

CHAPTER 3. TIQM[®] IMPROVEMENT PROCESS

3-1 Overview

- A. Information quality improvement is a proactive step to prevent non-quality data from being entered into information systems. The data correction process corrects defective data, and this correction is part of the cost of non-quality data. The information quality improvement process attacks the *causes* of defective data. Eliminating the causes of data defects and the production of defective data will reduce the need to conduct further costly data correction activities.
- B. Maintaining information quality is a continuing effort. Critical to the effectiveness of the procedures is an information quality awareness campaign that motivates information producers and knowledge workers to take daily ownership of information quality. As consumers and producers of quality data, knowledge workers and data providers are the best resource in identifying both quality issues and their solutions.
- C. Information quality procedures must include periodic assessments to review information quality. This ongoing process ensures that the highest quality data is being used throughout the enterprise. When deficiencies in data are discovered, immediate steps must be taken to understand the problem that led to the deficiency, to correct the data, and to fix the problem.
- D. The improvement process consists of five major steps (source: *Improving Data Warehouse and Business Information Quality*, p. 289-302):
 - 1. **Select Process** for Information Quality Improvement.
 - 2. Develop **Plan** for Information Quality Process Improvement.
 - 3. **Do** Implement Information Quality Improvement.
 - 4. **Check** Impact of Information Quality Improvement.
 - 5. **Act** to Standardize Information Quality Improvement.
- E. Improvements can be a mixture of automated and manual techniques, of short, simple implementations and lengthy, complex implementations that are applied at different times. Because of the possible diversity of improvements, the Program Area must track progress closely. Documenting the successes and challenges of implementation allows sharing and re-use of the more effective Information Quality Improvement techniques.
- F. The implementation of information quality improvements will include one or more of the following actions:
 - 1. The implementation of awareness (education) activities.
 - 2. The implementation of statistical procedures to bring processes into control (including run charts).
 - 3. Improvements to training, skills development, and staffing levels.
 - 4. Improvements to procedures and work standards.
 - 5. Changes to automated systems and databases.

3-2 Select Process for Information Quality Improvement

- A. The first step in planning improvements is to identify which process(es) are the best candidates for process improvement. Candidate processes can be identified through the Information Quality Assessment report generated in Section 2-7. The candidate processes

are then prioritized by the best return in information quality for estimated time/cost/effort investment. The return on investment is estimated by reviewing¹⁸

1. Technical Data Definition Quality Assessment developed in Section 2-3(C),
 2. Information Architecture and Database Assessment developed in Section 2-3(D),
 3. Information Quality Assessment developed in Section 2-5,
 4. Information Cost and Value Analysis developed in Section 2-6,
 5. Any data definition Customer Surveys that may have been conducted.
- B. Based on the nature of the problem(s) to be solved, a Program Area Quality Improvement Team with representatives from all stages in the value chain is put into place. For an information quality improvement initiative to be effective,
1. Improvement Team representatives must perform the actual work.
 2. A non-blaming, non-judgmental environment for process improvement is established. If there are defective data, it is because there are defective processes—not defective people.
 3. The process owner or supervisor of the process to be improved must empower the team to make and implement the improvements.
 4. The team must be trained in how to conduct a Root-Cause Analysis, and how to learn what kinds of improvement and error-proofing techniques are possible.
 5. A process improvement facilitator must be available and trained in conducting PDCA process improvement.
 6. The origin of the data and its downstream uses must be understood.
- 3-3 Develop **Plan** for Information Quality Process Improvement

- A. The foundation for developing information quality procedures is the investigation into the current processes controlling the data and an evaluation of possible root causes. All data control processes must be considered, manual and automated. All sources of the data must be considered, as well as who modifies the data or influences what the data looks like on a form, screen or report.
- B. Conduct Root Cause Analysis
1. Once the process is understood, analyze it to get to the “root cause” of a data defect using the Cause and Effect or Fishbone Diagram (see Figure 3.1 below), the “why analysis” technique, or any other method for root cause analysis. Six possible categories of failure cause are included in the Cause and Effect diagram – Human Resources, Material, Machine, Method, Measurement and Environment. For each defect cause identified, it is necessary to answer “why” the error occurred until the root cause is found. All possible scenarios for tracking down the root cause should be explored by considering all six categories in the analysis. A typical root cause analysis might develop as:
 2. Scenario - Defect identified is Customer Number not on Order:
 - a. Why is the Customer Number not on the Order? *Because the customer did not have the number (Material Cause).*
 - b. Why didn't the customer have the number? *Because the customer has not yet received the mailing that contains the customer number (Method Cause).*
 - c. Why was it not supplied? *Because the customer is new and ordered before receiving the customer number (Method Cause).*
 - d. Why did it cross in the mail? *Because the new customer mailing runs only once a month (Method Cause).*

