Mishap Description Quality Analyzer

An Event Description Quality Evaluation Toolkit

MDQA TUTORIAL

Version 2.01, January 2013

This Tutorial explains how to do a quality assurance evaluation of an event description in an investigation report. The tools are based on the concept that event descriptions in reports describe processes, and can be flow charted and analyzed, using *MDQA* tools. *Mishap Description Quality Analyzer* can thus be used to determine the quality of a reported explanatory description of any kind of process.

This Tutorial assumes you have read the Manual and have a digitized or paper report that can be processed on a computer. The Tutorial has two parts. Part I shows you how to prepare the reported description of what happened for analysis. Part II shows you how to restructure and display the reported description with event building blocks (BBs), and analyze them to evaluate the report's quality.

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INTRODUCTION

What is a "good quality" description in an investigation report?

A good event investigation report describes what happened in a way that also explains why it happened. In other words, it provides an explanatory description of the occurrence. A good description enables readers to visualize what happened in a "mental movie" without any missing or fuzzy frames. Like any movie it should tell the whole, easy-to-follow story of what happened, from its beginning to its end.

PART I. REPORT PREPARATION TASKS

Task 1-1. Familiarization Review.

Preparatory Step 1. Your first task is to review the report to get acquainted with the report contents, the occurrence and its setting. As you read the narrative section(s), try to visualize what happened, and create a crude preliminary "mental movie" of the occurrence. You may have to refer to several sections of a report for additional descriptive data to enable this visualization. Here is a sample report of an incident, for your use in this tutorial.

(Source: NTSB Accident No. NYC-80-F-HJ03, Part U - Narrative Statement)

"Again pilot (X) made an approach at 90 mph and 25° flaps. He stated that he touched down approximately 50 feet past the runway threshold numbers. He raised the flaps, then proceeded to apply the toe brakes. At this point, he claims the aircraft pulled to the right sharply, and he straightened its path by use of rudder. Mr. (X) now attempted stopping the aircraft by applying the hand brake and foot brakes. This time the aircraft started off toward the left of runway centerline. N4668J went off the departure end of the runway, left of centerline. His estimated speed at this time was approximately 30 mph. He traveled through 10 feet of grass, then his main landing gear struck a small trench, the aircraft then struck a dirt pile where it came to rest. Pilot and passengers exited N4668J without injury. Examination of the accident scene of 11-29-79 by EA-GADO-11 maintenance and operations personnel disclosed the following: Runway 18 showed one tire skid mark which measured approximately 300 feet long. It started on runway centerline and traveled to the end, gradually traveling toward the left edge. From the end of the runway hardtop, the skid mark went through the grass, across a 14 inch wide trench, and terminated at the dirt pile. Examination of N4668J was conducted on 11-29-79 in a hangar at (X) Airport where the aircraft had been moved to protect it from vandalism."

"The left wing was deformed, buckled and wrinkled at the rear spar, starting at the wing root and traveling outboard for approximately 7 feet. Rivets were popped and skin wrinkled on the left wing lower side at the area behind the left main gear well. The right main landing gear disc brake assembly had failed at the area where it is welded to the brake disc housing. This area was badly corroded to the point where the metal in this area is paper thin. Both propeller tips were bent 90deg. and one bend had a crack 1-1/2 inches long. Nose wheel gear was torn and bent. N4668J had sustained major structural damage to the left wing."

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Task 1-2. Identify and Mark Reported Actions.
Preparatory Step 2. Your next task is to find and highlight the reported name of each actor and what each actor reportedly did. Do this on your report text. Read the FAQs for further guidance. You may use the sample text above for the next part of this tutorial. Then compare your results with the results shown after the FAQs, on page 5.

  Hint: Use a word processor split screen function to view both files simultaneously.

1-2. Frequently asked questions.

Q 1. What should I mark during this step?
  A: Mark all explicitly stated actions reported in the document. An action consists of a named person or object (actor) with words stating what the person or object did (action). Mark the name and words that describe what the actor did. The words should but may not always enable you to visualize the persons or objects and what they did.

