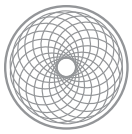


Enginuity Development Inc.

Engineering Change Notice process white-paper.

Enginuity Development Inc. 47 West Crystal Ridge Drive Crystal Lake, IL 60012 **T** (815) 301-9939 **F** (815) 301-2007
michael.hencin@edm-concepts.com www.edm-concepts.com

Current State of the ECN Process

Engineering change notice (ECN) processes remains in a state of manual intensive, inefficient workflow. Despite major advances in modern drafting and inventory control, what we see today continues to be a manual paper process.

Our experiences in working with companies from a wide range of industries and sizes demonstrate a significant reliance on manual paper process. Some companies have created ad-hoc database or e-mail process in an attempt to streamline the process. However, the vast majority remain a process of a live person filling out a form and manually initiating the process.

The focus of this white-paper is to analyze the process of discovering similarities, indentifing weaknesses, and exploring areas for potential expansion.

ECN Process Defined

The widely accepted three-step ECN process is frequently adapted to suit individual organizational needs. Such attempts have included the addition of sub processes to handle rejected ECR's and ECN distributions.

Definitions:

ECR - Engineering Change Request, typically the fist step in the process.

ECO - Engineering Change Order, term used to identify the form after it has been approved and work is authorized to begin on executing the proposed change.

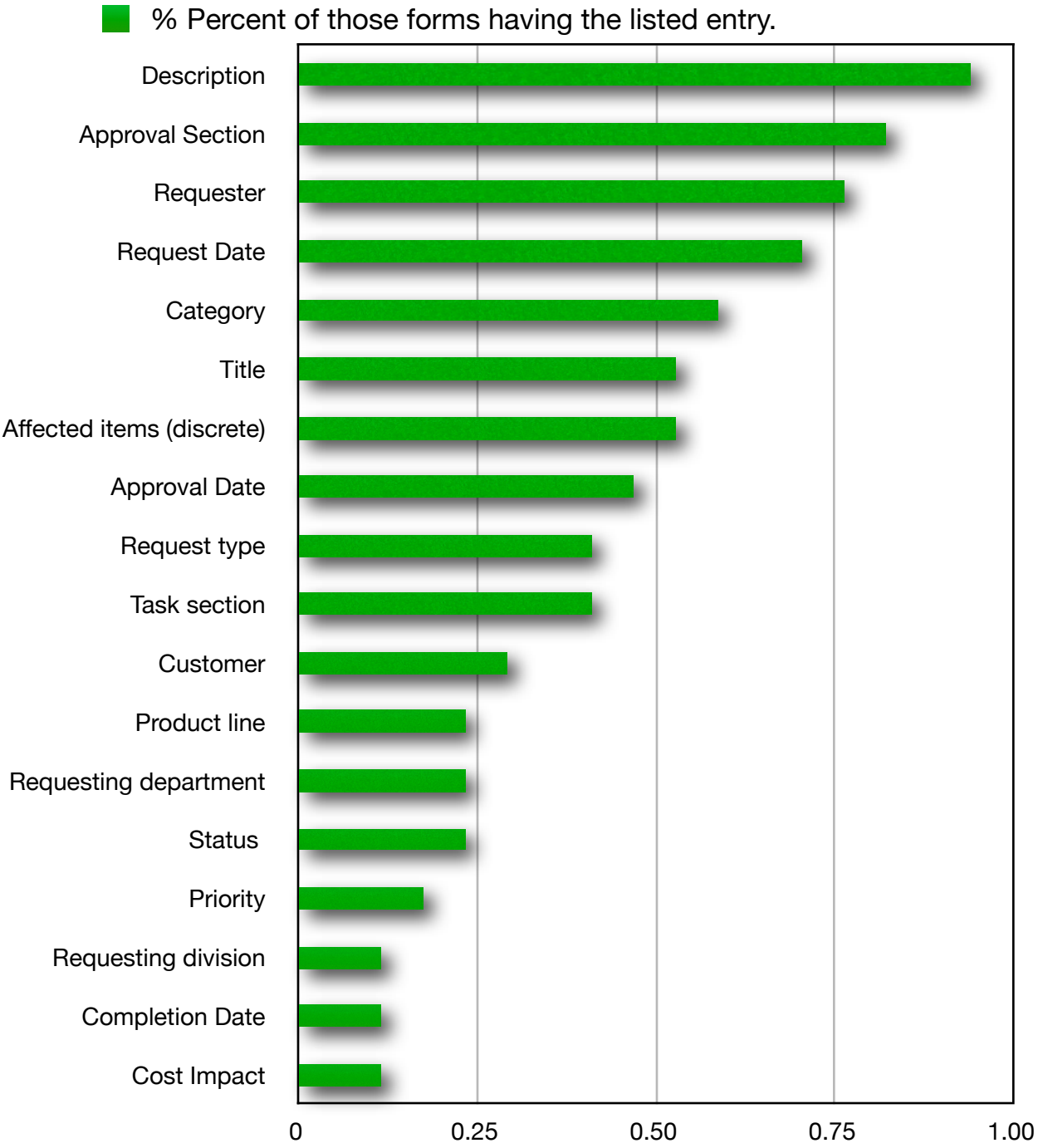
ECN - Engineering Change Notice, the last step in the process and term used to identify the requested change has been completed. At this point in the notifications are distributed and the form archived.

