November 18, 2005

Analysis of Project Management Survey Data

This preliminary analysis of the Project Management Systems ("**PMS**") was performed by Glenn Black, Associate with Process Quality Associates Inc. based upon data supplied by Ms XXXX XXXXXX, Continuous Improvement Specialist, XXXX XXXXXX XXX, on Nov. 10th, 2005.

1.　　**Executive Overview**

    a.　　If these survey results are typical for all project management areas within XXX XXXXXX, then XXX XXXXXX's system is **Fair** (overall score of 71.7%) in project management excellence.

    b.　　While 1980's were about Quality, the 1990's were about mergers, acquisitions, and globalization.

    c.　　**PQA** predicts the 2000 decade will probably be defined by *velocity*. While most organizations are operating at a JIT Velocity Factor of between 30 to 60, the world-class organizations have achieved a level of 2 to 3.

        i.　　Based on these survey results, we would estimate the XXX XXXXXX' JIT Velocity Factor is 40 to 80; average or slightly worse than average. Orders of magnitude better performance can be achieved as this is lowered toward the ideal level (3 and below).

    d.　　Project Management (PM), engineering, order entry, maintenance methods, process reliability, backlog, and work scheduling systems can have significant effects on the JIT Velocity Factor. Some organizations have been successful in improving PM velocity by 10% to as high as 50%.

    e.　　To further improve the current project management system, it is recommended that the following six areas be the focus for further development and improvement:

        i.　　Lack of measurement systems and tracking can allow a project to wander at great cost. (Question # 5, 9, 31).

ii.   Launching of projects, understanding the stakeholders and all their needs, and the stated/implied constraints need better control (Question # 13, 21, 30, 54, 59, 68).

iii.   People see the current system as too much of the wrong bureaucracy (too much in some areas, too little in others, people interact in a "free spirit" and a somewhat un-coordinated way) (Question # 51, 75, 76, 96).

iv.   Calculate your JIT Velocity Factor for the overall organization, and the impact of PM on that Factor. Take appropriate actions to improve.

v.   Investigate **CCPM** when both Sr. Management and the project team members are ready to get serious about projects. Currently, there may be inadequate motivation to achieve optimum project results (based on these survey results).

vi.   Awareness training on **CCPM** may help XXX XXXXXX achieve the necessary "critical mass" necessary to launch a **CCPM** implementation.

2.   **Analysis**

With the Adobe Acrobat pdf report format, the reader can zoom in on the graphs for additional clarity, when necessary. The graphs referenced in the following section are attached at the end of the report, 4 graphs per page. The sequence for the graphs on the page is shown in the following diagram for the first page, and is the same sequence for all subsequent pages:

Top of Page	
Figure 1	Figure 2
Figure 3	Figure 4

a.   **Figure 1** shows the distribution of Scores for the 96 questions on the survey. The scores can range between 1 and 25 based on the survey's scoring system (Severity from 1 to 5, Frequency of Occurrence from 1 to 5, Score= Severity x Frequency, scores have maximum range from 1 to 25). In this survey, the minimum score was 2, the maximum score was only 16 (for only 5 questions). Therefore, the full range of possible scores was not used. This fore-shortening in scores usually

means that:

i.   "politically correct" answers were provided. This means that the survey
         answers do not fully reflect the true conditions within the system.

         This could be due to "averaging" of the answers from multiple individuals
         into one score, or the person who answered is unsure of the true state in all
         questions, and tried to score less controversially in these less known areas.

         At the extreme, prison inmates tend to answer in this manner, as it
         provides the least possible information to their captors while still being
         compliant to the answering of the survey;

OR

ii.   there is "management towards mediocrity", where the naturally occurring
         highs and lows have been removed from the project management system
         through employee or management's actions in the past (ie. Management
         by exception).

This conclusion is supported by Figures 2, 3, and 4 all showing close to normal
distributions.