Q 2. Should I use a pen or pencil to mark a paper copy of he report?
  A. Highlighter markers are preferred on paper documents. If you are uncertain use pencil and mark the words, so you can erase your marks if you change your mind before highlighting them.

Q 3. How do I handle pronouns?
  A: Highlight pronouns like he or she or it or they if followed by an act. You will determine and assign one name during a later step.

Q 4. How do I handle different names for same actor?
  A: Mark all names in the report. The multiple names for the same person or object will get straightened out during later steps.

Q 5. How do I handle plural names like "the crowd" or "they?"
  A: Mark them, too. You will deal with them later.

Q 6. How do I handle multiple actions by an actor?
  A: Depends. If two or more acts follow a named actor, and the acts are linked by words such as "and," "then" or "before," etc., highlight both actions if you are reasonably certain from the report that the same actor did both acts. "He raised"..."then proceeded.")

Q 7. How do I handle two people doing the same thing?
  A: You have two actions. Mark both actor names, and then highlight the action. In Tutorial example, see "Pilot and passengers exited."

Q 8. What if a person or object is named, and the report does not describe anything they did?
  A: See inferred actions, Task 3 and 4..

Q 9. What parts of a document should I mark up?
  A: All parts. Mark any actions reported in the document, because you never know where a writer will report an action. Often you will find acts for the first time in the conclusions or appendix sections introductions, while in other reports they may be reported in the introduction, descriptions, analyses, cause or findings sections of reports. Read the whole document looking for acts by named people or objects, and mark what you find.

Q 10. What should I do with actions I don't think are worth marking?

A: Mark everything anyone or anything reportedly did. At this step of the report quality evaluation process, it is premature to make judgments about the validity, relevance, significance, or value of any of the acts described in the report. Those judgments can only be made when the acts can be placed in the context of other known actions.

When a report attributes the data to someone, as in "He stated" and "he claims" highlight these reported actions. Their importance or relevance cannot be assessed critically at this step. If in the Tutorial example the pilot said he thought the speed was 30 knots, and it turns out other reported data such as aircraft damage indicates it was 60 knots, this conflict might indicate a problem that should have been investigated. Was the difference due to a) a misunderstanding between the witness and investigator, b) the pilot's skill in judging speed, c) the pilot is misleading the investigator for reasons as yet unknown, d) instruments were giving false readings, etc. Value can only be determined when more is known about what happened. (During data entry, whoever "he" was would be shown as the source of the stated or claimed action.)

Q 11. What should I do if the report describes what an object did NOT do?

A: Do not mark it on the report. This information becomes part of your analysis task later. DID NOT in a report often reflects a conclusion that some action was expected (by the investigator) and did not happen without reporting the reasoning. Stick to what people or objects reportedly DID.

During investigations, you may try to identify what should have happened, and what supported your expectation for each such action. Then, record that in a DID rather than DID NOT format. For example, if some procedure or rule or standard said the person or object was supposed to do something, use the procedure or rule or standard as the actor, and express the expected action as ""Rule called for x to do y at this time." If expectations played a role or were supposed to play a role and didn't, it is good practice to put the data into the actor/act format, or you will find yourself getting subjective about things like errors, failures, etc. Any actions that have no value in understanding or explaining what happened will be filtered out during subsequent steps.

Task 2. (continued) Sample marked up report to show reported actions.

(Note: phrases in passive voice describe states, not actors or actions; ignore for now. Deal with that during next task.)

Again pilot (X) made an approach at 90 mph and 25° flaps. He stated that he touched down approximately 50 feet past the runway threshold numbers. He raised the flaps, then proceeded to apply the toe brakes. At this point, he claims the aircraft pulled to the right sharply, and he straightened its path by use of rudder. Mr. (X) now attempted stopping the aircraft by applying the hand brake and foot brakes. This time the aircraft started off toward the left of runway centerline. N4668J went off the departure end of the runway, left of centerline. His estimated speed at this time was approximately 30 mph. He traveled through 10 feet of grass, then his main landing gear struck a small trench, the aircraft then struck a dirt pile where it came to rest. Pilot and passengers exited N4668J without injury. Examination of the accident scene of 11-29-79 by EA-GADO-11 maintenance and operations personnel disclosed the following: Runway 18 showed one tire skid mark which measured approximately 300 feet long. It started on runway centerline and traveled to the end, gradually traveling toward the left edge. From the end of the runway hardtop, the skid mark went through the grass, across a 14 inch wide trench, and terminated at the dirt pile. Examination of N4668J was conducted on 11-29-79 in a hangar at (X) Airport where the aircraft had been moved to protect it from vandalism.

