

STARTING WITH QUALITY: USING TDQM IN A START-UP ORGANIZATION

(Practice-Oriented Paper)

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Abstract: Implementing a Total Data Quality Management program in a start-up situation presents unique challenges. It is difficult to document processes that are evolving. With no history of data quality to build upon, it is difficult to anticipate potential sources of error. The experience of Concept Shopping, Inc. provides an excellent example of how to successfully implement TDQM in a start-up situation. Process mapping and reporting on process performance are critical elements of this TDQM process. Concept Shopping's early implementation of TDQM practices reduced errors, identified priorities for continued development of quality processes and reduced costs by replacing costly manual intervention with well-engineered processes and tools.

Key Words: Data Quality, TDQM, process map, work process change

INTRODUCTION

In a start-up situation there are unique challenges to TDQM. Processes are new and evolving rapidly. Emphasis is on the initial delivery, rather than a repeatable process. It is difficult to identify problem processes since there is little experience with actual delivery and problem areas must be anticipated rather than actually observed. The importance of a stable process that is well documented and measurable must be clearly communicated to the organization, even before problems occur.

The experience of Concept Shopping, Inc. provides an excellent example of how to successfully implement TDQM in a start-up situation. The TDQM approach used at Concept Shopping is a simple six-step process that is based on the Plan-Do-Check-Act (PDCA) model defined by Deming [2]:

1. Document process
2. Track problems
3. Link problems to process
4. Identify root cause of problems
5. Develop and implement solutions
6. Report performance

COMPANY BACKGROUND

Concept Shopping, Inc. (CSI) helps retailers provide individualized marketing to customers using retailer loyalty card data, to grow profits by cost-effectively delivering the right message to the right customer at the right time. Concept Shopping works on behalf of the retailer to develop these personalized campaigns

and secure manufacturer funding of the offers.

CSI distills transaction summary logs (TLOGs) created by grocery retail point of sale (POS) systems using proprietary Shopper FingerprintSM technology, making it possible to efficiently and effectively market to individual households. The distillation process retains all data elements necessary to understand the preferences of each shopper and makes it possible to update those preferences daily for tens of millions of shoppers.

CSI's patented, closed-loop, Perpetually Relevant MarketingSM (PRM) program continuously monitors and evaluates the offers extended and purchases made - by shopper. This enables marketers to "learn" more about each shopper's preferences and better serve each shopper through rules-based, Perpetual RelevanceSM Campaigns. Acceptance or rejection of offers creates a change in each shopper's "state" and drives the selection of subsequent offers. Executing campaigns that are longitudinal and rules-based rather than one-time promotional events makes it possible to dynamically react to shopper response.

Quality was a top priority specified by the Chief Executive Officer from the earliest stages of the start-up. The CEO's previous experience included successful implementation of a TDQM process to eliminate errors and reduce costs. First hired were an elite staff of engineers, most with doctorates in Computer Science and all with extensive software engineering experience. Quality Assurance was the next function staffed, even prior to staffing sales and client service. Throughout the system development process, exhaustive regression tests were written and are run on a daily basis as new or revised programming code is implemented.

Concept Shopping is a privately held company founded in 1998 and headquartered in a suburb of Chicago. CSI is advised by a Board of Directors consisting of Dr. James Gosling and partners from venture capital investors Sutter Hill Ventures and Mohr Davidow.

CREATION OF TDQM FRAMEWORK

Define Overall Process

Documenting the overall process is the first step in establishing a Total Data Quality Management Program. The objective is to define, on one page, the high level tasks and the key constituents involved in the process of delivering the product or the service of the organization.

The mapping process used at Concept Shopping builds on the customer-supplier model described by Redman [3] and the Information Production Maps (IPMAP) proposed by Shankaranarayan et al [1, 4]. In these maps, information on critical processes, boundary points, and identification of process owners is defined. The process map format used by Concept Shopping specifically incorporates the needs and desired outcomes for each process owner group. Concept Shopping's process maps are designed to be used by both information managers (QA) as well as by each department process owner. In addition, these maps are used to communicate the information production process to external groups such as clients and CSI's investors.

