ABSTRACT

'The Peter Principle states that "in a hierarchy every employee tends to rise to his level of incompetence", meaning that employees tend to be promoted until they reach a position at which they cannot work competently'. There may be no better example than when a SAS® programmer is promoted to Project Manager. However the Peter Principal can be postponed by learning or improving certain skills or abilities.

In order to perform well, a project manager must master the tools of their trade and communicate effectively. But SAS programmers often operate more or less informally between the IT department and business users with little exposure to industry standards like CMMI, WBS, PMP, QAP and EVM and few opportunities to orchestrate formal meetings. This presentation will touch on those and other tools, best practices, suggested resources and lessons learned. While it is designed for those approaching or new to project management, the information should be useful to anyone within the industry.

INTRODUCTION

Project Management (PM) will be a natural extension of programming for some, and for others it will be a far more challenging and difficult task. One source of the dilemma is that it is both an Art and a Science and totally unrelated to programming. PM may be considered a science due to the many required and specialized vernacular, tools, reports, applications and practices. It may be considered an art because no matter how much you know; a significant amount of your success comes from how well you feel and how you make others feel. Another is that the comfort and confidence derived from knowing code is executable, efficient and produces accurate results is unheard of in this position. Results are highly subjective, perceived immediately if negative, often postponed (perhaps indefinitely if positive), and subject to change over time.

So what is project management? From the perspective of a programmer, the program manager may just be the one who assigns tasks and provides (hopefully positive) feedback for job and salary reviews. For others Project management is a carefully planned and organized effort to accomplish a successful project. A project is a one-time effort that produces a specific result, for example, a building or a major new computer system. This is in contrast to a program,
which is 1) an ongoing process, such as a quality control program, or 2) an activity to manage a series of multiple projects together.

Project management includes developing a project plan, which includes defining and confirming the project goals and objectives, identifying tasks and how goals will be achieved, quantifying the resources needed, and determining budgets and timelines for completion. It also includes managing the implementation of the project plan, along with operating regular ‘controls’ to ensure that there is accurate and objective information on ‘performance’ relative to the plan, and the mechanisms to implement recovery actions where necessary.

Projects usually follow major phases or stages (with various titles for these), including feasibility, definition, project planning, implementation, evaluation and support / maintenance. So while Project Management is the “next step” for many programmers, it has very little to do with writing code. The newly promoted programmer will find their responsibility, circle of communication and required documentation rapidly expanding and their deliverables shifting to abstracts and estimates focusing on time, money and resources.

When starting or expanding a career it is important to learn the vernacular or jargon. Some of the most common terms mentioned deal with project management certification (PMI, PMBOK, PMP, etc.). Others pertain to associated certifications for the company (CMMI 2 –CMMI 5) and yet more refer to the many expected tools, applications and types of reports that a manager is expected to use and produce (WBS, GANT, QAP, RAP, EVM).

The Program Manager’s Book of Knowledge (PMBOK) by the Program Manager Institute (PMI) offers information on program management and certification after managing for various periods of time. According to their website: “PMI’s Project Management Professional (PMP) credential is the most important industry-recognized certification for project managers. Globally recognized and demanded, the PMP® demonstrates that you have the experience, education and competency to successfully lead and direct projects. This recognition is seen through increased marketability to employers and higher salary; according to the PMI Salary Survey—Sixth Edition, a PMP increases your salary up to 10% more than your non-credentialed colleagues and peers.”

So when referring to an individual a PMP is someone who has obtained a Project Management Professional “PMP” certification from the PMI which tests the knowledge they consider essential for a manager. The test many be taken after completing the required hands on management and relevant classes.

**PMP Examination Blueprint**

The PMP examination is developed based on the PMP examination blueprint contained in the Project Management Professional Examination Specification. The examination blueprint details the percentage of questions contained in each project management process group. The following represents the percentage of questions in each domain that are included in the examination.

<table>
<thead>
<tr>
<th>Domain</th>
<th>Percentage of Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initiation</td>
<td>11%</td>
</tr>
<tr>
<td>Planning</td>
<td>23%</td>
</tr>
<tr>
<td>Executing</td>
<td>27%</td>
</tr>
<tr>
<td>Monitoring and Controlling</td>
<td>21%</td>
</tr>
<tr>
<td>Closing</td>
<td>9%</td>
</tr>
<tr>
<td>Professional and Social</td>
<td>9%</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
</tr>
</tbody>
</table>

Figure 1: PMP Question Domains
When referring to an object; PMP is the “Project Management Plan”. This is the single most important document the PM will produces and is responsible for maintaining. The PMP is designed to clearly explain all areas and components of the project from multiple perspectives. The initial PMP represents what is expected; based upon what is known at the beginning of a project. As the project moves through various stages and expends time and resources; the PMP and components must be updated and modified to reflect the new reality.

The following is a table of contents from a generic template. Note that this single “generic” PMP document contains twenty other plans and related material. More complex PMP must contain additional plans for security, disaster recovery and other considerations.