Change - Generic term referring to the form, process and workflow of implementing a change request.

ECN Form -The document, paper or electronic that captures the important data relating to a change.

ECN Form Analysis

From a random sample of ECN forms, we grouped similar entries and the graph below shows the percentile occurrences. For example, the "Category" entry occurred on 58% of all forms analyzed.



From this analysis, the upper 50% of forms and processes focus on the “who and the what”. The description, title and category serve to document what is meant to be changed. Due to the administrative focus of such requests, the person who requested the change and the approvals signature authorize the change.

The lower 50% the data tracked required action and their impact and follow up. Our analysis showed that the task section, priority, and completion date date are not universally tracked.

Similarities

The above analysis illustrates most organizations successfully document what needs to be changed, by whom, and then recording the organizational approval of that action.

The entries falling in the upper 50% all had very similar and clear meaning on the various forms. Clearly all engineering and manufacturing departments focus on documenting the “what” and “approval” of that action.

The affected item section, recording part numbers, revision changes, and item dispositions were also equally well represented. Some forms contained more item information but all had at a minimum item/part number, old revision, new revision, description, and disposition.

Weaknesses

The bottom 50% explores how some organizations may begin to lose focus of their process. Clearly much effort is put into documenting the upfront “what.” However, after the approval action little is done to document or track the implementation of the now approved change. Further metric data in the way of approval date and completion date are not generally documented.

What can we conclude from this? There exists a potential for approved changes to not be implemented in a proper or timely fashion. The lack of consistent task documentation, tracking and completion tools poses a major concern. Additionally, with no process for closure of completion dates and process changes, their data risks being lost and forgotten.

