



FIVE KEY CONSIDERATIONS FOR BETTER **TELECOM NETWORK** **RESOURCE MANAGEMENT**

Resource management is not a new concept, nor is it specific to telecommunications service providers. But telcos in particular are realizing just how important effective resource management is and the breadth of its impact on the organization, from keeping OPEX under control, to improving market competitiveness to keeping customers satisfied. This paper examines the different aspects of effective resource management and highlights key components of a winning resource management strategy.



“If only we knew what free resources are in our network, we could save millions every year.”

Many CTOs of large telco operators have said this or something similar when pondering their own network and workflows. This is a prevalent sentiment because many operators use a fragmented set of tools - or even a manual process leveraging Excel - to plan and manage network resources.

The alternative – and preferable – approach is to use is a fully integrated and automated resource management solution. The implementation of such a solution has many benefits: it will help keep track of available resources, speed up time to market of new services, prevent misconfiguration, reduce recovery time from network outages and significantly lower overall OPEX, to name just a few.

But before moving forward with a new resource management solution, it's important for operators to answer five critical questions. Doing so forces them to consider the broader context in which they must manage their resources and, in so doing, will ensure a cost-efficient and smooth new solution implementation.

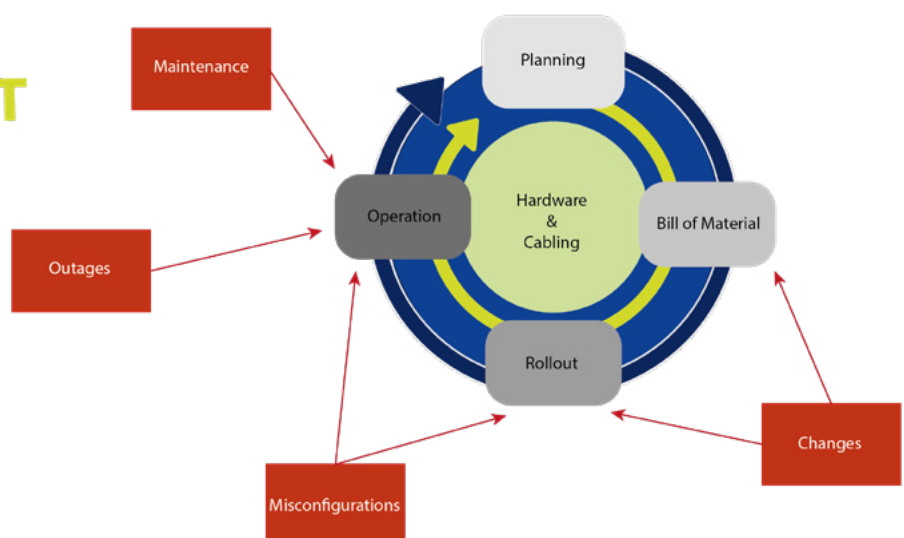
The key questions to ask are:

1. What potential problems are you likely to face?
2. Which resource management principles should you consider?
3. What key requirements must the solution support?
4. How will you manage the cost of implementation?
5. How can you prevent a “vendor-lock-in”?

Having workable answers to these questions is critical to the project's success. That said, let's take a closer look at each of these topics.

RESOURCE MANAGEMENT SOLUTIONS

“Closed Loop” Principle and
Solution Cost-Management



1. What are the potential problems you're most likely to face while implementing a resource management solution?

Being knowledgeable about any change you're considering is smart business. The last thing you want is to be blindsided by unanticipated issues. The most common resource management challenges an operator is likely to face include:

1 Fragmentation

The landscape of systems and technologies in an operator's network is typically very much disjointed. The reason? There are different devices from different vendors, and each vendor has its own management system. Additionally, since the typical life span of these systems is 10 – 20 years, they may also be outdated.