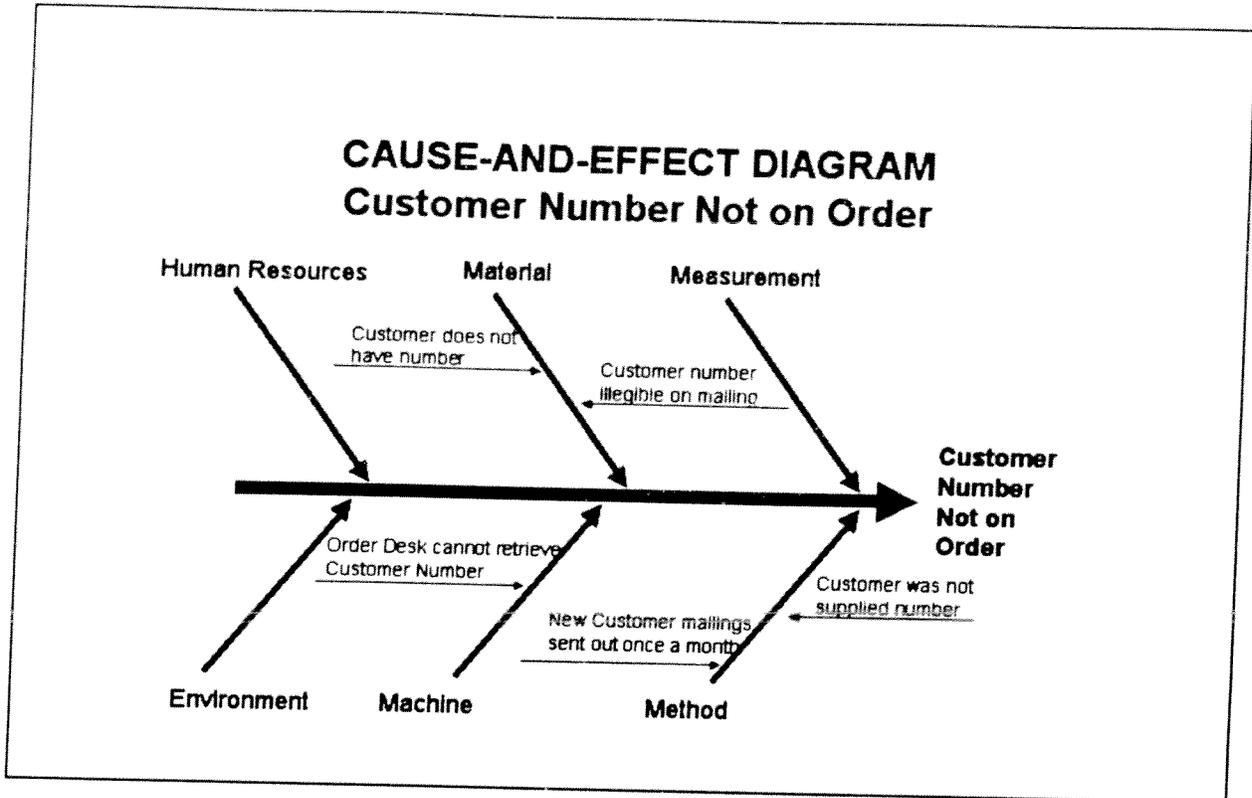


Figure 3.1: Illustration of a Cause-and-Effect Diagram

The diagram in Figure 3.2 presents typical areas of concern needed when applying the Cause-and-Effect diagram to the study of an Information Quality Issue.

