NEXT GENERATION OPERATIONS SUPPORT SYSTEM FOR THE SOUTHERN CROSS CABLES NETWORK

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Abstract: This paper explains some of the key considerations in building a next generation operations support system (OSS), and describes how Southern Cross Cables Ltd (SCCL), in collaboration with Telecom New Zealand International Ltd, Agilent Technologies Ltd and Boss Portal Ltd, have implemented it with the use of a meta-data driven unified solution framework. Also discussed are the Business benefits to SCCL and its customers, and the profound ramifications to the submarine cables industry from this new platform.

1 INTRODUCTION

The Southern Cross Cables Network comprises seven submerged segments and four land based segments in a fully protected Synchronous Digital Hierarchy (SDH) ring Wave Division Multiplex (WDM) system across the Pacific Ocean that links Australia and New Zealand to the west coast of mainland USA via Hawaii and Fiji. The network is managed centrally on Southern Cross Cables Ltd's (SCCL) behalf by Telecom New Zealand International Ltd (TNZI), from a Network Operations Centre (NOC) in Auckland.

Since its first commissioning in 2000, this vital communication backbone has grown substantially, with its capacity quadrupling in less than six years. In preparation for the next wave of expansion, we have set about to build a next generation Operations Support System (OSS) that can keep pace with the rapidly expanding network.

This paper takes a pragmatic look at how to build an OSS that can deliver business-oriented information from network data, provide a collaborative environment with ubiquitous access for streamlined workflow and adapt to evolving business requirements.

2 CONVENTIONAL OSS SOLUTIONS

Currently many network operators are confronted with the predicament of their OSS being an assortment of isolated point solutions. Typically, the inventory, trouble ticket and fault management systems are all from different vendors, with limited integration among them. The OSS cannot provide any value-added information under this framework. An alarm message from a transmission card, for instance, will remain nothing more than its face value that "an alarm occurred on the given transmission card at a particular point in time". The OSS cannot advise the users whether any customer is impacted, or whether the alarm has been the consequence of another network event. Since the OSS cannot provide the necessary "intelligence", conventional OSS solutions rely heavily on the experience of users, which is of particular concerns given today's highly dynamic workforce.

The usual remedy has been to integrate the various components after their implementation. While this could address the said deficiencies, it is less than ideal, given the extra costs, time and disruption involved in running an add-on integration project. More alarmingly, without appropriate design and planning from the outset, many of these integration efforts are reduced to mere attempts to retrofit existing components together, and often fail to achieve their intended objectives fully.

3 A UNIFIED SOLUTION FRAMEWORK

The new OSS being implemented at SCCL, referred to as CRIMSON (Customer Relation and Inventory Management System On the Net), breaks away from the conventional paradigm. It is based on a unified solution framework where components are designed to cooperate with and complement one another. The "plumbing" between components is pre-built into the framework, eliminating much of the integration complexities and efforts as required by conventional approaches.

The principles behind this unified solution framework are best illustrated by the example of CRIMSON itself. At the core of CRIMSON are the three functional components of an inventory system, a Customer Relationship Management (CRM) / trouble ticketing system, and a fault management system. The distinguishing feature lies in the cross-functional data models that the framework defines for each of these components. In addition to the typical inventory model,

the data model for the inventory component also includes alarm, customer and trouble ticket information in the context as they would relate to inventory, similarly for the CRM and fault management components, see Figure 1. These cross-functional data models provide the foundation for the "plumbing" within the framework, over which inter-component intelligent functions can be embedded as part of the infrastructure of the framework.
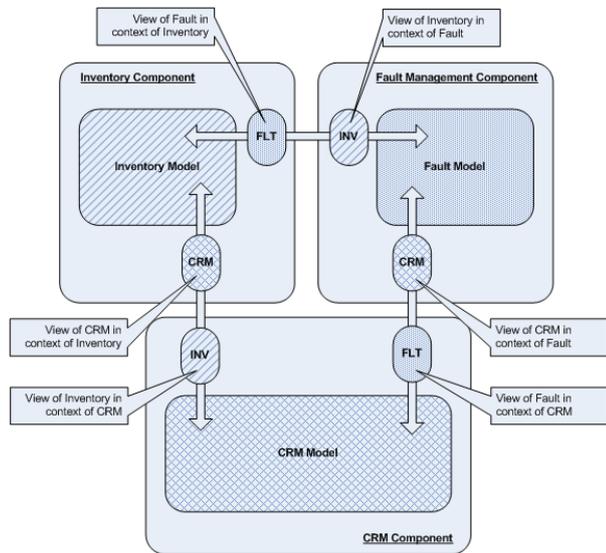

Figure 1: Inter-functional data models in the unified solution framework

By consolidating isolated "pockets" of raw data into a universal pool of inter-related information, more intricate details about the network can be revealed. Consider the same scenario when "an alarm message from a transmission card" is received. Through the use of built-in intelligent functions, CRIMSON can identify from its inventory model all the connections that terminate on the alarming card, and in turn all services running over those connections. It can then generate a customer impact report by looking up the owners for the identified services from its CRM data model.

It should be noted that a unified solution does not mean a single-vendor solution. Indeed CRIMSON is a multi-vendor solution drawing on the strengths of components from different vendors. In a multi-vendor environment, the integration efforts involved are largely confined to the mapping of functional components to their respective data models within the unified solution framework. The inter-component exchange of information and intelligent functions are still inherited from the framework, eliminating the most complex aspect of an integration task.