Furthermore, acquisitions are common among operators, which makes an already complex landscape even more complicated. In many cases, the merging of IP and transport departments results in a multi-technology network. This reality must be factored into any resource management solution.

Finally, the increasing prevalence of NFV and SDN means an additional merge of data center and network technologies, which means additional software and hardware components must be managed by the resource management system. The addition of virtual components into the network can complicate resource management, as it now extends beyond the boundaries of what is traditionally considered telco resources. On top of that, organizational silos compound these problems and present an additional significant hurdle.

2 Working Mode

Over the years, each operator has developed its own workflows and processes. These are the result of organizational structures, self-developed tools and legal restrictions at the time. Regardless of how an operator arrived at its present state, they now find themselves in a situation with very specific working modes.

This is problematic because any change in the working mode will force changes throughout the entire organization. Adapting

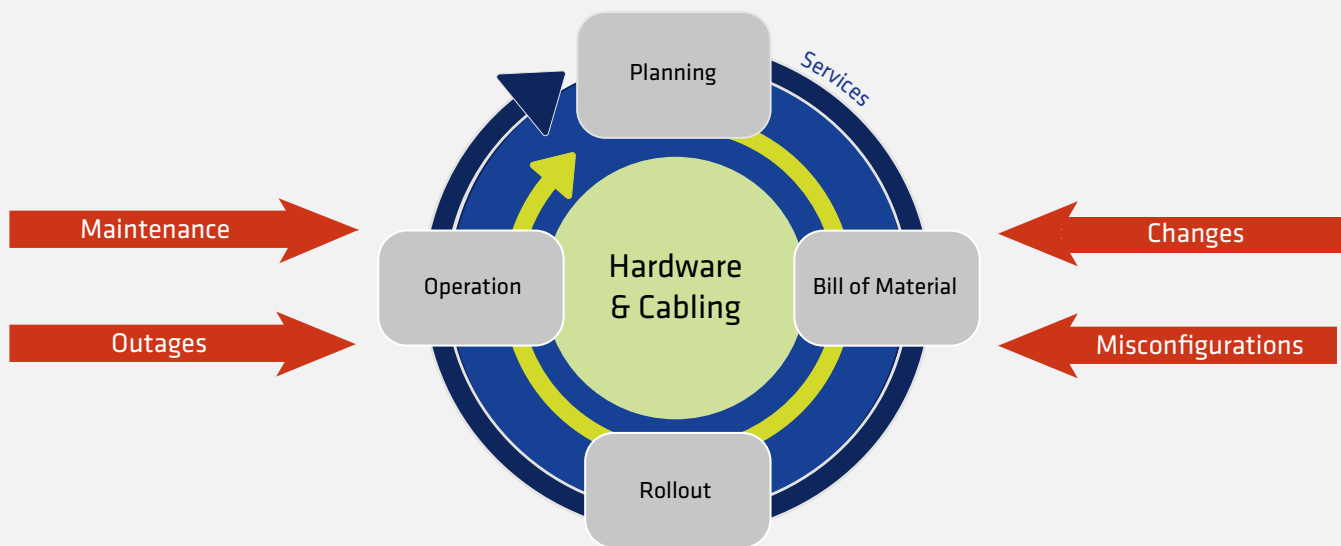
the organization from its Present Mode of Operation (PMO) to a new Future Mode of Operation (FMO) will take time for people to learn and adapt to the new processes. It also requires the new solution be flexible enough to support the specific working modes and any subsequent changes down the road.

3 Interface Limitations

Another challenge is the northbound interface on network management, or any other systems. Even though they are based on standards, these interfaces have limitations, or vendor-specific behaviours and extensions.

They may not support the required functionality, or there may be different data models within the management systems below. This creates additional challenges for developing a common resource management solution on top, especially in a multi-vendor and multi-technology network.





Closing the loop between operational data and planning data is critical to ensure data integrity. Because a closed loop reconciles the status of the live network with the planning status, the likelihood of error in a new planning cycle is dramatically reduced. In the telecommunications environment, the loop should cover both hardware resources and service data.

