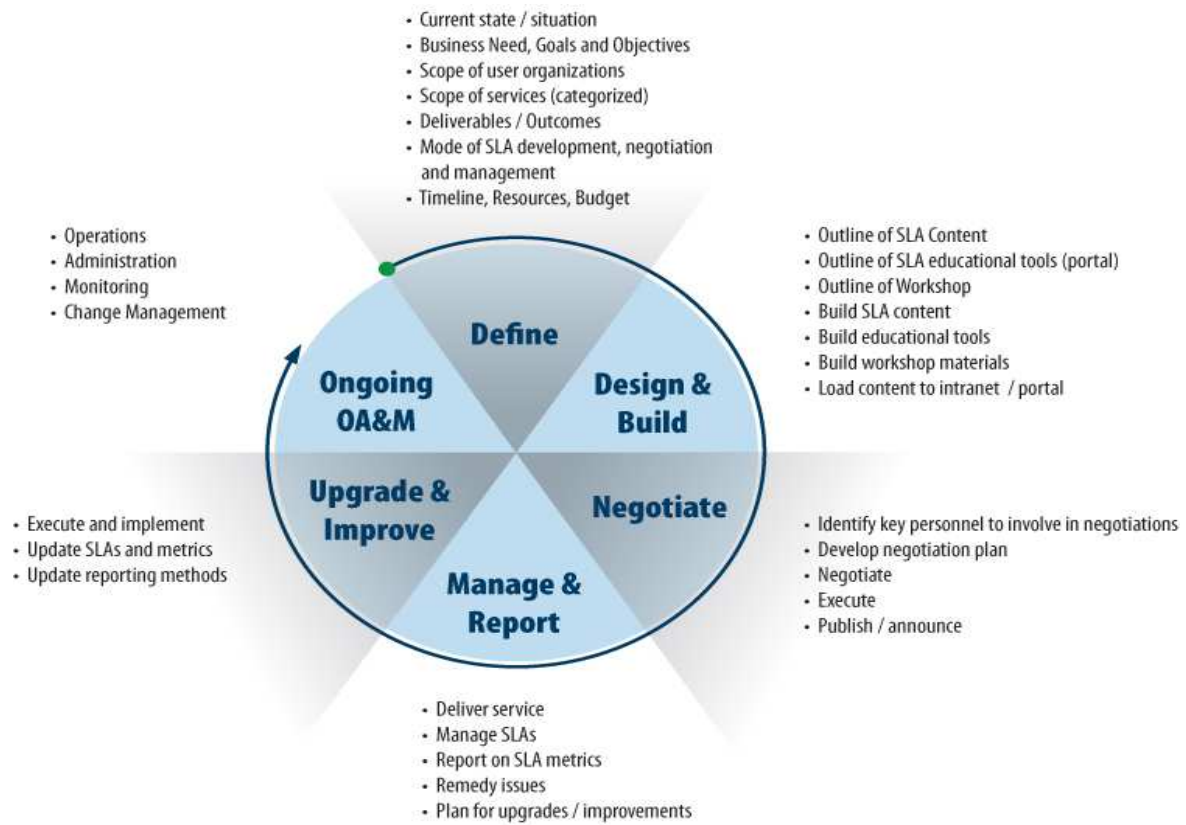


Figure 5 SLA Implementation



## **4 Recommendations and conclusions**

Implementation of the recommendations outlined within conclusions and would be considerable as a benefits for Rothchild Incorporated transformation with cloud adaptation. There are large list of benefits that are inherent within cloud computing technology. Benefits of outsourcing applications, datacentre, servers and substitute them with ready SaaS solutions.

The implementations will benefit cost of daily operations, technical services, applications management, workforce reduction, improve scalability, resource utilization, business continuity and others.

They also need to have a clear understanding of their organization requirements before making any decision on particular cloud offerings. The IT department need to consider what physical changes going to happened on promises, what steps need to be taken in place where solutions will be conducted. In others words that inheritance of previous systems might will remain in parts. For example; there is no need to spend money on new thin clients- departments can repurpose fat clients that were already in place.

Companies should accept the fact that cloud computing is here to stay. When building solutions in the cloud expect constant change. At the end of the day, it all comes down to architecture.

Understand the business requirements first, indicate the right cloud service and deployment models for departments. Build what is core to the business and leverage cloud solutions for everything else. Identifying steps and stages to consider next: data, security, authentication, SLAs, monitoring, disaster recovery, database management, DevOps, and organizational impacts.

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