For each constituent group, their needs, their desired outcomes, and their critical tasks or areas of responsibility are defined. Most important, however, is identifying the handoffs from one constituent group to another. Quality issues often occur when handing off from one group to another, particularly if

these groups cross organizational boundaries. Once these handoffs are defined, it is possible to identify where to collect process performance data and establish performance metrics.

At Concept Shopping, the QA organization documented the overall process, even before the specific tasks were defined or understood. The starting point for mapping the overall process was a system map created by the Engineering staff. Marketing, Sales, and the client were then involved in order to understand critical needs and outcomes of each constituent group. The result was a one-page process map that is easily understood and accurately defines the goal of the overall process (Figure 1).

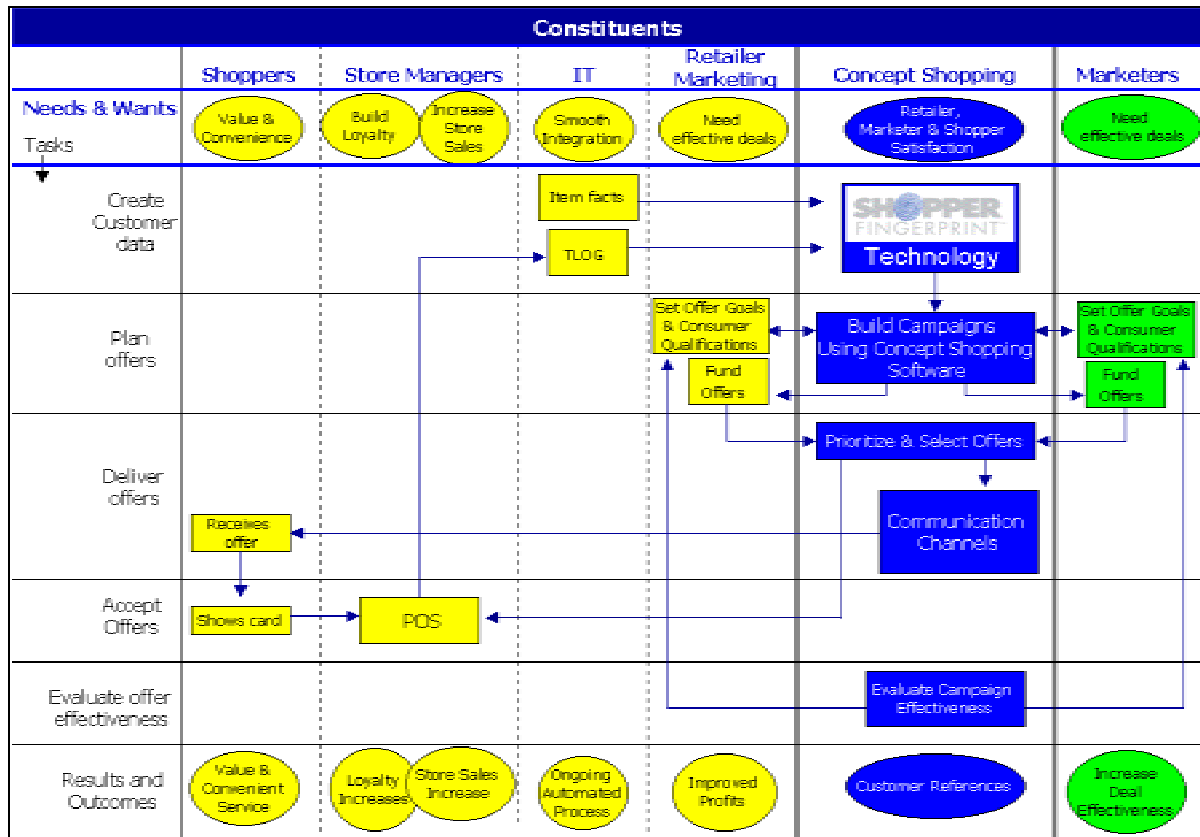


Figure 1: Process Map

This overall process map is used by all areas of the organization for several purposes:

- Sales and Client Service: communicate the process to clients
- QA: identify and prioritize process areas to be documented, measured, and reported upon
- Administration: train new employees
- Accounting: planning and selecting an accounting management tool
- Board of Directors: planning and prioritizing capital expenditures with a focus on quality and scalability

Define Specific Processes

As procedures were established, each department was interviewed to create a map of all key processes, including the Sales Process (Figure 2), Campaign Creation, Link Code Creation and Maintenance, Campaign Installation and Reporting, Field Maintenance, Accounting and Billing, and the Shopper Feedback Process. Since these specific process steps were documented early, during the creation of the process, they were continuously updated, as the process was refined.

