White Paper:
A Pragmatic Approach to Capacity Management

ITIL® provides an excellent framework for companies to define capacity management as a formal discipline within their IT organizations. However, most organizations face a very real, and difficult, “leap” from the ITIL definition to actual execution of a value-based capacity management deployment.

Capacity management should be viewed as a long-range goal, not a short-range activity. Capacity management will often fail or under-deliver because of lack of a pragmatic, realistic approach to its deployment. ITIL should be viewed as a guideline, but realities of the business should define the actual execution.

Our experience indicates a healthy, productive capacity management practice is achievable, and can produce substantial, measurable results. This paper highlights many of the challenges we’ve observed, and proposes a pragmatic approach to implementing a capacity management practice that will return excellent short term results and provide the building blocks to achieve a high performing, consistent capacity management organization long term.

This paper will:
- Discuss common barriers to building a capacity management practice,
- Summarize ITIL guidelines and a maturity model for capacity management, and
- Propose a pragmatic approach to defining and deploying a capacity management capability.

Barriers to Building a Capacity Management Practice

In our consulting experience and industry awareness, we have observed a few common barriers companies face when attempting to define and deploy a capacity management capability.

1. **Deficient Scope**

Capacity management, or more traditionally, capacity planning, can mean different things to different people in an organization. Often times, the traditional understanding of capacity planning is rooted in the ITIL Capacity Management discipline definition (IT domain-specific groups or individuals performing uncoordinated capacity planning for servers, networks, end-user response times and perhaps database and storage).

The scope struggle typically occurs as a gap between IT’s understanding and linkages between resource, service and business capacity management. For example, a marketing manager may think of capacity planning in terms of a predictive mathematical model, whereas an administrator may consider capacity planning as the trending of CPU utilization across a server farm.

We often encounter an incomplete organization-wide understanding of the definition of an IT service. Without a strong, corporate-wide concept of an IT service, it is literally impossible to define the
underpinnings of an ITIL-based capacity management approach, let alone a long-range roadmap for achieving it.

Finally, many organizations view the scope of capacity management as enterprise-wide, and therefore their approach to developing a capacity planning capability is much too large. This will often lead to the proverbial “boil the ocean” activities that lead to cost overruns, little or no value in return, frustrations, disillusionment and skepticism of future capacity management initiatives.

2. Existing Capacity Planning Practices

Most organizations have some form of capacity management in place, typically infrastructure resource focused capacity management. These practices may be formal (e.g. a capacity management group) or informal (administrators performing tactical metrics review or trend analysis as part of their regular activities). Capacity management reporting is typically done at the technology level (e.g. CPU or network bandwidth trending).

Service capacity management tends to be either non-existent or weak, at best. This lack of good service reporting can be due to a poor definition or approach to managing the service, or a poor mapping of service components to the underlying IT resources. Because of this, it becomes difficult to integrate cross-domain metrics into a service view in a meaningful way, which leads to poor quality service reporting.

Finally, there is often a breakdown in what types of metrics are useful to the business stakeholder vs. the types of metrics used for management and reporting by the capacity planner(s).

The status quo capacity planning practices can strongly influence resistance to expanding its scope to embrace the ITIL guidance.

3. Budgeting

Available budget will always be a strong determination of what can realistically be achieved when defining a capacity management practice. The realities of the real world usually dictate current-year budgets are already set and capacity management doesn’t typically get on IT’s high priority project list. Additionally, capacity planning investments are typically heavily weighted toward purchase of technology, foregoing the needed investment in personnel, process development and deployment.

Given a shortage of earmarked IT funds, it can be difficult to free up additional budget to expand capacity management maturity. Formal capacity management is often seen as a long term goal, and it is easy for IT to accept an attitude of “we’re doing OK as it is; we need to focus our budget on short term, tactical issues”. Given the general lack of good capacity management scope definition, it is nearly impossible to develop an ROI – which also requires a good (and usually nonexistent) baseline of cost measurements.