By "management towards excellence", we would find a skewed distribution, with
a large number of positive attributes, and few negatives. This is the
recommended, but not yet the installed method for this project management
system.

b.   **Figure 2** shows the box-and-whisker plot for the scores, with a median of 8
         (notch centre-line), an average slightly below the mean (black plus sign by notch
         centre-line), and one distribution from 2 to 12 (the left and right whiskers). The
         16 scores are seen to be outliers from the main distribution (separate data point).
         This is a normal distribution, but fore-shortened (no scores between 16 and 25,
         the maximum).

c.   **Figure 3** shows the box-and-whisker plot for severity scores of the various
         Project Management Undesireable Effects (PMUE's). This factor defines how
         badly the PMUE's have disturbed the normal PM system, the deliverables, and
         the expectations of the various stakeholders (ie. customers, employees, suppliers,
         etc.). The scores have a median of 3 (notch centre-line), an average slightly
         above the mean (black plus sign by notch centre-line), and one distribution from 3

to 3 (the left and right whiskers). The scores of 2 and 4 are seen to be outliers from the main distribution (separate data point). This further supports our comments on Figure 1. This 3 score means there are *Significant negative effects* in the current Project Management system.

d.   **Figure 4** shows the box-and-whisker plot for Occurrence, with a median of 2.5 (notch centre-line), an average slightly below the mean (black plus sign by notch centre-line), and one distribution from 1 to 4 (the left and right whiskers). This is a normal distribution, but fore-shortened (no scores at 5, the maximum).

e.   **Figure 5** shows the reason codes for why the above scores have occurred (why the Project Management system was found in its current state). Please see the exact wordings that these short tags refer to and reference. All systems evolve to a point of stability, or equilibrium. This Pareto graph shows that the main factors are:

i.   Lack of resources;
ii.   Poor motivation;
iii.   Fear to change;
iv.   Unknown solutions;
v.   Unknown causes; and
vi.   Plus+Minus Symptoms

It is suggested that significant solutions to all of these causes need to be included into any solution that is proposed to move the system to a new equilibrium. If all of these factors are not considered and solved, the change process will be incomplete, and buy-in will not fully occur, or if some significant improvement are achieved in spite of this lack of buy-in, back-sliding to the currentequilibrium point (or other similar) will most likely occur.

f.   **Figure 6** is the frequency distribution for the severity scores; same data as Figure 3.

g.   **Figure 7** shows the same data as Figure 4. Here, we can clearly see a slightly skewed distribution, suggesting that PMUE's are occurring more frequently than with a normal distribution. A skew in the opposite direction is what is desired. This means that management systems, or naturally occurring events are causing the PMS to be in a slight downward spiral towards self-destruction and chaos.

h.   **Figure 8** shows the same data as Figure 2. The histogram shows non-normal shape, which may be recent movements towards a skewed distribution (the reason

this survey was done now ?). Are the scores above 15 to be interpreted as outliers, exceptionally worse areas, or something else?

i.   **Figure 9** shows the cross-plot of Severity and Occurrence. Note the absence of data at (1,4) co-ordinates. This is bad news. The greatest problems (high severity) tend to happen at high frequency, and never do they rarely occur. The good news is that no problems occur on a continuous basis.

j.   **Figure 10** shows the multiple box-and-whisker plots for severity vs. occurrence. Here, we can see 3 non-normal distributions (ie. One side of the notch is folded over onto itself, indicating data expected in this zone for a normal distribution to occur, is non-existent; indicating a significantly skewed distribution). Note that the screws are in two different directions (right- or left-handed). What is it in the PMS that causes, forces these non-normal distributions. These forces are usually physical limitations that cannot be over-come, or severe system pressures. Note also, that the severity increases as the frequency increases; again a non-random pattern that is caused (or forced upon) the PMS.

k.   **Figure 11** shows the multiple box-and-whisker plots for occurrence vs. severity (opposite of Figure 10). Here, we can see 3 non-normal distributions, all of which are different shape. Same questions as for Figure 10.

l.   **Figure 12** shows the multiple box-and-whisker plots for overall score vs. severity. Here, we can see 3 non-normal distributions.

m.   **Figure 13** shows the multiple box-and-whisker plots for overall score vs. occurrence. Here, we can see 4 non-normal distributions.

n.   **Figure 14** shows the multiple box-and-whisker plots for severity vs. the Family for the Question. Each question has been assigned to one of 6 different Families:

   i.   Environment
   ii.   Inputs
   iii.   Measurements
   iv.   Methods
   v.   Outputs; and
   vi.   People

Here, we can see that all Families have the same median score; 3. Some Families have much wider distributions, and 3 of the Families have outliers (abnormally high or low severity, different from all the other questions in that same Family). These outliers often represent opportunities to better understand the PMS, and

why it is in its current state.

o.   **Figure 15** shows the multiple box-and-whisker plots for occurrence vs. the Family of the Questions. Again, all distributions are non-normal (skewed), but with no outliers. Here, we see significant differences in the median scores among the various Families. Environment, Inputs, and people have statistically similar mean occurrence values (notches overlap each other). Measurement, Methods, and Output all have similar median occurrence values. Methods all received a 3 rating, no variation whatsoever; a very curious outcome.