2. Which Resource Management Principles need to be considered?

As such, changes are part of the daily work. Data consistency is therefore an important topic and managing it should be a high priority.

The **closed loop** principle is integral for high data consistency. It means that network configurations created in a planning phase are transferred, step-by-step, into a bill of material and a purchase order, followed by rollout, installation and operation phases. The “loop is closed” when the resources in operation are compared with the original planned resources, and any data discrepancies due to planning changes, installation errors or changes made because of outages have been resolved.

Without data consistency, a planned network extension may be not implemented. For example, slots may already be occupied by undocumented cards or there may be network misconfigurations because of wrong assumptions that were based on incorrect network documentation. These scenarios are painful and expensive – and highly avoidable.

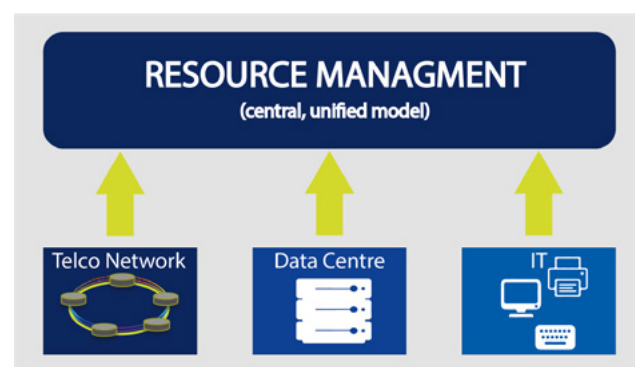
The **closed loop** principle ensures that the next planning cycle is built on verified and accurate data, and that no surprises await the technician when installing new planned resources.

Another important principle of resource management is to implement a **common central database** for all resource related data. This ensures that all activities carried out by various people and roles within the organization are always based on a shared master data source, and all involved people have the same consistent view of the network at all times.

DATA CONSISTENCY IS KEY TO THE CLOSED LOOP PRINCIPLE.

Finally, a **unified data model** is a very important principle for accommodating and managing disparate data. This data model needs to be detailed enough to facilitate daily work, and be flexible enough to support extensions, e.g. to manage new objects and attributes of new network layers or to support new equipment in the network. The data model must also not degrade the database with too much complexity and overload the database with unneeded information.

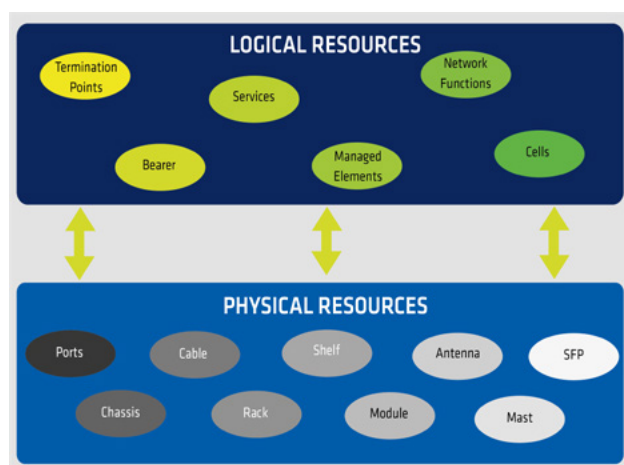
Achieving a unified data model and central database is challenging because resource data comes from many different interfaces, which are built on different vendors' data models, or data models representing different technologies.



3. What key requirements need to be supported?

Any new resource management system should support at least the following five basic requirements:

Requirement 1: Documentation of physical and logical network resources



This is a basic functionality and should be the foundation of any resource management system. Physical resources are the chassis, modules and SFP, as well as the cable, patch panels and splice boxes.