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Figure 2 Project Management Plan
For any plan, it is not uncommon to have multiple ‘artifacts’ such as documents, forms, charts and graphs. Various artifacts are used to document the constantly changing nature of a project and to provide clarity to the “stakeholders” with access. Stakeholders are anyone and everyone that has an impact on the project, or is impacted by the project and those with access would be listed in the Communication, Tracking and Reporting Plan.

**CMMI**

An excellent source template for PM is the Capability Maturity Model Integration (CMMI). “CMMI defines practices that businesses have implemented on their way to success. Practices cover topics that include eliciting and managing requirements, decision making, measuring performance, planning work, handling risks, and more. Using these practices, you can improve your chances of business success. CMMI practices can be used in a team, a work group, a project, a division, or an entire organization.”

The various CMMI levels are 1-5:

1. Initial (chaotic, ad hoc, individual heroics) - the starting point for use of a new or undocumented repeat process.
2. Repeatable - the process is at least documented sufficiently such that repeating the same steps may be attempted.
3. Defined - the process is defined/confirmed as a standard business process, and decomposed to levels 0, 1 and 2 (the latter being Work Instructions).
4. Managed - the process is quantitatively managed in accordance with agreed-upon metrics.
5. Optimizing - process management includes deliberate process optimization/improvement.

CMMI is a companywide certification that focuses on how processes are performed, documented, communicated and improved upon. The artifacts for CMMI overlap with the PMP and the two works very well together (as should be expected). Another reason for going after the CMMI certification is that many contracts for companies or governmental agencies require it. Even if not required; following CMMI practices should improve processes and will save time and effort with documentation.

**TOOLS AND APPLICATIONS**

While the PM will not be writing much code, they will not be far from the PC. There are many tools and applications designed for project management and a new PM should take advantage of the many templates and forms available. While specialized tools are useful, many of the most common applications can mirror their functionality with a little effort.

My applications of choice are now Microsoft Outlook, Project and Visio. Depending upon how it is used, **Outlook** may be the greatest assistant or obstacle to project management. If used well (many rules, folders, organized archives, groups, etc.), Outlook can provide a written, searchable and recoverable thread of correspondence and instructions. If not well organized, material will become unorganized and more of a burden than an asset.

Microsoft Project and to some degree Microsoft Excel are used to keep track of resources and commitments. Being able to switch between the two makes both more productive. Microsoft Project has many “bells and whistles” but some find it difficult to work with. Excel is easy to use and almost always available, but lacks the pre-defined processes and reports that make Project so desirable.
A primary use of Microsoft Project or Excel will be the Work Breakdown Structure (WBS) (see figure 2). The WBS is a tool used to define and group a project’s discrete work elements in a way that helps organize and define the total work scope of the project.

A work breakdown structure element may be a product, data, a service or any combination. A WBS also provides the necessary framework for detailed cost estimating and control along with providing guidance for schedule development and control. Additionally the WBS is a dynamic tool and can be revised and updated as needed by the project manager.

Figure 3 Work Breakdown Structure

NON TECHNICAL

Besides the technical, Project Management requires a paradigm shift and many non-technical skills with Analysis, Communication, Budgeting, Teamwork, Intelligence, Calmness and Time Management considered the most essential. The paradigm shift is represented by the use of “We” rather than “I”, but it includes much more. The programmer who was once responsible for only their own work is now responsible for the work effort and business practices of everyone who works on the project. To some degree they are also responsible for any and all factors that may affect the project; because they are responsible for mitigating risks. While project management may bestow a certain degree of authority upon an individual; the authority is typically bundled with even greater responsibility.
Analysis, Teamwork and Intelligence are traits every successful programmer should have. Although present, they will be used very differently than before and can always be improved upon. Programmers should also be skilled in communication, but the level required of a PM will be both higher within the organization and broader to include other departments, companies or agencies. For many PM the enhanced communications requires formal documents and presentations to explain the project to key stakeholders, or to justify the associated resources and expenses.

Resources and expenses are all part of budgeting and will be a major complication for most new PM. The three key stages to a budget are preparing it, writing it and monitoring it. Whilst your finance department may well be ostensibly charged with doing these things for you – as project manager you have the ultimate responsibility for the budget and need to be able to understand what you are being told about the budget. Unless your own background is in accounting you will feel obliged to accept what you’re told, if you don’t take the time to learn some basic budgeting skills. You will need these as at time you will need to know how to rationally and logically challenge budget over-runs that you become aware of as well as be able to sensibly monitor the budget as the project progresses. Budgeting is also very emotional as programmers and former coworkers become “resources” to assign and monitor.

Calmness may also be a significant challenge for a new PM. While programming under time constraints and other issues can be frustrating; most programmers will not be prepared for the often negative social and political interactions and the consequences they present. Regardless of the situation, a PM must be able to move on from a setback in an orderly manner to solve the problem or to rectify the situation.

CONCLUSION
To transition into a program manager without becoming a cliché; a programmer needs to devote sufficient time, effort and understanding to develop the essential skills and abilities. This does not guarantee success, but it should make the Peter Principal easier to avoid.

ACKNOWLEDGMENTS
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CONTACT
Gary McQuown
Data and Analytic Solutions Inc.
McQuown@DASconsultants.com
703.628.5681
www.DASconsultants.com

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