APPLYING CRYSTAL BALL® TO TRANSACTION PROCESS ANALYSIS

Paul J. Benson, B.S, M.E., M.B.A.
Xerox Corporation – Certified Master Black Belt
7 Chippenham Drive
Penfield, NY 14526 USA

ABSTRACT

Efforts to improve transactional processes often focus on reducing process cycle time. Prior to incurring cost to reduce cycle time, estimates of benefits should be developed and used to define improvement plans. Benefit estimates are usually based on average cycle times for each step of a process. However this approach does not account for process variability. Nor does the approach account for unique situations like binary process events. A binary process event occurs when a decision with two possible outcomes occurs in a process. Crystal Ball can be utilized to evaluate process steps for their full range of variation and assess the impacts of binary events. Results from the analysis provide better assessments cycle time variation than an average approach. Graphical outputs from the software quickly illustrate cycle time differences. The outputs can also be used to define the probability of exceeding a desired cycle time. These results provide a business team with a better understanding of impacts from proposed changes. The team can assess impacts against their current baseline and develop the appropriate improvement plan.

1 PROCESS BACKGROUND

Transactional processes combine information from a number of sources to create various business documents and or forms. Improvements of these processes can examine improving accuracy or reducing cycle time. This case will consider cycle time improvements only. The analysis approach can be applied to larger processes, but for demonstration purposes a three-step process in Figure 1 will be considered.

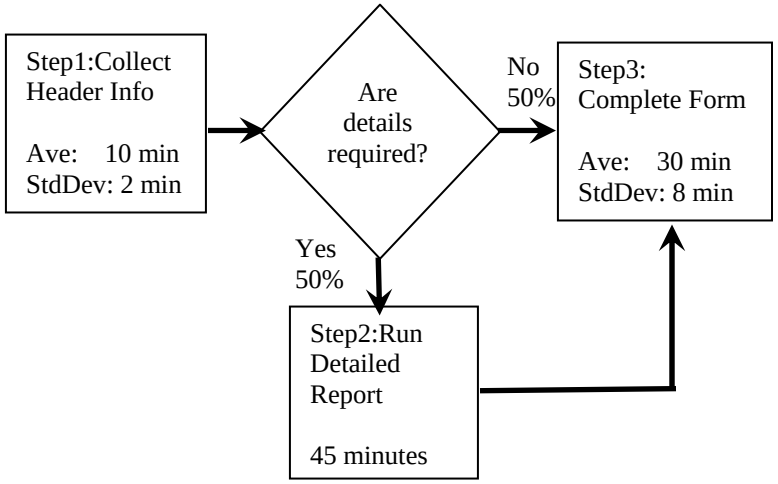


Figure 1: Transactional Process A

The process outlined in Figure 1 consists of inputs, outputs, and a decision point. Based on performance information, steps 1 and 3 are normal processes with average and standard deviations for cycle times. Step 2 is an automated process with a fixed operating time. Step 2 is only required for half of the forms. The business unit would like the maximum cycle time for the process to be 70 minutes.

2 PROCESS ANALYSIS

An initial analysis step is to create a baseline of the current process. Data from process observations are used to define input assumptions. Process data indicate a normal distribution for step 1 with an average of ten minutes and standard deviation of two minutes. This information can be entered into the Crystal Ball software with the following assumption input.

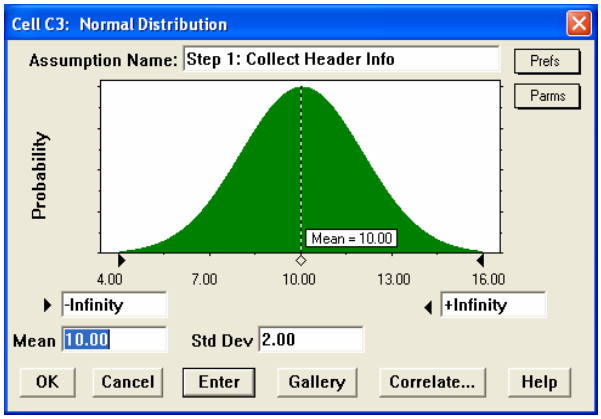


Figure 2: Sample of normal distribution input into the system

The same input approach can be applied for the other normal process step 3. However, step 2 represents a binary event that only occurs 50% of the time. The step is an automated system query that requires a fixed time of 45 minutes to run. A common approach for this type of step is to take the average cycle time for the binary event, 22.5 minutes, and add it to the cycle time result of the other processes. The approach yields the results in Figure 3.