Logical resources are network connectivity and network functions e.g. firewalls or data filters. Any dependencies between the physical and logical resources need to be modelled e.g. to report the effected services in case of an outage of a physical resource.

Requirement 2: Flexible frameworks to implement interfaces

Since a resource management solution is both the source of data for many external systems, as well as a repository for them, flexible interface adapters are critical for northbound integration, e.g. with OSS and BSS systems, and southbound integration to the network for reconciliation of the network data.

Northbound: A user-friendly interface with state-of-the-art technology, e.g. REST or even GraphQL, is preferred. The internal data model should be exposed by applying role-specific access rights. Extensions of entities, or even newly designed entities, must be available on the interface without programming work.

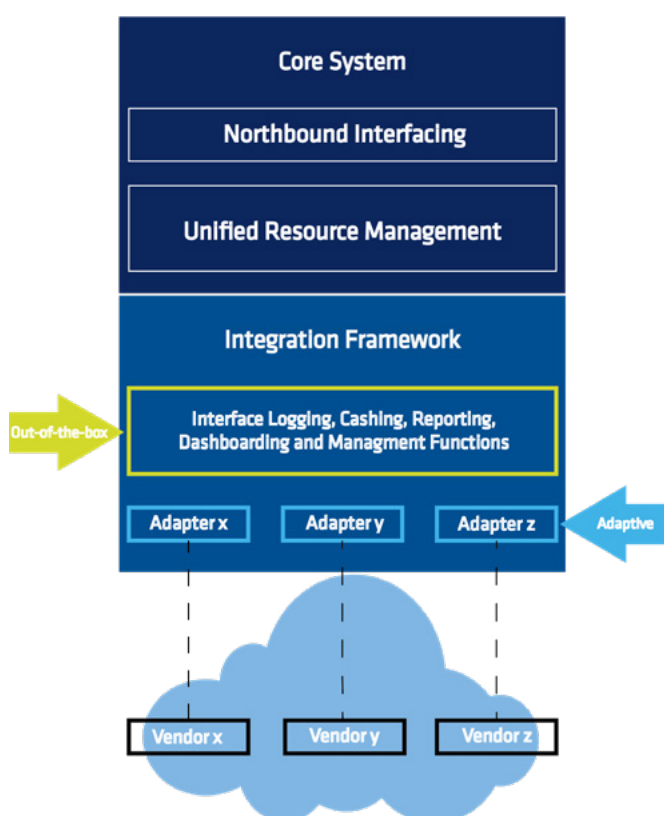
Southbound: Interfacing and reconciliation data from the network is trickier. Different interface technologies, from a simple CSV file to the more complex MTOSI or CORBA interfaces, or different data models, possibly all of them need

be supported.

However, all interface adapters should share common features such as the ability to:

- define mapping rules between external and internal data
- define rules to resolve discrepancies between external and internal data
- supervise the interfaces
- log the interface activities

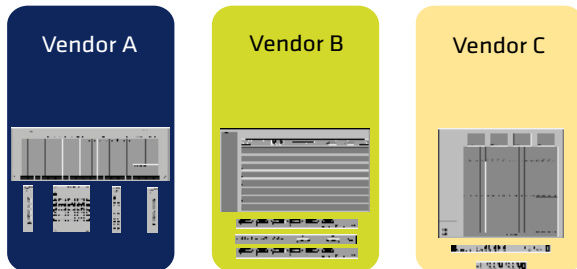
Even if interfaces have completely different technologies or data models, this capability can still be implemented into a framework to reduce the overall effort and time to change or implement new interfaces and to keep costs under control.



Requirement 3: Library of components

Another feature of a resource inventory solution is a database of predefined components from the different devices to be managed. This includes a graphical representation but also data such as size, power consumption, slots and ports, etc. Access to such a library speeds up the addition of new equipment and reduces the effort for the user to define these components.