Unfortunately, a “compelling event”, such as expensive downtime due to overcapacity or slow customer online services, typically drives short-term capacity planning investment. Other opportunities in which IT may invest include short term tactical projects, such as server consolidation.
4. **Resources**

As alluded to above, a lack of a well-defined capacity management scope typically will lead to loosely defined roles required to support this effort; and those roles typically are reflected in uncoordinated resource management activities. Effective capacity management requires a highly coordinated effort that spans IT organizational structure, which is incompatible with traditional “silo’ed” environments. Additionally, the best existing company capacity management capable resources are typically heavily engaged in other high priority IT initiatives.

5. **Expertise**

There is insufficient supply of experienced, industry best practice fluent capacity planners. It is a fact of life that they are hard to find, hire or train. This leaves companies faced with promoting technical resources into capacity management, but it is rare to find individuals that have skills or the business perspective required to be a successful capacity planner. Moving an IT manager into this role may provide the skills of application-centric or global systems thinking, but they may lack the technical knowledge required to pull it all together. Finally, there needs to be recognition that different skills and experience are required to support business, service and resource capacity management.

6. **Unrealistic Expectations**

It is a natural temptation to think of capacity management in the global sense; in other words, capacity management across the entire IT enterprise. This often leads to “boil the ocean” experiences described above. It takes great discipline to focus capacity management on a specific service.

Another tendency is to want to leap frog capacity management activities before securing underlying capabilities. For example, it is a strong desire to produce highly accurate predictive mathematical models to reduce the investment in testing hardware and resources. However, this is highly unlikely if the prerequisites of scope, service definition, skills attainment and experience are bypassed.

A final unrealistic expectation is that a tool will provide capacity management. The unfortunate reality is there are no tools that exist which provide this silver bullet. Tools can only be successfully deployed to automate well-defined processes.
Backdrop for Defining a Capacity Management Practice

Fortunately, there are some good industry sources/guidance on which to develop and build a capacity management organization. Two of them are the Information Technology Infrastructure Library (ITIL) guidance as defined by many participants in an initiative sponsored by the UK’s Office of Government Commerce, IS Management Group (OGC for short), and a capacity management maturity model.

OGC Information Systems Management Group has developed a holistic approach to understand how to build an effective, well-balanced IT service organization. The following are the levels the OGC defines that must be taken into account when developing a capacity management practice:

- **Level 1: Prerequisites** ascertain whether the minimum level of prerequisite items is available to support the process activities.
- **Level 1.5: Management Intent**, establishes whether there are organizational policy statements, business objectives (or similar evidence of intent) providing both purpose and guidance in the transformation or use of the prerequisite items.
- **Level 2: Process Capability**, examines the activities being carried out. The capability is aimed at identifying whether a minimum set of activities are being performed.
- **Level 2.5: Internal Integration** seeks to ascertain whether the activities are integrated sufficiently in order to fulfill the process intent.
- **Level 3: Products** examines the actual output of the process to enquire whether all the relevant products are being produced.
- **Level 3.5: Quality Control** is concerned with the review and verification of the process output to ensure that it is in keeping with the quality intent.
- **Level 4: Management Information** is concerned with the governance of the process and ensuring that there is adequate and timely information produced from the process in order to support necessary management decisions.
- **Level 4.5: External Integration** examines whether all the external interfaces and relationships between the discrete process and other processes have been established within the organization.
- **Level 5: Customer Interface** is primarily concerned with the on-going external review and validation of the process to ensure that it remains optimized towards meeting the needs of the customer.
Capacity Management Maturity Model

There are a few existing maturity models that can help define capacity capabilities maturity, such as CMMI. I prefer the model proposed by George Thompson\(^1\), shown below, as an easy to understand approach to help guide development of concrete objectives. It is very important to note that a company must master a lower level in order to achieve success at the next higher level.

\(^1\) George I. Thompson, “Six Levels of Sophistication for Capacity Management,” CMG 2000
Pragmatic Approach to Develop a Capacity Management Capability

The following diagram is a high level perspective of the components of a robust capacity management capability:

This article doesn’t contain details presented by this diagram, but we will propose an approach to pulling the necessary components together, in an organized and incremental fashion, to get there. The steps are:

1. Education
2. Develop and communicate capacity management scope
3. Develop a capacity management roadmap
4. Develop a short-range detailed action plan
5. Execute the short-range project plan
6. Communicate successes
7. Review results; adjust mid- and long-range roadmap
8. Define and execute detailed mid-range project plan
9. Perform long-range capacity management execution

These steps are summarized below.