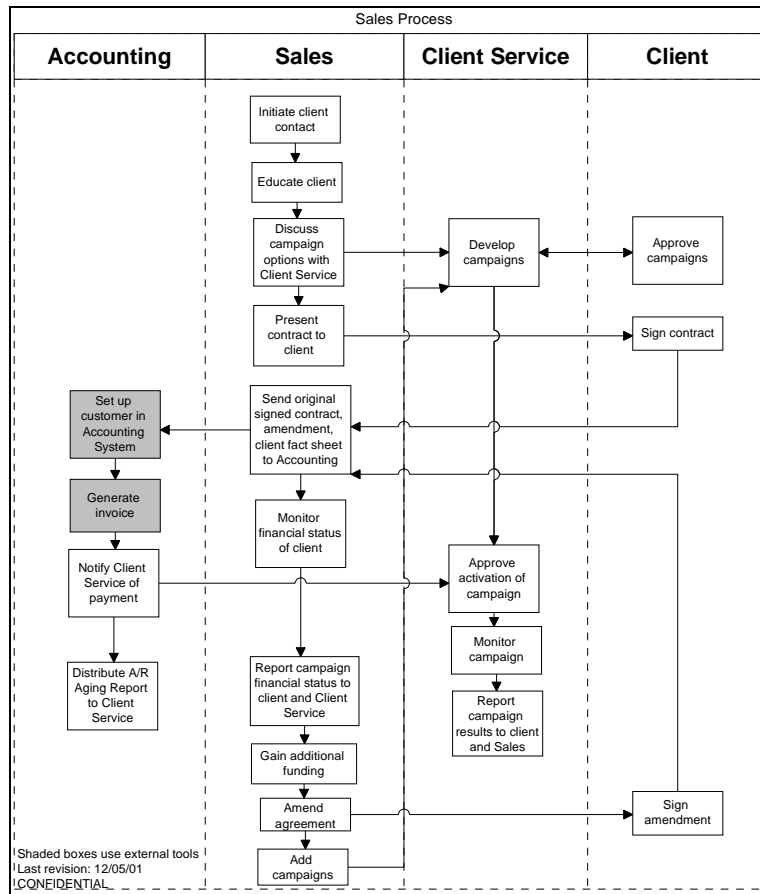


Figure 2: Sales Process Map

Define Reports

The categories and dimensions of Information Quality, as defined by Wang and Strong [5], were used to define reporting for both internal and external users (Table 1).

IQ Category	Dimensions
Intrinsic IQ	Accuracy, Objectivity, Believability, Reputation
Contextual IQ	Relevancy, Value-Added, Timeliness, Completeness, Amount of information
Representational IQ	Interpretability, Ease of understanding, Concise representation, Consistent representation
Accessibility IQ	Access, Security

Table 1: IQ Categories and Dimensions

Internal Reports

Initial internal reports were designed to meet the needs of Client Service and reflected weekly campaign status. This information was critical for Client Service in their analyses of campaign performance. In addition, information on errors or customer outages was collected to be used by QA and Engineering to identify issue areas. These reports were produced initially using spreadsheets while a more robust database was being created for full reporting.

FileMaker Pro™ was used to create a straightforward interface to enter problems tracked by campaign. Problem areas were defined based on the documented processes. This method provided easy input (Figure 3), covered all key data, and was updated with POS exception reports.