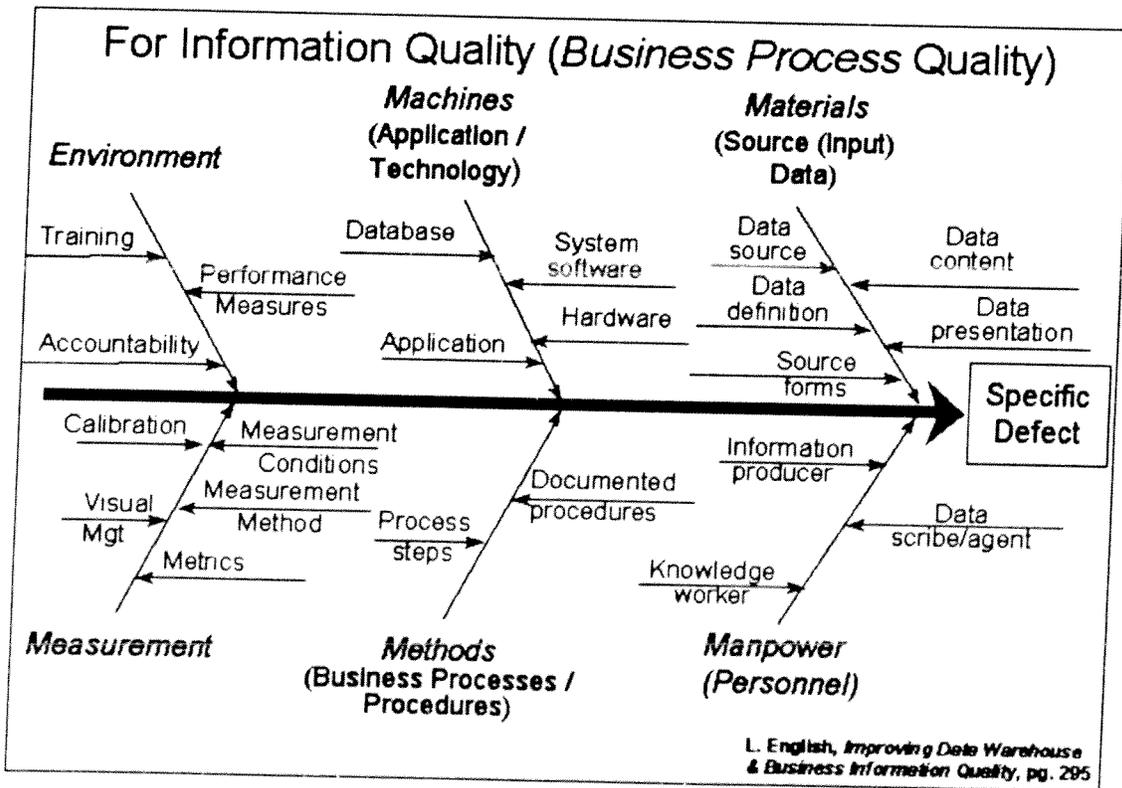


Figure 3.2: Cause-and-Effect Diagram Template for Information Quality

C. Define Process Improvement(s)

1. Process improvement(s) should be defined only *after* root cause(s) have been identified and understood. Otherwise, it may be that only the symptoms or the precipitating cause of the problem are being attacked and not the root causes.
2. Data correction activities can also be leveraged into process improvements.
 - a. Any automated correction techniques should become permanent software edits.
 - b. Any manual correction procedures should either become permanent software edits or transition to heavily emphasized sections in the information quality awareness and training programs.
3. Just as the categories of failure cause may be Human Resources, Material, Machine, Method, Measurement and Environment, the recommended improvement may involve improvements in any of those categories. Improvements should not be limited to "program fixes." Each of these categories of cause requires a different type of improvement. Other categories may provide improvements that can be implemented easier, faster, or at lower cost. Examples of solutions from all categories include
 - a. Reengineer business processes to include procedures to ensure information quality. For example include supervisor review of critical transactions before entry.
 - b. Enforce information stewardship by holding managers and business process owners accountable first, then information producers, for their information quality, completeness and timeliness as well as for other required quality standards.
 - c. Allow data element domains to have a value of "unknown" in order to allow information producers to identify an unknown data value rather than entering a guess. The data producer may not know all possible data values, and the "unknown" value may allow for future analysis and correct interpretation.
 - d. Identify and designate official record-of-origin, record-of-reference, and authorized record duplication databases.
 - e. Adequately train information producers.
 - f. Define information quality targets and measures and report information quality regularly.
 - g. Implement effective edits that may prevent entry of defective data or flag entry of defective data for later correction.¹⁹
4. A specific set of information quality standards, procedures and performance measures should be linked to each data control process. Ideally, performance measures should encourage all information producers to create or maintain quality data. The performance should be measured at the time of data capture.
5. Another valuable guideline to help maintain information quality is implementing a single process for data creation and maintenance along with a single application program for each information type, such as stakeholder, address and property. These standard, commonly defined processes and applications should be implemented as early as possible in the information life cycle (or value chain). The databases and data elements must also be standardized to support the information requirements of all information customers.

3-4 **Do** Implement Information Quality Improvement

- A. Develop the information quality improvements to implement the recommended solution and implement in a controlled fashion.
1. Document the new procedures, training, software modifications, data model and data base changes as required.
 2. Identify a controlled area in which to test the process improvement.
 3. Implement the change. If a "people" process is changed, provide orientation and draft procedures. If software changes, deploy the new version to a test area and provide knowledge workers training and/or draft documentation if necessary.²⁰

3-5 **Check** Impact of Information Quality Improvement

- A. Once the process improvement has been deployed to the test environment, the results of the improvement must be evaluated to verify that it accomplishes the desired quality improvement without creating new problems.
1. Measure and quantify the benefits gained in business performance measures.
 2. Quantify economic gains.
 3. Record lessons learned.

If the desired results are not achieved without introducing new problems, the implementation of the quality improvement must be adjusted (Section 3-4), or a different solution identified (Section 3-3).

3-6 **Act** to Standardize Information Quality Improvement

- A. Once the information quality improvement has been checked, it can replace the old, defective process(es) (source: *Improving Data Warehouse and Business Information Quality*, p. 301-302).
1. Roll out the improvements formally.
 - a. Formalize the improved business procedures and documentation
 - b. Implement software and database changes into production
 2. Implement quality controls as necessary.
 3. Communicate to all affected stakeholders.
 4. Document:
 - a. Lessons learned
 - b. Best practices
 - c. Cost savings and opportunity gains realized
 - d. Process improvement history

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