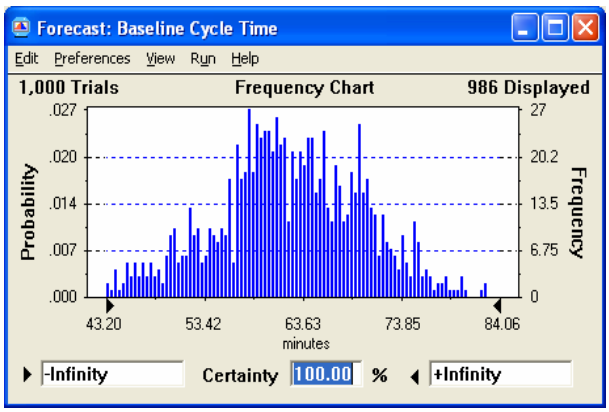


Figure 3: Forecast for Average Assumption Baseline

The output of the average cycle time method does not account for the full impact of the automated query. Figure 3 should have cycle time distribution with two peaks and a valley between them, because time is either required for the binary event or not. The automated step with fixed run time will never add 22.5 minutes to the process. Crystal Ball can be applied to model binary events and generate a better estimation of process cycle time.

2.1 Binary Event Modeling

During assumption definitions for a Crystal Ball model, a custom distribution can be used to define a binary event. After a custom distribution is selected, the window appears (Figure 4). The value ranges are 0 to 1, which represent that either the

event occurs or does not. The total probability is defined as 1, and the step between values is defined as 1. Providing these inputs generates a relative probability for each value of 50% and is observed on the y axis in Figure 4.

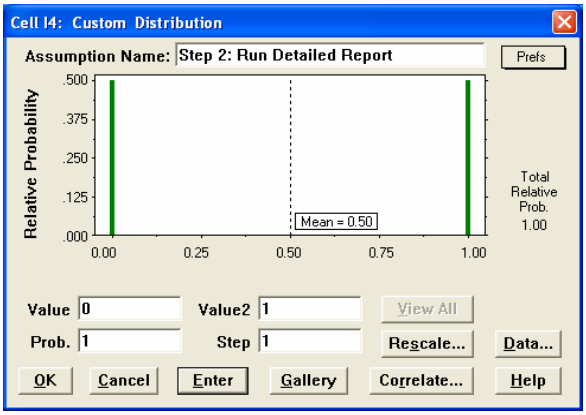
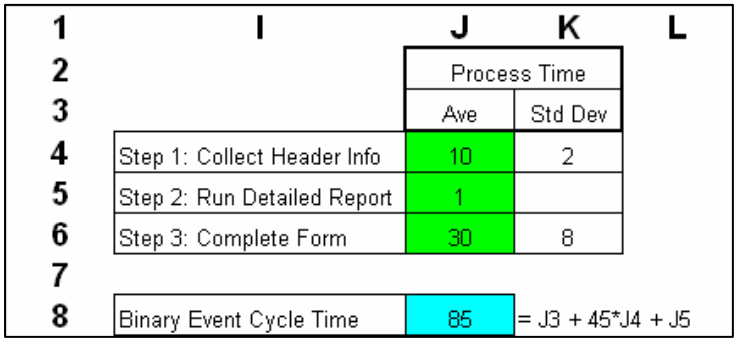


Figure 4: Input for a binary event

To forecast the impact of the binary event, the cell with the custom distribution must be multiplied by the time for the step. Figure 5 below indicates assumptions in green and forecast in blue. To the right of the forecast cell is an expression that account for step 2's cycle time.



	I	J	K	L
2		Process Time		
3		Ave	Std Dev	
4	Step 1: Collect Header Info	10	2	
5	Step 2: Run Detailed Report	1		
6	Step 3: Complete Form	30	8	
7				
8	Binary Event Cycle Time	85	= J3 + 45*J4 + J5	

Figure 5: Modeling a binary event

Updating the initial process baseline to account for the binary event yields a process time forecast in Figure 6.

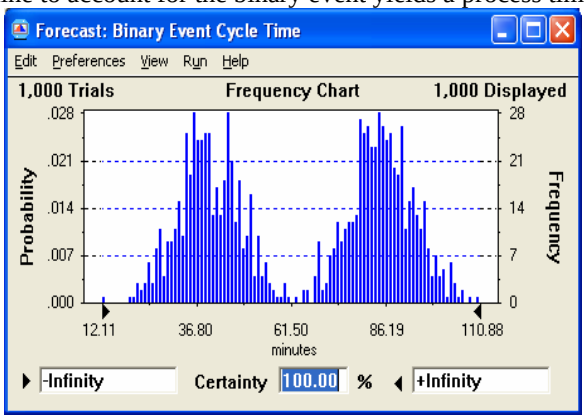


Figure 6: Updated Process Cycle Time baseline

The updated model forecast results in Figure 6, which has the expected two-peak distribution. The result clearly indicates the impact of the binary event. A graphical comparison of the average and binary event baseline cycle time models would emphasize the differences of the two modeling approaches.