'The left wing was deformed, buckled and wrinkled at the rear spar, starting at the wing root and traveling outboard for approximately 7 feet. Rivets were popped and skin wrinkled on the left wing lower side at the area behind the left main gear well. The right main landing gear disc brake assembly had failed at the area where it is welded to the brake disc housing. This area was badly corroded to the point where the metal in this area is paper thin. Both propeller tips were bent 90°. and one bend had a crack 1-1/2 inches long. Nose wheel gear was torn and bent. N4668J had sustained major struc-

tural damage to the left wing.

Task 1-3. Identify And Mark Words Inferring Actions.
Preparatory Step 3. Your next task is to identify WORDS in the report which INFER actions. Format those words with ***bold italics*** so they are readily visible. You may use the sample markup file on page 5 above for this part of this tutorial. Mark the words, and then compare your results with the results shown on page 7, after the FAQs.

1-3. FREQUENTLY ASKED QUESTIONS

Q 1. Why process inferred actions?

A: The need for readers to infer the actions constitutes an undesirable quality attribute of the report's description. However, it seems desirable to try to credit the report for the data, despite its format.

Q 2. How can I recognize an inferred action?

A: Look for specific clues, like:

a. Passive voice clue. When you see the word "was" or "were" look for an underlying action. Example: "wing was deformed" infers that someone or something deformed the wing.

b. Changed state clue. When you observe words indicating a change of state from a prior state, look for action(s) that produced the new state. Examples: tire skid mark on runway 18 infers that something a tire or runway did something to produce the skid mark on the runway 18. The description of the skid mark infers that the aircraft or tire did something else before they came to rest in the dirt pile. (Selecting words to describe what happened can be very challenging to investigators so they often use "cover up statements" like "was corroded," etc.

c. Mental action clue. Some word combinations infer that someone or something was involved in a mental action like a decision, choice or observation. For example: "His estimated speed..." infers that someone estimated the aircraft speed at some point in time but report doesn't say who or when.

Q 3. How should I mark words inferring actions?

A: In computer and paper files, highlight the words with color #2 so they are readily discernable.

Q 4. What happens if I mark words that should not be marked?

A: Nothing serious. They will be treated during subsequent steps.

Q 5. What happens if I miss words that I should have marked?

A: Err on the side of marking too many rather than too few. When you do subsequent tasks, you will be guided to look for words that should have been marked, and if they are there, you'll get a second chance to mark them.

Task 1-3. (continued) Identify and mark words inferring actions.

 Again pilot (X) made an approach at 90 mph and 25° flaps. He stated that he touched down approximately 50 feet past the runway threshold numbers. He raised the flaps, then proceeded to apply the toe brakes. At this point, he claims the aircraft pulled to the right sharply, and he straightened its path by use of rudder. Mr. (X) now attempted stopping the aircraft by applying the hand brake and foot brakes. This time the aircraft started off toward the left of runway centerline. N4668J went off the departure end of the runway, left of centerline. *His estimated speed* at this time was approximately 30 mph. He traveled through 10 feet of grass, then his main landing gear struck a small trench, the aircraft then struck a dirt pile where it came to rest. Pilot and passengers exited N4668J without injury. Examination of the accident scene of 11-29-79 by EA-GADO-11 maintenance and operations personnel disclosed the following: Runway 18 showed one *tire skid mark* which measured approximately 300 feet long. *It started* on runway centerline and *traveled* to the end, gradually traveling toward the left edge. From the end of the runway hardtop, the *skid mark went* through the grass, *across a 14 inch wide trench*, and *terminated* at the dirt pile. Examination of N4668J was conducted on 11-29-79 in a hangar at (X) Airport where the aircraft *had been moved* to protect it from vandalism.