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1. Education
The following steps are recommended prior to embarking on any capacity management capabilities development:

- Capacity Management ITIL training. Participants should include a capacity manager, IT service management process owners, executive stakeholders and operations managers. This will help develop a shared understanding of the concepts, scope and terminology used in capacity management.
- Research case studies of successful capacity management engagements. This will help understand how others have successfully implemented capacity management, and understand the value they have achieved.
- Communicate key concepts to executive management.

2. Develop and Communicate a Capacity Management Scope
The following steps are critical in establishing a well scoped initial capacity management approach. This should be done with the following objectives in mind: the scope should be well understood by various business and IT stakeholders; it should provide compelling business value; it should be of easy or moderate complexity to improve chances of success; and business and IT metrics should be well-defined.

The following are solid, best practice steps to developing an initial capacity management scope:
- Identify a key existing service as a focus area for capacity management process development.
  - Develop a list of candidate IT services that exhibit existing challenges; for example, underperforming SLAs, high operational costs, future IT capacity requirements, or compromised customer satisfaction.
  - From a list of candidate IT services, select a service that represents high-value, low risk success criteria. This criteria should include:
    - Well-understood business metrics
    - Well-understood architecture; the applications and underlying infrastructure that supports the IT service
    - Small enough to develop and execute a good capacity plan with a small number of resources, using existing experience and tools.
    - Clearly identifiable success criteria.
- Develop a service component map. This identifies key linkages between business functions, IT services, application architecture that supports the IT services and their supporting IT infrastructure components.
- Review the as-is state
  - Identify existing business, service and IT metric definitions
  - Identify tools and staff already in place that may support capacity management (e.g. resource monitoring, end user response time monitoring, web access trends, etc.)
- Define the high level to-be state based on gaps of existing process to industry best practice
  - Identify additional or desired business, service and IT metric definitions
  - Identify additional automation tools and staff that may be needed to support gathering and analyzing the identified metrics
Identify gaps in capabilities
• Develop high level approach to manage the identified service
  – Include operational goals
  – Include value proposition
  – Include high level cost estimates (automation tools, process best practices, staffing)
• Communicate with executive stakeholders and secure acceptance to pursue

3. **Develop Capacity Management Roadmap**

This is an extremely important step prior to the implementation of a formal capacity management practice. The roadmap provides the short, mid and long-term objectives for the rollout of capacity management. The short-range objectives are tactical, supporting the IT service identified in the previous step. The mid-range objectives are a mixture of tactical (e.g., extending the short-range objectives) and strategic (forward-planning to provide the foundation for the long-term objectives). The long-range objectives are strategic and visionary. For example, how does the capacity management practice support the organization in the future?

The best tools to help guide this effort are the OGC requirements and the capacity management maturity model described above. The roadmap objectives should encompass a part of each of the OGC requirements, based on an analysis of the ‘as-is’ results, with an eye toward moving to the ‘to-be’ state.

The capacity management maturity model (MM) should be used to guide the “building blocks” of the capacity management practice. Care should be taken to realistically develop objectives that complete a lower MM tier before focusing on a higher tier. For example, if an organization doesn’t have the ability to formally measure, trend & forecast peak resource utilization, then it is unreasonable to expect to be able to partition resource utilization, let alone expect to have the foundation to provide predictive analysis.

Building the short, mid and long-range objectives will require great discipline to resist the temptation to prematurely prescribe objectives before making sure their dependent foundations are in place and realistically take into account IT constraints.

The following are the basic steps to build the capacity management roadmap:

• Detail the short-term objectives and approach using results from *Develop the Capacity Management Scope* step above. Steps include:
  – Build initial capacity plan to support the initial IT service identified above. An example capacity plan is provided in the ITIL books supported by ITSMF.
  – Develop a short-range roadmap using the goals of the capacity plan, reasonable coverage of as many of the OGC’s requirements as possible, the ‘as-is’ analysis and the capacity management maturity model. Also consider an objective to develop formal capacity management processes in this step, as they can be leveraged to optimize and accelerate future maturity (more on this later).
  – Refine costs and resource needs. Perform a gap analysis of the ‘as-is’ state and what is required to support the short-range roadmap above. Estimate what technology (software, hardware, storage, etc.) and support resources will be required to successfully implement the short-range roadmap. This is purely a budgetary exercise. The resources should be sufficient to provide resource capacity management coverage for the IT technology domains identified in
the capacity plan, and have at least one person responsible for the coordination of the capacity management activities.