LIBRARY WITH STANDARD COMPONENTS

**Requirement 4: Reporting and dashboarding of resource data**

Having the required resource data in a database is one thing, but making it useful for the operator is another. For example, can the operator easily access the data to identify free resources to be put into service, or those to be replaced? To get the most value from an implemented resource management solution, a flexible, user-defined reporting and graphical representation of data on a dashboard is required. This also includes reports for impact analysis, e.g. in case of fibre breaks or outages, as well as for workorders generated for new equipment and configurations in the network. These types of reports simplify network operations very much.

Requirement 5: Support the company's workflow

Data consistency and reliability is usually the result of a process and workflow driven working mode. For a resource management solution, it means the integration with or the integration of a process management solution is a key requirement. The process still needs to give the freedom to manually fix issues, and by automating workflows it can help to lower efforts, speed up the work and increase the data consistency of the resource management systems. This will also prevent network errors and outages, and reduce costs associated with misconfigurations due to inconsistent network data



Extensive reporting capabilities are key to keep track of resource utilisation



4. How to manage the cost of solution implementation?

A productized software solution is the key to managing the cost of a solution. A productized solution is a ready-to-install software package that supports required key use cases out-of-the-box. Such a solution eliminates the need to integrate each new customer solution from scratch, which eliminates the cost of programming for software integration and customized features.

Each customer of the productized software solution can decide for themselves whether they need additional customized functionality to support their specific historical workflows. The overall solution may even provide more features than required at the beginning for a specific customer, which makes extension even more efficient.

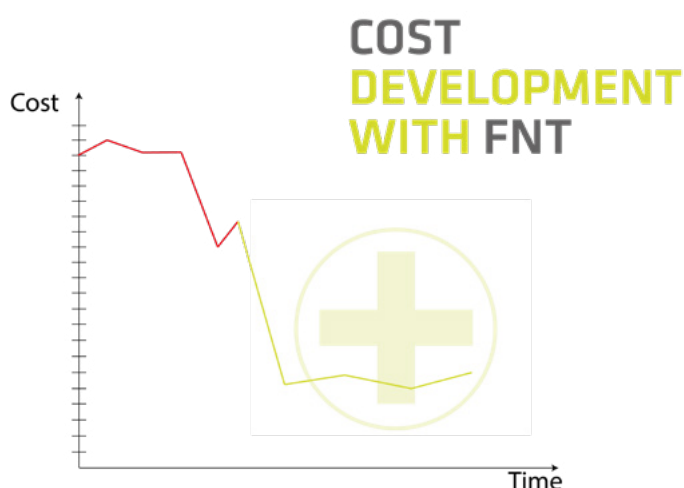
While this sounds straightforward and simple, it still requires certain principles be considered when starting the software design of the solution. **Configuration** instead of **programming** are the key words. The solution needs general openness through its interfaces, but also of the software design. Most vendors don't make their software generally configurable and open, with the configurable interface adapters that would make their solution flexible enough to create a productized software solution. Instead, they let their customers pay for the additional programming during solution implementation or extensions. The productized software solution, with its ability to configure features, is much more fiscally desirable for operators of all sizes than expensive integration and programming.



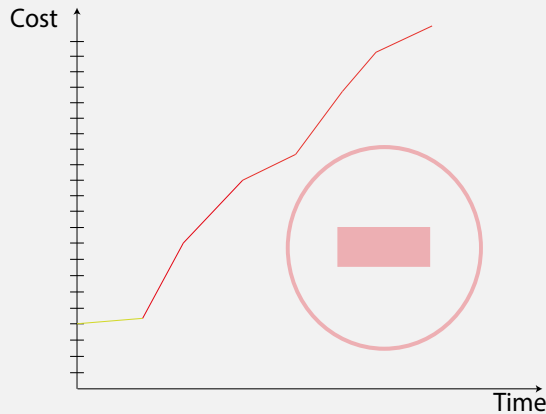
The benefit of such a solution is not only the **solution cost**, but also **faster implementation and extensions**, as the functions are already available and data migration is the main concern. Additionally, for data migration, productized features can help to streamline the process. Also, a productized software solution makes the addition of **new features** after a software upgrade available for **all customers**. Users will therefore be guaranteed access to the continuous innovations of the software.