2.2 Graphical Comparisons of Baselines

Crystal Ball software provides an Overlay chart function to plot multiple forecasts. Figure 7 below compares the results of the two approaches used to model the process baseline.

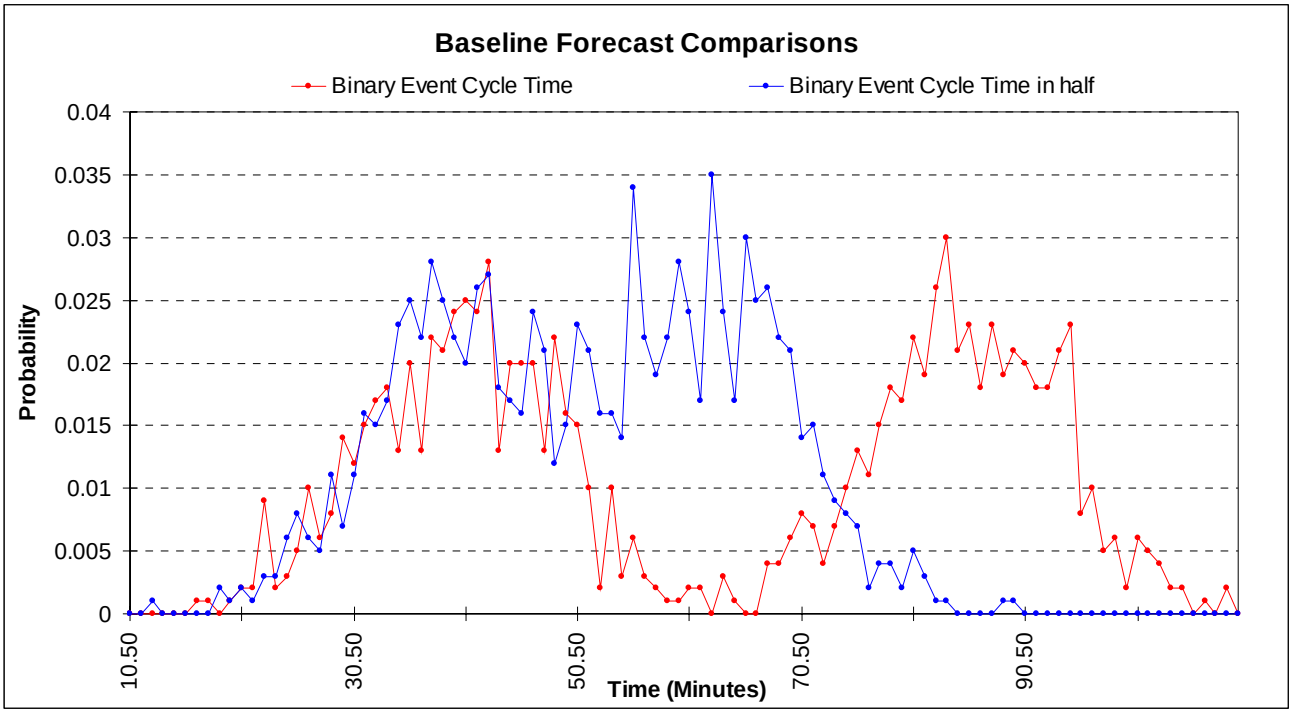


Figure 7: Baseline comparisons

The plot clearly indicates the difference of the two approaches. The average approach in blue does not have the same cycle time range as the binary event model in red. If the average approach was used to define the baseline opportunity for the process, then a team would not expect to observe any cycle time over 90 minutes. The same team would not expect more than 20% of the process runs to exceed 70 minutes. The binary event model sets different expectations for a team.

The binary model has a maximum process cycle time of 105 minutes. The model forecasts that 45% of the process results could exceed 70 minutes. The extra time and higher probability of exceeding 70 minutes is directly attributed to the extra time associated with collecting detailed data. The impact of the extra time was diluted by assuming an average cycle time. Applying the binary approach yields a better estimate for process cycle time.

2.3 Cycle Time Probability

Business teams may want to assess the probability of a process cycle time meeting a desired target. Crystal Ball allows a team to quickly and easily generate the probability of being above, below, or between a range for process cycle times. Figure 8 shows that the probability of being less than 70 minutes is 53%. Figure 9 assess the probability of being greater then 45 minutes is 63 minutes. Figure 10 provides a value for process cycle time being greater tan 45 minutes and less than 70 minutes as 16%. Teams can leverage this information to perform risk versus benefit analysis prior to committing valuable resources to any initiative.