   'The left wing *was deformed*, *buckled* and *wrinkled* at the rear spar, starting at the wing root and traveling outboard for approximately 7 feet. Rivets were *popped* and skin *wrinkled* on the left wing lower side at the area behind the left main gear well. The right main landing gear disc brake assembly *had failed* at the area where it is welded to the brake disc housing. This area *was badly corroded* to the point where the metal in this area is paper thin. Both propeller tips *were bent* 90° and one bend *had a crack* 1-1/2 inches long. Nose wheel gear *was torn* and *bent*. N4668J had sustained major structural damage to the left wing.

Task 1-4. Format Inferred Actions.

Preparatory Step 4: Format inferred actions. The task is to convert each inferred action word into the actor/action building block format. Then insert all the inferred action BBs in the report within parentheses in the marked up report above, page 7, and then compare your results with the results shown on page 9 after the FAQs below. Use a contrasting color for these analyst-generated BB entries.

You can use the sample markup above for this task.

1-4. FREQUENTLY ASKED QUESTIONS

Q 1. How should I convert and format inferred actions?

A: Convert the reported statement into the name of the person or object that acted, if it can be identified, and what they did, if reported. Restate the inferred action in the actor/action format.

Q 2. What if I can't identify the actor or action from the words or report?

A: Use a ? in place of the actor name or action to show that you do not know the name or what the actor did, or both. (This is usually a sign of a quality problem.)

Q 3. How will I show the inferred actions?

A: Insert the inferred actions in parentheses, using ? when the name of the actor or action is not identifiable, or when more information about either should be shown.

Q 4. Should I just skip over the obviously irrelevant actions?

A: NO, not at this stage. You are not ready to jump to conclusions until you can see how the inferred action might point to data that would help define what happened, or suggest aspects of the process not yet considered, or other discoveries. You will note reported irrelevant actions during your analysis stage. The problem reflects "unsupported conclusions" and creates many problems for investigators.

In the example, who estimated or observed the 90 mph approach speed is ambiguous. If not reported, don't guess.

Q 5. Should I guess at the uncertainties indicated by a ?

A: NO NO NO. Remember your task is to assess the quality of what is reported, without interjecting your new data, even if it is "obvious" to you.

Task 1-4. (continued) Mark up by inserting formatted implied actions.

Again pilot (X) made an approach at 90 mph and 25° flaps. He stated that he touched down approximately 50 feet past the runway threshold numbers. He raised the flaps, then proceeded to apply the toe brakes. At this point, he claims the aircraft pulled to the right sharply, and he straightened its path by use of rudder. Mr. (X) now attempted stopping the aircraft by applying the hand brake and foot brakes. This time the aircraft started off toward the left of runway centerline. N4668J went off the departure end of the runway, left of centerline. His estimated speed (? estimated speed to be 30 mph?) at this time was approximately 30 mph. He traveled through 10 feet of grass, then his main landing gear struck a small trench, the aircraft then struck a dirt pile where it came to rest. Pilot and passengers exited N4668J without injury. Examination of the accident scene of 11-29-79 by EA-GADO-11 maintenance and operations personnel disclosed the following: Runway 18 showed one ***tire skid mark*** (tire began to skid ?) which measured approximately 300 feet long. ***It started*** (skidding tire drifted toward left runway edge ?) on runway centerline and ***traveled*** (? tire ?) to the end, gradually traveling toward the left edge. From the end of the runway hardtop, the ***skid mark went*** (skidding tire skidded through grass ?) through the grass, ***across a 14 inch wide trench*** (skidding tire skidded across 14" trench ?), and ***terminated*** skidding tire stopped at the dirt pile?) at the dirt pile. Examination of N4668J was conducted on 11-29-79 in a hangar at (X) Airport where the aircraft ***had been moved*** (? moved N4668J to hangar?) to protect it from vandalism.