Another benefit of such a software solution is that the software upgrade is a standard procedure that is much cheaper than it would be with a highly customized solution, and drastically reduces the TCO. This, by the way, is the reason some CSPs introduce a completely new product rather than upgrade an existing, highly customized system. A strong focus on a productized solution drives configurability and flexibility of the software, which is the most effective way to provide smooth solution implementation and keep the cost down.

One other point worth mentioning is that Open Source is considered by many to be a solution to prevent a “vendor-lock-in”. However, as resource management is not the focus of Open Source projects, this premise is questionable. Even for an Open Source project, the operator still needs a solution integrator to integrate the solution, program missing functions, and upgrade the solution when a new version of software is available. This creates a vendor-lock-in situation, as this is customer-specific programming and handing over the customer project to another vendor won't be a smooth task and will definitely require significant additional effort.



COST DEVELOPMENT VENDOR-LOCK-IN



5. How to prevent a “Vendor-lock-in”?

“Vendor-lock-in” is the most critical topic beyond the technical capabilities of a solution. It means that a solution, and its vendor, is mission critical and cannot easily be replaced. This allows the vendor to dictate the price for any innovation.

Again, the productized software solution is one of the best ways to mitigate the risk of a “vendor-lock-in”.

Why? With the configurability of the software the operator can independently configure and use new features. With a configurable interface adapter, they can even introduce new devices and modules without additional programming.

Finally, with a productized software solution strategy, a vendor is forced to continuously maintain and innovate the software as all its customers depend on this and will demand they do so. All new features will be available for all customers, and feature requirements are generally similar among different operators. The cost for the operator is limited to software upgrade and maintenance, and it is in the best interest of the supplier to upgrade all customers as the maintenance cost for older versions will increase with each new version.

Resource Management from FNT Software

FNT’s standard software solutions are specifically designed to deliver end-to-end visibility across entire telecommunication, IT and data center networks. The resulting unified resource management is a critical point of differentiation as physical, logical and virtual resources must be managed holistically in today’s digitally transforming environment. The convergence of IT, telecommunication and data center resource management is a non-issue with FNT Command. By managing all assets via a single, dynamically updated repository that integrates with key systems, providers not only have the information and tools to support existing networks, but also to support networks of the future as they undergo digital transformation. What’s more, this visibility lays the foundation for an agile network operation that allows providers to more easily convert emerging opportunities into revenue.

FNT’s Telecommunication Resource Inventory is speciality data that enhances the FNT Command management system with detailed information about all network and service resources in the telecommunications environment. It’s a single source for network and service data that encompasses all relevant resource information for the planning and engineering,

service fulfilment, and service assurance processes of telecommunications providers and multi-service providers. Providers use it to maximize the use of all network resources, boost the efficiency of planning, fulfilment and assurance processes and, ultimately, improve customer satisfaction.

FNT Command delivers these benefits out-of-the-box as a standard software package. It’s also highly flexible to configure new requirements as needed. The Telco Integration Framework allows easy integration with any network management system along with a configuration option that makes it easy to adapt to new hardware or other changes in the network.

The FNT Command / Telecommunications Resource Inventory combination gives network managers immediate insights into all the data connections in their networks, independent from underlying hardware vendor technology. Network operation teams use it to improve workflows and service delivery, analyze and trace entire signal chains and identify port capacities across all network devices and services.

To learn more about FNT’s solutions for telecommunication service providers – and ensure you make the right resource management solution choice for your needs – visit us at <https://www.fntsoftware.com/en/solutions/telco>, call us at (973) 590-2627, or email us at: contact@fntsoftware.com.