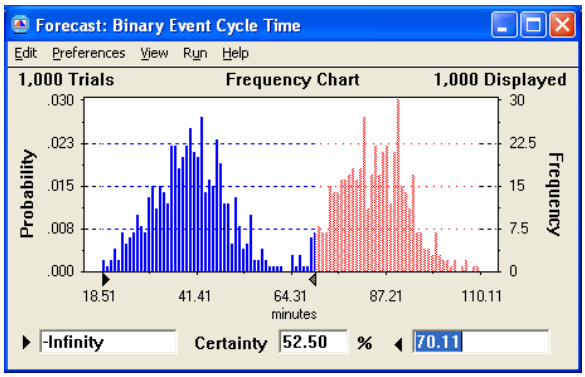


Figure 8: Probability of being bess than 70 minutes

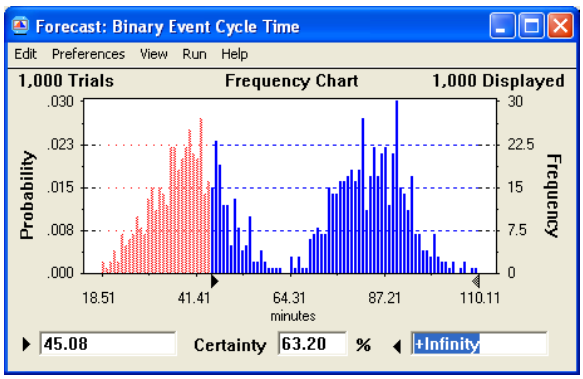


Figure 9: Probability of being more than 45 minutes

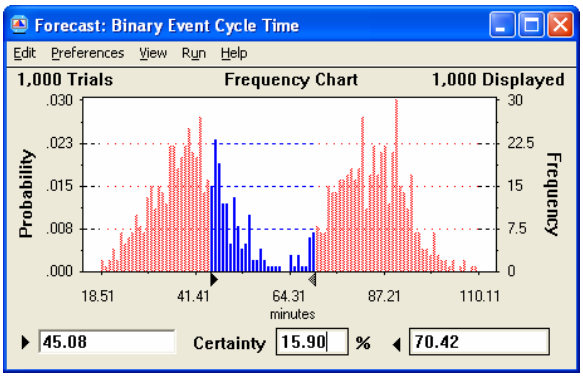


Figure 10: Probability of being between 45 and 70 minutes

3 DISCUSSION

Analysis of transactional process cycle time can be achieved by a number of methods. Despite the difference in approaches there are some common stages between methods. At the start of an analysis, a team will define a baseline for an existing process. In the second stage, major contributors to cycle time are determined. The third stage compares benefits and cost of potential actions to reduce cycle time. The fourth stage implements process changes. In the final stage, a team will validate process cycle time improvements. Utilizing Crystal Ball software at various stages of process analysis can be beneficial for a team.

During baseline definition, Crystal Ball can enable a team to estimate baseline cycle-time distributions more accurately. The software can also assist a team to quickly and easily model unique situations like binary events. Assessment of proposed

changes is also a critical step in the improvement process. Validation of process changes and comparison against specific business targets are desirable outcomes from process improvements. The software's graphical features like overlay charts provide a team with a powerful tool to efficiently compare process changes and quickly communicate changes in a process. Other graphical tools enable teams to clearly communicate the probability of meeting or exceeding a desired target. Baselines that account for process variability, easy-to-understand performance comparisons, and clear probability assessments against a target are several examples of the benefits of applying Crystal Ball to transactional process analysis.

4 SUMMARY

Transactional process improvement teams can benefit from applying Crystal Ball to their projects in at least three areas. The software enables a team to create better estimates of process baseline cycle times when binary events are involved in a process. The graphical overlay feature of the software allows a process team to quickly visualize the difference in process cycle time from both a variation and average perspective. A team could also benefit from the software's ability to estimate andd graphically display the probability of meeting a specific cycle time. Crystal Ball's combined abilities of enabling better baseline estimates and providing easy–to-understand graphical outputs provide a team with excellent tools for improvement planning and communication.

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BIOGRAPHY

Paul Benson (585-423-5671) received the second Master Black Belt certification at Xerox Corporation after completing numerous projects, developing and delivering training material, and coaching several waves of Black and Green Belt candidates. Prior to Xerox, Paul worked for General Electric Company, where he was first introduced to Crystal Ball software. Over the years Paul has utilized Crystal Ball software for manufacturing, design, and transactional process improvement projects.