   'The left wing *was **deformed*** (? deformed left wing), ***buckled*** (? buckled left wing) and ***wrinkled*** (? wrinkled left wing)   at the rear spar, starting at the wing root and traveling outboard for approximately 7 feet. Rivets were ***popped*** (? popped rivets on lower L wing) and skin ***wrinkled*** (? wrinkled left wing) on the left wing lower side at the area behind the left main gear well. The right main landing gear disc brake assembly ***had failed*** (R main landing gear disk brake assembly failed) at the area where it is welded to the brake disc housing. This area *was **badly corroded*** (? corroded main landing gear disk brake assembly at weld to brake disk housing) to the point where the metal in this area is paper thin (corrosion reduced metal to ?"). Both propeller tips ***were bent*** (? bent propeller tips) 90° and one bend ***had a crack*** (? bent propeller tips) 1-1/2 inches long. Nose wheel gear ***was torn*** (? tore nose wheel gear ?) and ***bent***. . (? bent nose wheel gear ?)   N4668J had sustained major structural damage to the left wing.

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Part II. BB DOCUMENTATION, ANALYSIS AND REPORTING

Part II tasks help users to build skill in the QA procedures, and use of the *QA*templates. The*MDQAE*suite of MS Word templates is designed to help users document the reported and inferred event blocks, to support remaining quality assurance tasks. Data are transferred from the marked up reports, and printed on labels which can be organized, analyzed and tested to show the reported interactions during occurrence.

> *Hint: The templates can also be used to conveniently capture, organize, display, analyze and evaluate data as acquired during investigations.*

Task 2-1. Set up folders/directories and files for your project.
  a. Create a new project folder/directory to hold your files for this project
  b. Save this Tutorial file in the new project folder/directory.
  c. Copy the QA-Keys.doc, QA-BBdb_Template.docx, QA-SourceDB.doc, QA-Glossary.doc and the QA-Label_template.docx files to your new project folder/directory.
  d. MasterLabel.doc produces Avery 5190-sized labels.
  e. Open each of these 5 files in your new project folder/directory with your MSWord 98 or later word processor.
  f. Arrange the windows for each file on you screen so all the scroll bars are visible.

Task 2-2. Enter actors and actions in BBdb file.
  a. Enter marked actions and actors from the report (split screen or scroll up to report p 9). For practice, enter at least 15 action BBs in the renamed EEBBdb_Template file.
  b. After the data are entered, review marked actions and compare with entered data, to verify entries before proceeding.
  c. Add any new actors or actions to the glossary (Optional- if you analyze more than one report, this glossary will help you keep actor names consistent.)
  d. If your preferences are not set to save your file at frequent intervals, save the BBdb manually every 5-6 records, and the glossary file with every few additions. Make this a habit whenever you enter data into these files.
  e. During this tutorial, enter additional actions until satisfied with your data transformation and entry skill.

Task 2-3. Prepare label files.
  a. Save all open files before proceeding. Follow MSWord procedures for producing labels from your renamed QA-BBdb_Template file, and name labels for your rows from your Glossary file.
  b. Open your reamed QA-Label template file. Opening file should open mail merger dialogue pane.

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c. Select 2>Select Recipients Listl>Get List>Open data source>select your renamed QA-BBdb_Template file with your BB entries. Select fields to suit your preferences, but include at least the actor, action source and record number on each.

d. Use of Avery 5160 or 5190 labels or equivalent is suggested. Show the fields you prefer on the labels and their sequence during this step.

e. Save the new file to your new folder/directory.
   Hint: Changing data in DB file and printing labels again is easier than trying to diddle with your label print file; discard unchanged duplicate labels after each run.

Task 2-4. Print labels with actions (BBs).

a. Review the label document for formatting, spelling and errors one final time before printing.

b. To print labels, print the labels from renamed QA-Label_template file you created.

c. During investigation you will be saving numerous label files as records are added or changed.

d. Print the new file with the merged labels on Avery 5095 (business card) or 5160 (mail label stock.)

e. Close your marked up report file, your QA Summary Report file, and your renamed QA-Keys.doc, QA-Sourcedb.doc, and QA-Glossary.doc files when finished, making sure your folder/directory contains and the label file you created for printing the labels. Leave your QA-BBdb_template.doc file open for Task 5 entries.