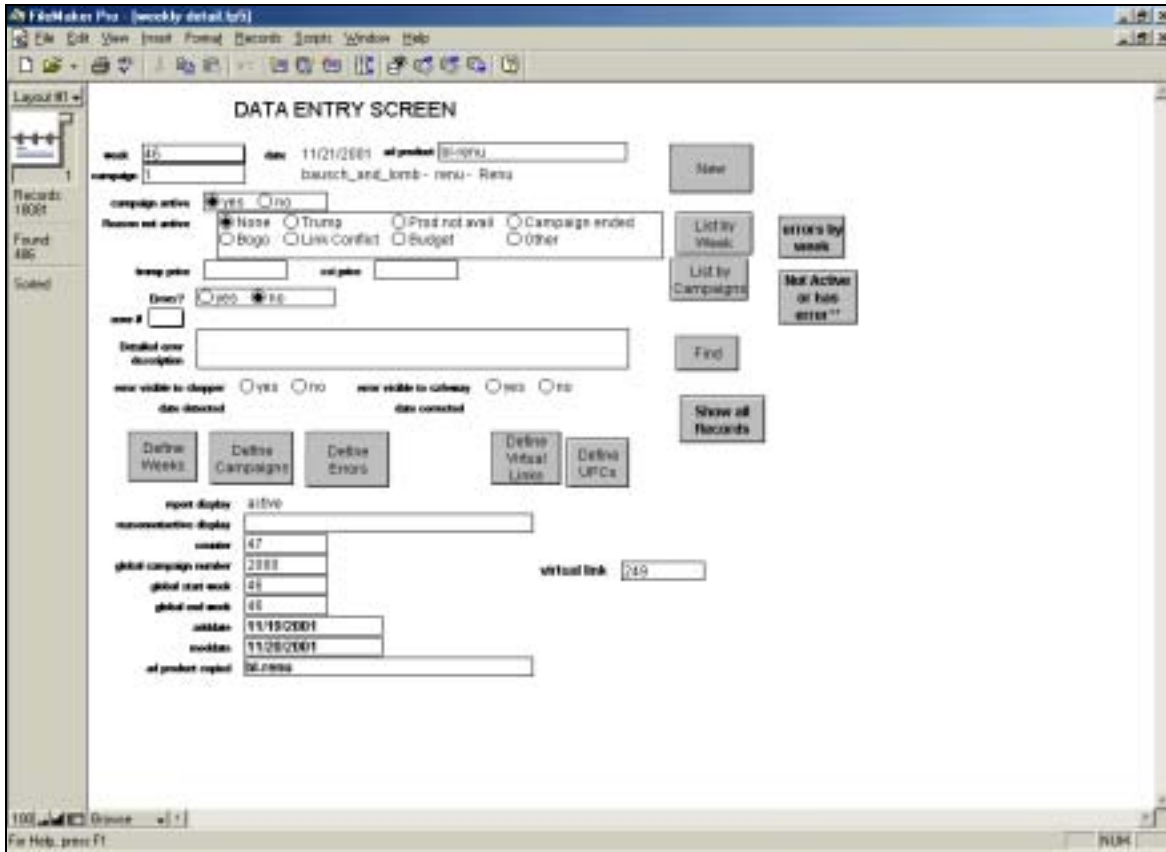


Figure 3: Data Entry Screen for Problem Tracking

Initial reports were distributed to get feedback on the format and usability from users (Representational IQ). Because key information was collected, the QA staff was able to answer ad hoc inquiries quickly using the data (Contextual IQ). Standard reports in summarized and detailed formats were available to internal users on a LAN and via email (Accessibility IQ).

Although operational issues were infrequent, they were easy to identify in reports, and an exception report isolating the errors, was created (Figure 4). This report was used by QA and Engineering to develop solutions for any recurring issues.