The reason to have a PMS is for the outcome. Notice that the outcome Family has the greatest variation of all. A PMS is supposed to take all form of input and create consistent, dependable output. The opposite is occurring here. Why? What does management want to do about this inconsistency and lack of predictability for the outcomes?

p.   **Figure 16** shows the multiple box-and-whisker plots for score vs. the Family for the Questions. Again, all distributions are non-normal (skewed), but with outliers. Here, we again see significant differences in the median scores among the various Families.

Again, the outcome Family has the greatest variation of all. Same questions are posed as for Figure 15.

q.   **Figures 17, 18, and 19** show a 3-D plot for the Severity, Occurrence, and Score in different statistical formats.

3.   ## Conclusions

a.   The PMS is functioning and achieving results consistent with most other businesses.

b.   There are significant frustrations, losses, and opportunities in the current PMS.

c.   There is significant variation in the outcome produced by the PMS; far more than the systems within the PMS, or the inputs to the PMS. This creates or contributes towards an atmosphere of fear, unknown, and will eventually severely limit or destroy trust amongst the PMS' stakeholders.

d.   Projects could be implemented 10% to 50% faster and/or cheaper by making some small, but extremely significant changes in the current PMS. CCPM

(Criticaal Chain Project Management) could be an excellent tool for achieving these improvements.

   i.   Further analysis would be required to determine exactly what these required changes are, the constraints on the current system towards change, and the most likely benefits to be achieved through these changes (ie. Narrow the 10% to 50% range to a specific number).

e.   Management needs to take action to improve the current PMS. This change will require a stable environment upon which to build the required improvements. Therefore management's first priority is to stabilize the current environment, and get it 100% ready for taking the necessary corrective actions.

4.   Recommendations

a.   Perform a more in-depth analysis to confirm these preliminary results;

b.   Stabilize the current PMS and its environments

c.   Develop a master plan for communicating current conditions, proposed future, and the optimum path for getting there.   Get someone assigned to the PMS assessment and improvement project who has:

   i.   demonstrated expertise in PM systems;

   ii.   PMS analysis;

   iii.   state-of-the-art PM systems, tools and methods; and

   iv.   change management.

5.   Points to Ponder before taking Action

Before changing your company's strategy or its implementation, PQA recommends you consider 6 aspects. These aspects are unique to you, so we present most of them as questions to consider, rather than generic statements that may not apply to your unique situation. Think about the following aspects before implementing:

a.   **Is this a real problem?**

       i.   Are these challenges soon to disappear on their own? While many managers may agree on the issues and solutions presented here, these issues may be neither the cause nor the solution for you. Only detailed analysis can identify and confirm the optimum strategy for you.

b.   **Is this your Top Priority?**

       i.   There is only one Top Priority. Has it been chosen correctly? In all cases, you need to take care of your people and systems so they keep delivering quality products and services without missing a beat. Next is short term cash flow. Without these, is there a future?

c.   **Necessary Resources?**

       i.   Ideally, your solution should reduce employee stress, improve quality & on-time reliability of each shipment or transaction, and improve short-term cash flow. Can your people achieve all of these while they do their "regular" job as well?

      ii.   Right now, your resources are 100% occupied on something. Distracting them with the issues and methods raised in this report will cause some loss of momentum, delays, and additional risks. If you hire (or transfer internally), finding the right resource can take considerable time (time you may not have). Will the added resources be self-managing, or add to the workload of existing management and support staff? Can they analyze, synthesize, and implement the right solution?

d.   **Project Management?**

       i.   If it's Priority #1, then it needs to be implemented as soon as possible, getting all necessary resources so as to ensure rapid success. Next, the second priority should select from the resources still available (provided #2 stays out of the way of Priority #1).

      ii.   Are your Project Management systems up to the challenge? To change a PMS, you need a plan to the future. This can be a circuitous problem (eg. dog chasing its own tail) with no solution unless you use an outside PMS to fix your current PMS.

iii. You are in a race (with your sister plants, competitors, or bankers). In races, most people will eventually cross the finish line given sufficient time and resources. But you need rapid implementation with minimal resource consumption. Do you use antique methods (eg. 1910's Gantt, or 1950's CPM, PERT), or just "wing it"? CCPM is 10% to 50% faster & cheaper than the best of these other methods.