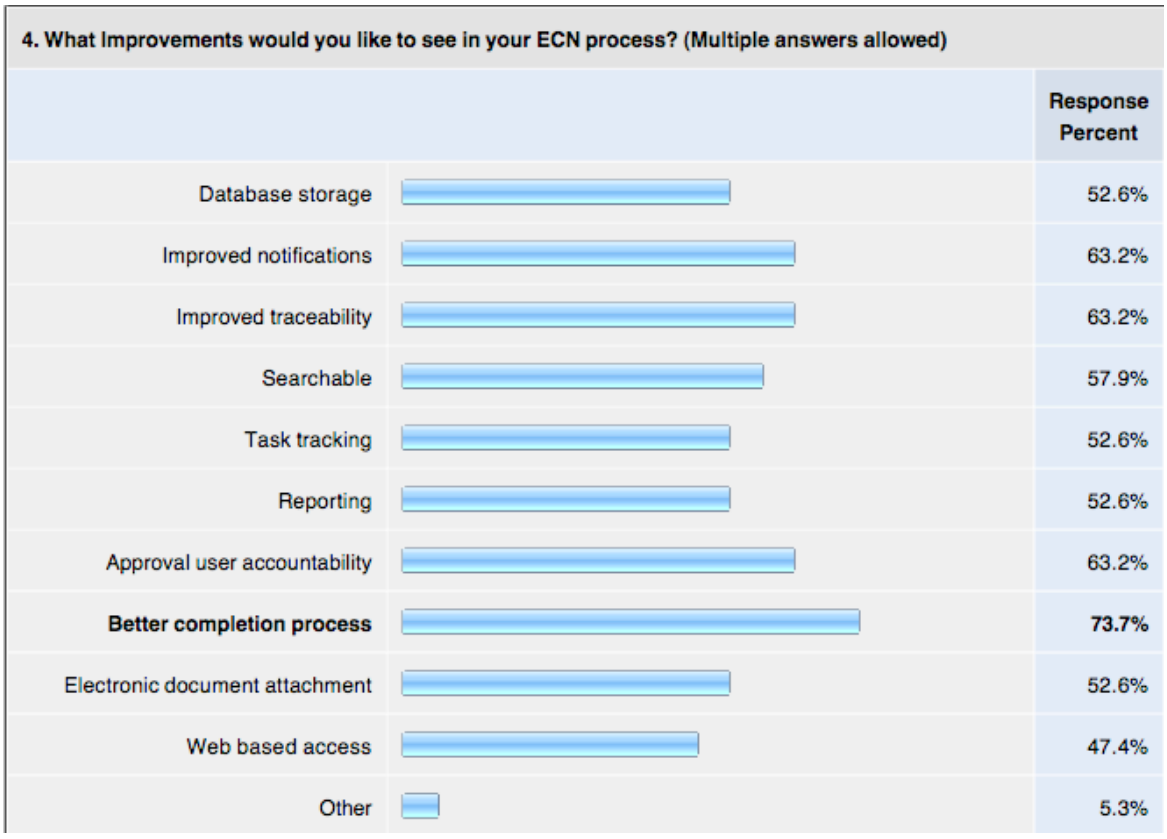
Returning to our general process we can clearly see three basics phases with tollgates between each: Phase 1 - request or ECR. Phase 2 - approval with the tollgate of approvals and signatures or ECO. Phase 3 - completion with the execution of the approved work and wrap up and completion notifications or ECN.

From the chart and analysis one can conclude that phase one and two are well documented and tracked, leaving the execution of the approved change. Our market research confirms a need for an improved completion process.

Focusing solely on the front end results in poor documentation and tracking of the actual work required. Of further complication is the predominance of engineering departments in control of phase two, yet the execution of the work and subsequent notification effect many other departments. This inter-department communication is not well handled by the change process.

Additionally, important item disposition information may not be communicated clearly or timely to departments in need of the information, resulting in errors such as a purchasing buying obsolete parts or manufacturing using prints and BOM’s about to be revised, resulting in unnecessary costs in both material and labor.

Full survey can be viewed at: http://www.surveymonkey.com/sr.aspx?sm=9Jamc_2fJG6HkIGcob_2f6p2EHV36O3jt0Q91K5fDStWkcE_3d



4. What Improvements would you like to see in your ECN process? (Multiple answers allowed)	Response Percent
Database storage	52.6%
Improved notifications	63.2%
Improved traceability	63.2%
Searchable	57.9%
Task tracking	52.6%
Reporting	52.6%
Approval user accountability	63.2%
Better completion process	**73.7%**
Electronic document attachment	52.6%
Web based access	47.4%
Other	5.3%

Process Improvements

Considering the insufficient documentation and follow up on the important phase three of the ECN process, improvements should be reviewed and updated. Based on market research we have isolated the following process improvements:

1. Consider at minimum some form of database storage for the request date. This will facilitate searching and data analysis.
2. Consider creating general or standing tasks that must be completed after approval.
3. Design and promote systems that increase accountability and tracking of task assignment.
4. Consider using a task tracking sheet or database to help track tasks and their status. Create a clear and consistent notification method. Document and track task status and completion.
5. Leverage your email system and utilize return receipts for notification to verify receipt.
6. Develop time metrics based on the three important dates, ECR (date the request was submitted) ECO (date the request was fully approved) and ECN (date the request was completed.) These dates will allow you to develop time metrics to help identify lagging phases and address root causes for delays in the process.

   Approval Time = ECO - ECR
   Completion Time = ECN-ECR

About the Authors

Michael Hencin - President of Enginuity Development Inc.

Enginuity Development supplies engineering data management software to engineering and manufacturing companies, specializing in ECN and project management.
Michael is an Aerospace and Aeronautical engineering graduate from the university of Illinois Champaign-Urbana. He has worked in the aerospace industry, commercial switch, and connector industries for over 14 years.

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