Error Report - sorted by week, then campaign							
Campaign Name	Errors	Error Visible to:		Date:			
		retailer	shopper	Detected	corrected		
<div style="text-align: right; margin-bottom: 0;"> xAll stores </div>							
10/24/2001	vendor: xAll store - Store 1138 - Corema or POS issue Corema outage - 57 offlines - 2.27% of all transactions	<input type="checkbox"/>	<input type="checkbox"/>	10/25/2001	10/25/2001		
10/24/2001	vendor: xAll Store - Store 639 - Corema or POS issue Corema outage - 49 offlines - 3.11% of all transactions	<input type="checkbox"/>	<input type="checkbox"/>	10/25/2001	10/25/2001		
10/24/2001	vendor: xAll Store - Store 658 - Corema or POS issue Corema outage - 33 offlines - 2.75% of all transactions	<input type="checkbox"/>	<input type="checkbox"/>	10/25/2001	10/25/2001		
10/24/2001	vendor: xAll Store - store 971 - Corema or POS issue Corema outage - 49 offlines - 1.54% of all transactions	<input type="checkbox"/>	<input type="checkbox"/>	10/25/2001	10/25/2001		
10/24/2001	vendor: xAll Store - Store 999 - Corema or POS issue Corema outage - 56 offlines - 2.34% of all transactions	<input type="checkbox"/>	<input type="checkbox"/>	10/25/2001	10/25/2001		
<div style="text-align: right; margin-bottom: 0;"> xAll Campaigns </div>							
10/17/2001	vendor: xAll Campaigns - Global - Other issue No logs received 10/11/01-10/15/01.	<input type="checkbox"/>	<input type="checkbox"/>	10/11/2001	10/15/2001		

Figure 4: Error Detail Report

External Reports

Certain types of issues needed to be communicated to the client. CSI isolated the data the client required (Contextual IQ). Reports were created and tested with users until an effective format was determined (Representational IQ). The result was a one-page daily report (Figure 5) that was emailed to the client (Accessibility IQ).

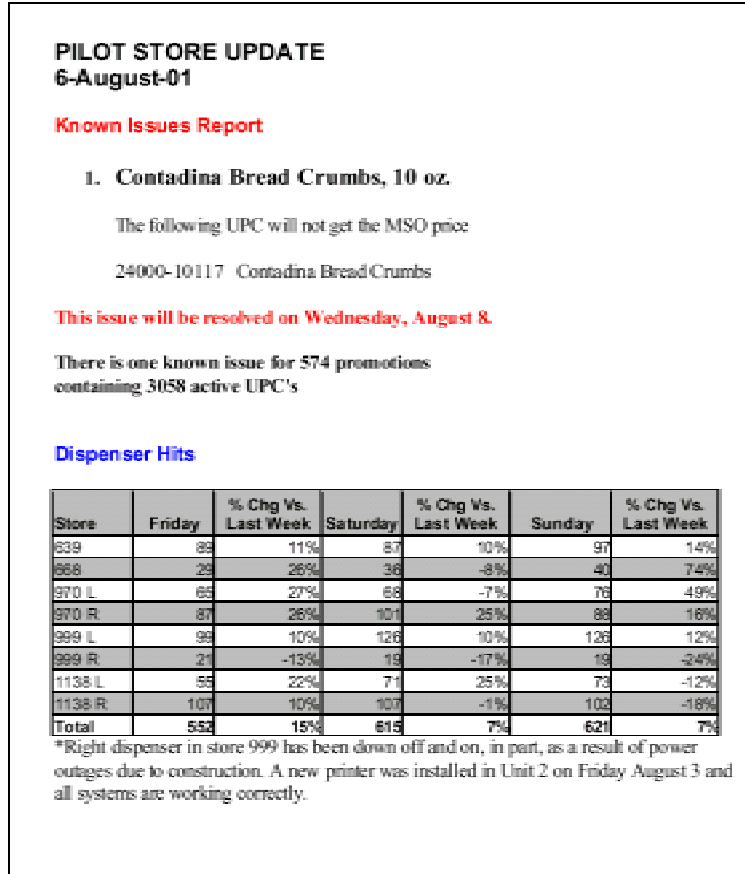


Figure 5: Daily Store Report

EARLY WORK PROCESS IMPROVEMENT

Process Improvement with Internal Customers

The PRM system that delivers customized offers to customers through the retail POS was implemented in five stores, with expansion to a larger market and divisional level planned. At that point, initial work processes were in place. The system worked as expected and there were few customer issues reported. But, the system required high levels of support from Engineering and Operational staff to guarantee successful delivery to retail customers. There was risk of a higher than acceptable level of errors in the future. Additional staffing requirements, hence additional expenditures, would be high as the program was expanded.