Task 2-5. Organize labels on a work surface.
See Figure 1 in the Appendix for an example of a work surface with labels attached.

a. Array the labels in their temporal sequence on the work surface in an MES Time/Actor matrix. Put one actor's actions on each row of the matrix. If different names are used for an actor, keep all actions by that actor on the same row. Further guidance is provided in Reference3, and a sample layout is shown in Reference 1 part 2.

b. After all your BBs are displayed, draw arrows from each input BB to subsequent BBs the input(s) influenced. Ideally, a complete description of the occurrence will have all the BBs linked with input-output arrows. See Appendix Figure 2 for illustration of links and comments.

c. After links are drawn and finalized, enter the record number(s) of lined BBs in the Links column in the project QA-BBdb_template.doc file. When you analyze more files you will be able to use the data to find patterns, and help you define context of individual BBs.

Task 2-6. Analyze displays.

    a. Ideally, a reported description should enable the reader to make a complete "mental movie" of what happened, and understand why it happened.

    b. Take the time to use all the events in the sample report: you need to work the system to understand its power Add notes freely on the work surface.

Every remaining ? or discontinuity or ambiguity or form of "did not" or unlinked BBs or inferred action in the final display points to potential description quality issue.

Examples of quality issues to look for on the display include:

- Ambiguities (pronouns, passive voice statements, higher levels of abstraction for words or phrases used, plural names, etc.)

- Incomplete data ("?" in BBs or on links)

- Incomplete description (gaps in flow of linked BBs, incomplete inputs disclosed by input tests* for each BB)

- Unsubstantiated conclusions (did nots, failed to, inadequately, etc.)

- Extraneous data or fragmented description (possibly, unlinked BBs)

- Conflicting data (two actors named as actors for an act, or act reported at two different times or locations)

Do not modify what was reported with your own new data or information. Do that in a separate document if required. Reformatting of inferred entries extracts partially reported action.)

For more information or assistance, contact "luben" at this web site.

- *input tests are necessary and sufficient logic tests for each BB linked to an output BB: are all the linked input BBs necessary and are they sufficient to produce the output BB at the end of the link(s)?*

Task 2-7. Reporting findings.

Prepare a Summary Report containing each quality shortcoming you found in the reported description by your quality assurance evaluation of the final work surface display.