- Determine scope of mid-range objectives
  - Following similar steps in developing the short-range roadmap, determine what should be the follow-on objectives. These may be:
    - Extend the capabilities of the short-range objectives
    - Support additional IT services
    - Support additional OGC requirements
    - Incrementally grow the capacity management maturity model capabilities
  - Develop the high level mid-range roadmap required to achieve the mid-range objectives.

- Determine scope of long-range objectives. The long-range objectives should be thought of as organizational in nature; visionary and strategic. Review the ITIL capacity management definition in detail, evaluate the long-term OGC requirements and study the capacity management maturity model. How can your organization best leverage these capabilities? The long-term objectives aren’t concerned with detail; they are to provide the long term focal point of subsequent capacity management maturity cycles.

- Communicate the capacity management roadmap with executive stakeholders and secure acceptance to pursue.

4. Develop a Detailed Short-Range Action Plan

This step is building the project plan to implement the short-range roadmap developed above. While much can be written in this section, I will opt to outline for brevity purposes.

- Use the service component map, capacity plan and as-is gap analysis to identify the project activities
  - Develop a service capacity management approach
    - What business metrics will be measured?
    - How will those business metrics be gathered and reported?
    - Who will be responsible for establishing and managing the environment for service capacity management (this may be multiple resources)?
  - Develop a resource capacity management approach
    - What resource metrics will be measured to support the capacity plan?
    - How will those business metrics be gathered and reported?
    - Who will be responsible for establishing and managing the environment for resource capacity management?

  Note: initially, we have found it to be very productive to leverage the existing IT organization to minimize potential disruption. Identify IT resource administrators, and work with their direct management to incent and provide resource capacity management activities into their MBOs. The resources’ direct management should also be incented to manage to the expectations of capacity management.

  - Identify other IT Service Management (ITSM) process integration points (e.g. Service Level Management, incident management)
  - Develop formal capacity management processes. The goal of the processes are to establish the daily regimen required to sustain the capacity management activities, address the ad-hoc needs of capacity management, show specific integration steps with other ITSM processes
identified above and establish a sustainable service improvement activity. The following are examples of capacity management subprocesses:

- Develop a capacity plan (including business cost justification)
- Business capacity management activities
- Service capacity management activities
- Resource capacity management activities
- Tactical capacity planning activities (e.g. support incident or problem resolution)
- Strategic capacity planning activities (e.g. perform predictive analysis)
- Capacity management process improvement

Note: thinking through how these processes may be developed during the following execution stage, you may find this helps refine the roles, responsibilities and potential resources that will be needed.

- Identify the specific software and supporting hardware required to support the service and resource capacity management needs described in the capacity plan, along with any technology that can be leveraged to automate the capacity management processes.

- Develop detailed cost estimates required to procure and deploy technology, attain process best practices, training and the resources required to execute the project plan.

- Develop a short-range capacity management implementation project plan. This endeavor must be treated as a formal IT project to increase the likelihood of success. It is also important to utilize potential capacity management resources and key stakeholders to develop this project plan. The project plan should take into account:
  - Activities identified in the short-range action plan,
  - Training,
  - Tool acquisition and deployment,
  - Process development,
  - Implementation and testing,
  - Milestones,
  - Existing workload of any identified staff resources,
  - Acceptance criteria and deliverables,

- Develop a communications plan. This plan will provide the various communications to executives, managers and IT staff of the objectives and needs of this project.

- Communicate with executive stakeholders and secure acceptance to pursue.

5. **Execute the Short-Range Project Plan**

If done correctly, this step follows best practices for executing the short-range capacity management project plan:

- Execute
- Monitor
- Report
- Adjust
- Test
- Deploy
- User acceptance
Communicate the results with the executive stakeholders. Finally, based on the experiences of the project, revise the capacity plan!

6. **Communicate Success**

The first step in the post-implementation is to meet with the technical, management and business stakeholders of the short-range capacity management project. The communication is bilateral: communicate the results of the project (good and bad), and seek honest feedback. This feedback should be used in subsequent steps to adjust mid- and long-range planning.