4 A META-DATA DRIVEN FRAMEWORK

Another important aspect of a next generation OSS is its ability to adapt to evolving business requirements. CRIMSON's answer has been to build atop a meta-data

driven framework. Typically, a system's behaviour and appearance are to a large extent "hard-coded" within its core software program. Any changes, however trivial, will be a time-consuming task that involves modifications to the core by developers and considerable amount of testing. Consequently the responsiveness of the business suffers.

A meta-data driven framework, on the other hand, allows the use of meta-data to instruct an underlying engine how the system should respond and render, see Figure 2. Meta-data are high-level descriptions that can be configured by system administrators without any low-level programming. As the software core is not modified, the level of testing required could be minimal. All these lead to a dramatically shortened turnaround time.
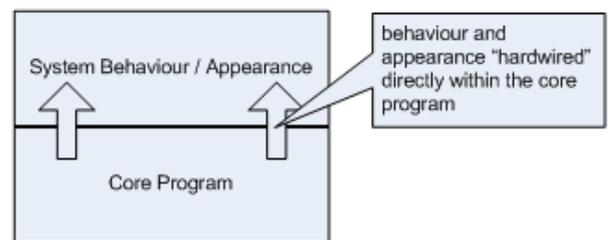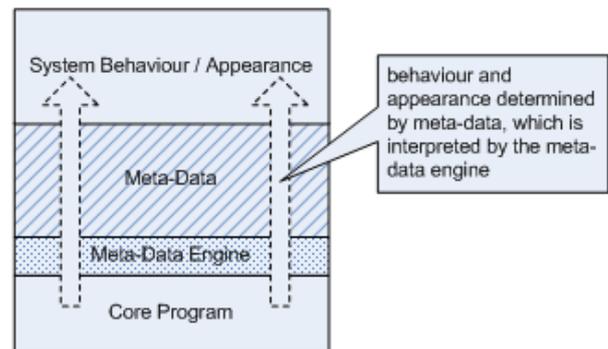
Figure 2: Meta-data driven and non-meta-data driven software

5 A STREAMLINED AND DISTRIBUTED SYSTEM

Traditionally the NOC has always assumed the responsibility in relaying information to and taking updates back from field personnel because the latter have no access to the OSS. It takes two people to do one person's job.

One of the primary objectives of CRIMSON is to eliminate this double-handling by allowing ubiquitous access to the OSS over the internet. What a user can view or edit in CRIMSON is determined by his or her user/role and data level access privileges. Taking collaboration one step further, CRIMSON includes a workflow management component within the

framework that provides task and resource management capabilities. All users will be empowered with the necessary information and tools to perform their jobs.

6 CLOSE COLLABORATION, INCREMENTAL DELIVERY AND ITERATIVE PROCESS

CRIMSON is an ambitious project that tackles with the challenge of a complete overhaul of both the Business Support Systems (BSS) and OSS of a vital communications infrastructure amid stringent constraints in terms of timeline and zero operational impact. A number of strategies have been put in place to mitigate the potential risks and ensure its successful delivery.

First and foremost is the close collaboration between all parties and endorsement from business owner ensures the solution is inline with business objectives. At the same time, consultation with end users ensures the solution is pragmatic and will be embraced when implemented.

An incremental delivery approach has also been crucial. The iterative process allows feedback to be considered and adjustments, if necessary, to be effected more readily.

7 BUSINESS VALUES OF THE OSS

At the time of writing of this paper, the CRIMSON project is half way through Phase 2. Nonetheless numerous business benefits to SCCL are already evident, such as:

- A universal platform for the entire organization

- Flexible framework that can adapt to evolving business requirements

- Improved customer communication flow through real time access to customer information and network data

- Improved Key Performance Indicator (KPI) and network performance reporting

Considerably more benefits are expected at the completion of Phase 3 through:

- Centralised inventory management, including spare and in-transit equipment

- Centralised workflow management that controls all activities on the network and in cable stations

- Improved inventory management through floor plan and element face view integration

- Reduction in high-volume-low-value manual tasks and staff required

- Automated generation of fibre pair ring diagrams

8 BENEFITS TO SCCL'S CUSTOMERS

In keeping with SCCL's continual focus on customers' satisfaction, the majority of the expected benefits to SCCL's customers have been achieved, namely:

- Proactive fault management through customer impact analysis

- Reduced restoration times with probable cause analysis and pre-built restoration plans

- Automated customer-specific reports and event notifications of planned and unplanned network situations

At the end of Phase 2, additional benefit is anticipated from:

- Real-time SDH schematic diagrams showing how a customer's circuit is routed over the network

9 CONCLUSIONS

The three key features of a successful OSS strategy are "integration", "accessibility" and "flexibility". Integration plays a crucial role in the overall success of the OSS. A closely integrated OSS can turn mundane network data into business-oriented information, allowing users to focus on how to respond to an event, rather than trying to figure out what happened. Universal accessibility holds the key to streamlining business processes; and flexibility is the basis for long term success.

Looking ahead, the success of CRIMSON has profound ramifications. With its wealth of comprehensible business-oriented information, universal accessibility with fine-grained data access control and flexibility to be individually customised, CRIMSON has laid down a platform that enables SCCL to one day offer bandwidth that comes complete with its own OSS. Instead of a black-box, customers will be able to log into their own private partition of the OSS, and use it for the management of their own Virtual Private Network (VPN) with full visibility of their services in real-time.