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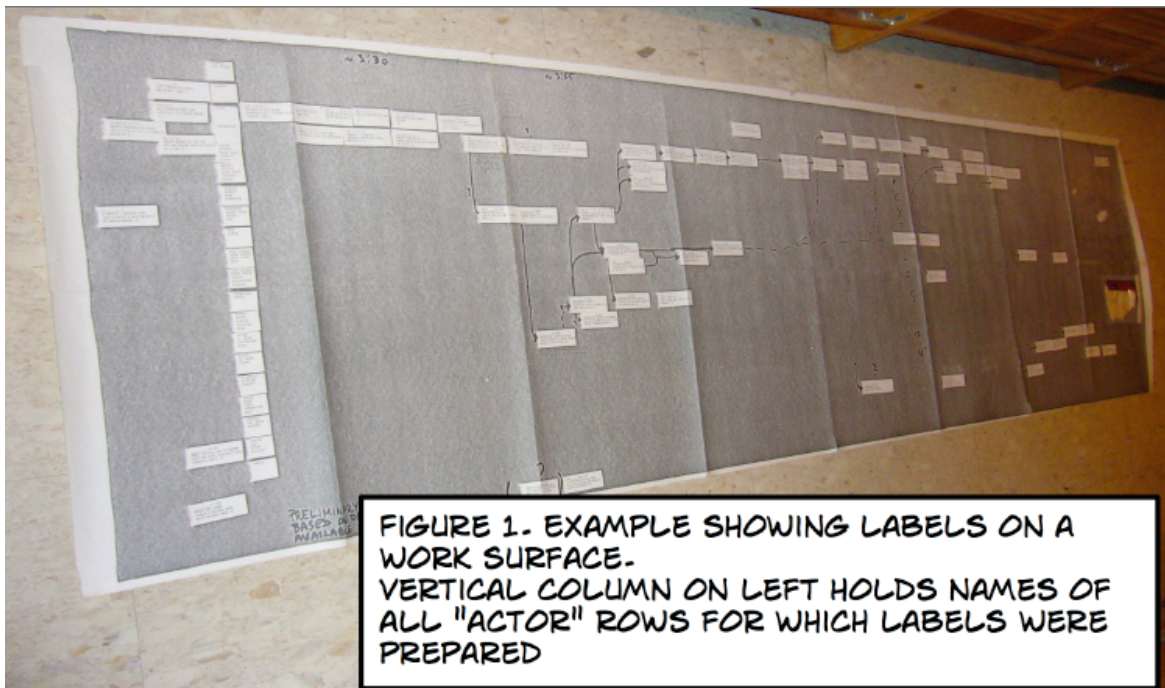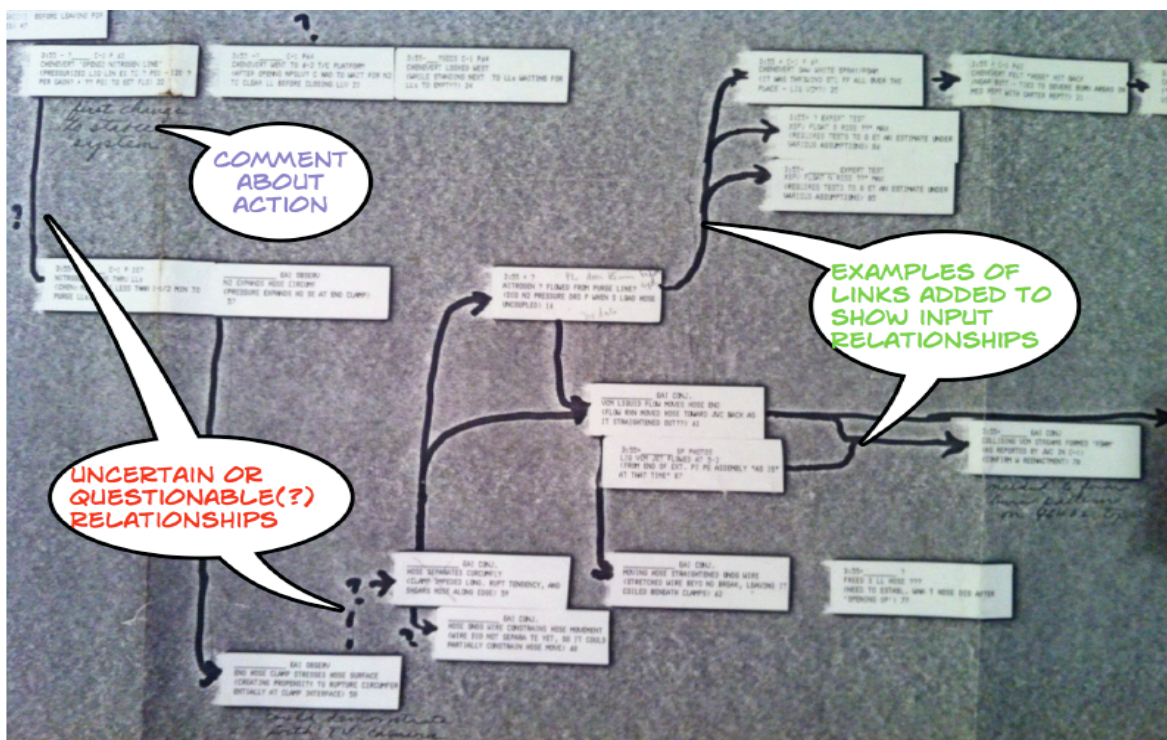### An Event Description Quality Evaluation Toolkit

APPENDIX

FIGURE 1. EXAMPLE SHOWING LABELS ON A WORK SURFACE.
VERTICAL COLUMN ON LEFT HOLDS NAMES OF ALL "ACTOR" ROWS FOR WHICH LABELS WERE PREPARED

FIGURE 2 Example markings on work surface.

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