Another communication activity, and perhaps one of the most underappreciated, yet effective tools to build momentum and support for capacity management, is the internal promotion (“PR”) that is very necessary to build global awareness of the capacity management initiatives, and a value proposition to the organization. **This should be an ongoing exercise.** The following are goals of the communications:

- Socialize the value of capacity management at an organizational level,
- Help secure future support and funding,
- Modify the organization’s perception of capacity management as a valuable, **strategic** business and IT service.

The following are various mediums to convey the communications:

- Company newsletters
- IT review meetings
- Business review meetings
- Individual IT domain weekly meetings (instill cross-domain, global thinking at lower organizational layers)
- Trade publications
- IT conference presentations

7. **Review Results, Adjust Mid- and Long-Range Objectives**

Perform a thorough review of the short-range capacity management project results. Were the objectives met? What were the issues encountered (technical and organizational)? Were the short-range objectives too aggressive? What is the feedback from the technical, management and business stakeholders?

Based on the review and analysis, refine the mid-range objectives. The mid-range objectives will now shift to more tactical in nature, but should keep the strategic, long-range objectives in mind. In other words, how will the mid-range tactics support the long-range strategies? Include lessons-learned and unaccomplished goals from short-range project. Evaluate any changes in the IT or business climate and factor those into the objectives. The following are additional objectives to be considered in the mid-range objectives:

- What are reasonable coverage areas that can be incorporated based on best practice guidance?
- What adjustments are needed to track against the capacity management maturity model?
- What modifications or additions should be made to the capacity management processes?
- Can any of the artifacts from the previous project be used as templates going forward?
- Refine the existing capacity plan created for the short-range project.
- Define new IT services to support and develop associated capacity plans.
- Develop new or modify existing service component maps.
- Refine existing or define new IT process integrations (e.g. problem management, SDLC support.)
- What additional technology and resources (with associated training) will be required to support the mid-range objectives?
- What are the estimated costs to implement the mid-range objectives?

Next, refine the long-range objectives. These will continue to be strategic and visionary. The revisions will ideally be more realistic, based on experiences gained in short-range experience and mid-range planning. Again, review the current business and IT goals and priorities. Are range long-range objectives in line with business needs and the company’s ability to support them?

Finally, present the objectives, approach and cost estimates of the revised capacity management roadmap to the executive and business stakeholders. Secure appropriate support and funding.

8. Define and Execute Mid-Range Detailed Project Plan
This step is very similar in nature to the one described in the subsections for the definition and execution of the short-range project plan, and the communication of the short-range project results. Review those steps and apply them to the mid-range objectives.

9. Perform Long-Range Capacity Management Execution
By the time the organization reaches this stage, the capacity management service improvement process should be a significant contributor to the definition and execution plan for the long-range capacity management practice objectives. By this stage, the long-range objectives should be embodied in the service improvement evaluation and planning. Any short-term activities to implement portions of the objectives will merely be IT projects governed by the capacity management organization. In other words, capacity management should be an ongoing, self-sustaining IT discipline within the company!

Summary
Organizations that attempt to leapfrog the incremental building blocks of organization, resources, experience and capabilities defined by a capacity management maturity model face a high risk of failure. Using an organized, pragmatic, step-by-step approach, it is possible to establish a highly effective best practice-based capacity management practice. This article described a real-world approach that incorporates ITIL guidance, capacity management maturity models, a balance of theory vs. reality, and strong project-based definition and execution.

Our experience indicates it can take between 4 and 6 months to define and execute the short-range capacity management project (steps 1 through 6) for a single well-scoped, low-to-medium complexity service. An additional benefit which is typically revealed during the first 6 steps is unforeseen monetary wins, typically in the form of cost-avoidance scenarios. We have consistently seen a trailing break-even or positive ROI of capacity management within the first 4 months!

Finally, we have noticed that organizations will eventually be excited about the value capacity management brings to them. Business entities (finance, marketing, operational lines of business) are able to have insights they’ve never had before to help make more informed and accurate decisions for budgeting, planning and
technology deployment. In mature organizations, we have seen the capacity management practice actually become part of their proactive service planning activities.

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