To address these risks before they occurred, a process improvement session was held which included all

internal process owners. The simple six-step TDQM process described above was used to link problem to process steps and generate solutions.

In this meeting, the team reviewed the process maps and discussed where errors had or were likely to occur. Emphasis was placed on process steps that required hand-offs from one group to another. Next, process issues were prioritized based on frequency and severity. The group could then focus on these most critical areas. Root causes were defined and solutions generated.

Solutions included both organizational changes as well as software and technology based solutions. Each solution was documented with the following information:

- Solution description
- Long term vs. short term fix
- Solution owner
- Priority of solution
- Next steps for solution implementation

The process maps and the solution summaries were distributed to all staff members. This provided everyone with a clear and consistent understanding of critical next steps. This insured that all development and organizational focus was on improving quality and achieving scalability with limited costs.

Process Improvement with External Customers

During the internal process improvement session, process owners identified a key process that required substantial interaction with the retailer client. This process was cumbersome and error-prone due largely to numerous hand-offs between the retailer and CSI. The process tasks needed to be completed weekly, usually with tight timing pressure.

It was important to address the process with the client early, before minor handoff issues escalated to major operational problems with the client. CSI requested a meeting with key constituents at the client to discuss process improvement.

There were two stated objectives for this meeting:

- Improve the short-term specific process
- Guarantee scalability of processes as the system was expanded beyond the initial pilot

CSI emphasized the need to document, check, evaluate, and measure performance. Deming's PDCA cycle for continuous process improvement [2] was used as the specific framework for the meeting since the client used this model in their own internal work process improvement. CSI and the client reviewed the relevant process map to identify hand-offs. Specific solutions were developed jointly. These solutions included longer-term technology changes as well as immediate changes to the client's documentation and training materials. Because CSI used a well-defined process improvement approach, a potential complaint session turned into a productive discussion of solution options.

LESSONS LEARNED

There are several key learnings from the TDQM process at CSI, some of which apply to all organizations and some that are of special relevance to start-up organizations.

General

- TDQM reduces costs by creating an efficient process.
- Reports must meet the needs of recipients and be easily accessible or they will not be used.
- Well-established processes and documentation enable people to deal with facts rather than emotions when problems occur.
- Process improvement meetings must be well structured and leave the organization with a prioritized list of solutions.
- Solutions must be communicated back to the organization following a process improvement meeting to insure everyone is working on the same priorities.
- The entire organization benefits from the use of process maps both internally (e.g. new hire training) and externally (e.g. sales efforts).

Start-ups

- Using TDQM to develop well-engineered processes with less manual intervention means hiring fewer employees to manage the process.
- Using TDQM establishes credibility within and outside of the organization.
 - Across groups – fosters working relationship between QA and Engineering.
 - With the Board of Directors – creates confidence with investors
 - With external customers – enables productive improvement discussions with the client
- Process maps help focus development efforts by highlighting vulnerabilities such as hand-offs.
- Having initial process maps to reference is an excellent reminder for people to focus on quality as they develop roles and improve procedures.
- Early versions of process maps must be continuously updated as the process evolves.

CONCLUSION

Implementing TDQM in a start-up situation is essential. Quality initiatives must be in place early to guarantee the continued success of the organization. By using TDQM from the beginning, Concept Shopping identified problem processes before the system was in full operation. Development priorities could then be established to focus on building the right processes from the start, rather than fixing error prone processes later. By mapping and measuring the processes during the initial implementation, CSI successfully prevented errors and increased customer satisfaction. Focusing on building the right process reduced costs by allowing CSI to operate with fewer employees, making it easier to secure financing from investors.

Once implemented, the TDQM process must be continually updated, to meet the needs of the organization as processes evolve and mature. Critical next step efforts at Concept Shopping will be focused on defining process quality indicators and then collecting and reporting on these quality metrics to the entire organization.

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