e. **Can you Do-It-Yourself?**

i. Everybody can (and has to) learn sometime. Is this the time for developing new skills, or using existing skills (internal or external)? Do you need to get it right the first time, or can you risk trial & error?

ii. How many people will follow a leader if they think it's "blind leading the blind"?

f. **Guaranteed Success?**

i. Even if you are confident in your current plan, it helps to get a second opinion.

ii. If a second opinion agrees with your plan, your plan gains buy-in from everyone. If issues are raised, you can quickly improve the plan. Either way, you win!

iii. Remember, some solutions take years to implement. Others can start next week. Nothing starts until you take action.

About PQA

PQA is a team of professional who help organizations improve their quality, productivity, profitability, and stakeholder satisfaction.

We have specialized in the automotive parts manufacturing industry for the past 17 years.

We offer consulting, coaching, implementation, and training on 65 different topics. This includes modern management methods, strategic planning, environmental, energy, auditing,

statistical data analysis, ISO management systems, Lean, Six Sigma, Theory of Constraints, project management, and Business Excellence.

For further analysis, training, or implementation assistance, feel free to contact **Process Quality Associates Inc.** at +1 (519) 667-1720   (Toll Free 1-800-837-7046), or e-mail pqa@pqa.net.

Feel free to visit our Critical Chain Project Management website at http://www.pqa.net/ccpm/W05001001.html for more information on PMS and CCPM.

Yours truly,
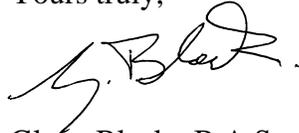
Glenn Black   B.A.Sc.   P.Eng.   CQE   CQA
President
Process Quality Associates Inc.

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Project Management Survey Results
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Plot of Score (Severity x Freq) vs Question #
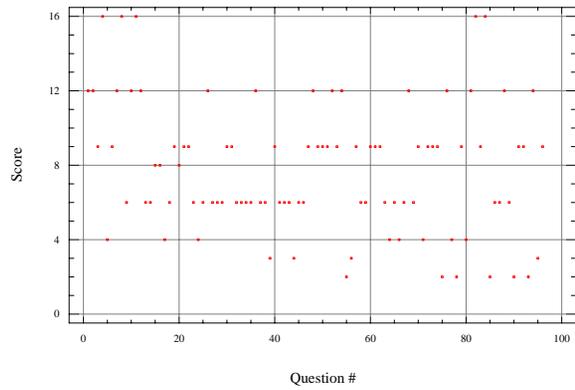
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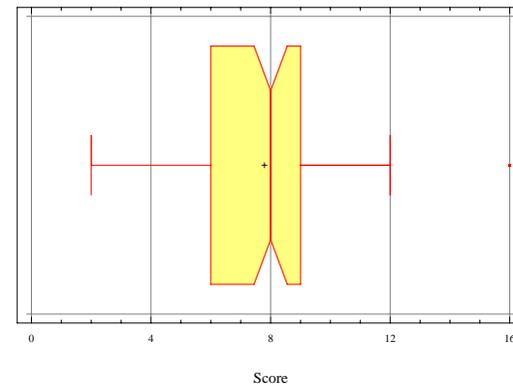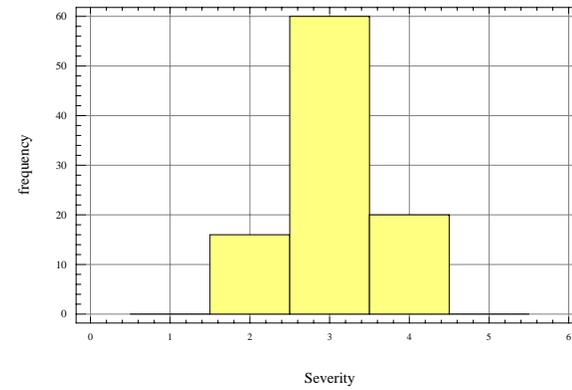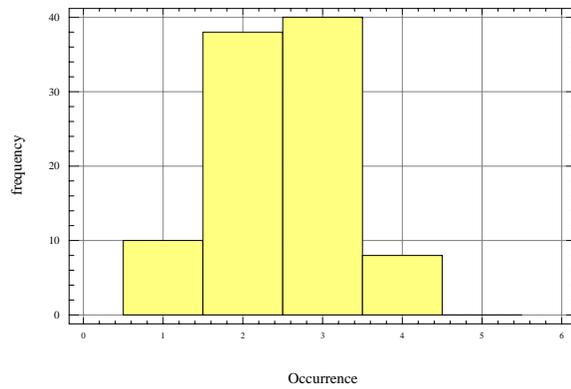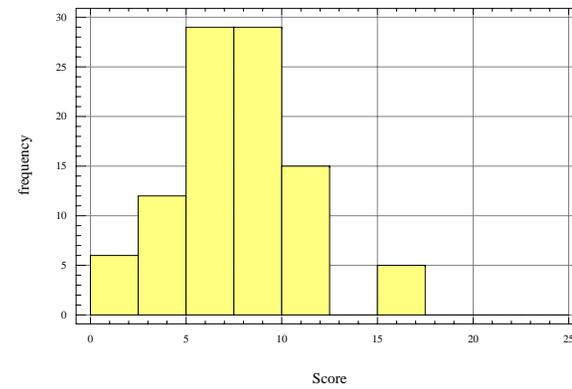

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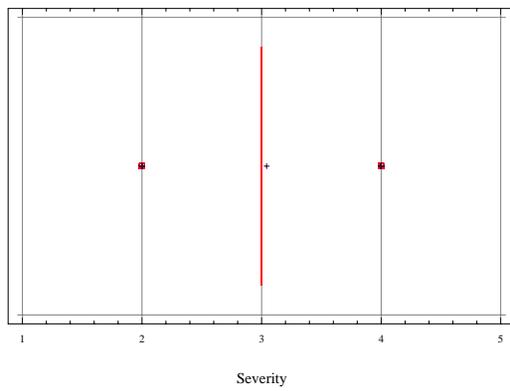
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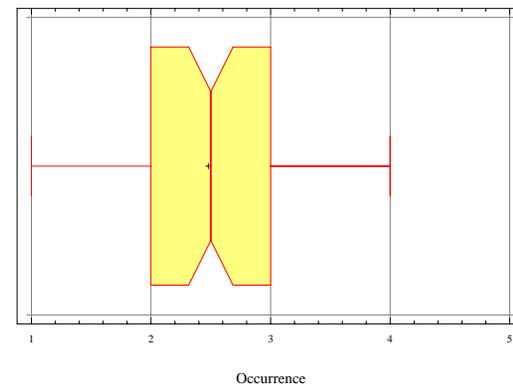
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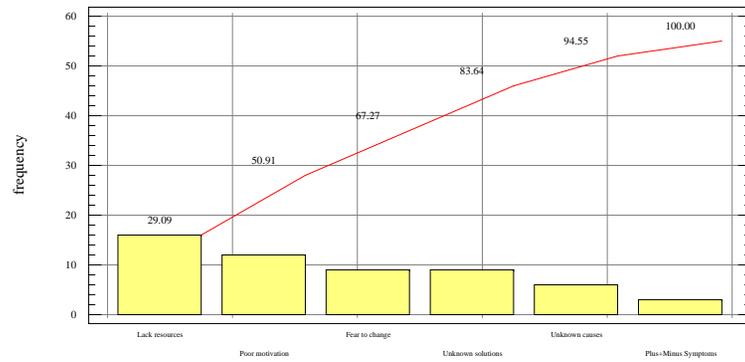
Histogram for Severity

Histogram for Occurrence
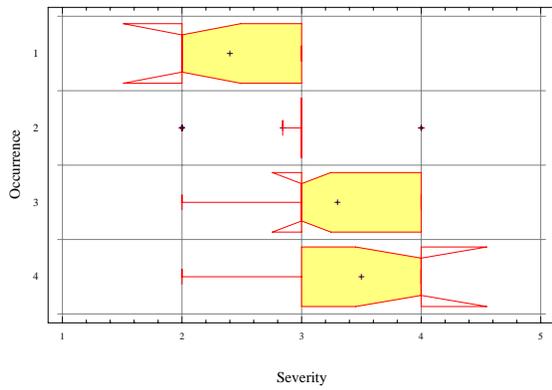
Histogram for Score (Priority x Freq.)

Plot of Severity vs Occurrence

Box-and-Whisker Plot

Box-and-Whisker Plot

Box-and-Whisker Plot

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Box-and-Whisker Plot

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Plot of Score vs Severity and Occurrence

Draftsman's Plot

Casement Plot by Levels of Score