Sanitizing Proprietary Manufacturing Information for Public Presentation

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Abstract

A need to prepare - or sanitize - a variety of proprietary manufacturing information for public presentation may come about for a number of reasons. Typical situations requiring technical presentations include publishing a technical paper[14, 15, 17] or a presentation at a technical conference or classroom, preparing and publishing a technical thesis in a proprietary manufacturing environment, preparing supporting material[33, 37] for an announcement by a company of a breakthrough in a manufacturing process, staffing a technical trade show[50], applying for a Quality Award - such as the Baldrige Award, the President's Quality Award, various state Quality Awards, etc. - or preparing content for a corporate (or public agency) web site. The degree of sanitizing can range from a deferred disclosure tactic used at a technical trade show ("Why don't you give me your business card and let me give you a call back with that information after I confer with ...") to presenting proprietary manufacturing data that has been numerically modified - such as defect level numerical data improvement 'normalized' with an X-Y graph - and published in a technical journal. While a more open and complete discussion of technical details means there may be greater risk of disclosing proprietary information, doing so may achieve tangible corporate needs[10, 18, 38] and identifiable benefits. A strategy for communicating technological advances without revealing proprietary information is suggested and outlined.

I. Introduction

This paper was initially written within the context of one co-author's participation in a manufacturing engineering Master's program[48] while working in a large contemporary manufacturing environment[20]. The engineering department Master's theses were predominately non-proprietary, with a small percentage being proprietary. The large, technical manufacturer that supported the author's thesis had strong ties to the engineering department. After discussions with the engineering department and with the author's management (to the level of Director of Manufacturing), developing a non-proprietary technical Master's thesis would be much easier within the manufacturing environment the author was employed in. In the course of developing the thesis topic, getting internal permission and technical reviews, the author located

a number of resources and articles broadly related to proprietary information and technical public presentations. It is suggested that most of this material can be effectively translated to the public sector. In reading this paper, it is suggested that companies are equivalent to public sector government agencies and manufacturing is equivalent to governmental activities[3, 47].

II. Background Considerations

While maintaining a prudent concern[42] for proprietary information, trade secrets[2, 40] and intellectual property[24] from "unauthorized or other unintended disclosure of information[31]," competitive manufacturers must get their stories told. As observed by Goldfarb[12], "The protection of proprietary information by private industry is a continuous and expensive effort which may occasionally be rewarded by royalties or favorable court decisions or even contracts. The protection of proprietary information is an effort which can be likened to a contest between two adversaries, with one side being the lawmakers, sometimes supported by the Public Interest groups, with their output of statutes and case law being updated on almost a daily basis. On the other side is industry trying to protect the intellectual property created by its researchers, developers, engineers, and technicians in order to be competitive in the marketplace. In between and under fire by both sides is industry management, supported by its patent department and associated personnel, devising and implementing procedures as best they can for the protection of their employer's rights to this property." A similar and relevant concern can exits in the university classroom setting: "corporations restrict the flow of information in order to protect profits. Professional societies urge technical communicators to do the same. Universities encourage the flow of information so that many may learn from it. All want ethical behavior[31]." As observed by one author, leading edge companies and professional societies are promoting education. Undergraduate degrees, advanced education, and Master's level technical degrees tend to produce case study-type papers which are presented in a technical classroom setting[4].

All companies have proprietary information. Protecting it is a normal business activity. People inside as well as outside the company expect it. "Generally speaking, proprietary information can be defined as "commercially useful ideas." (...) "If you run a business, proprietary information or intellectual property consists of any data that help sell your product or increase your revenues[38, 44]. Pooley[38] further states that "there are two categories of proprietary information: technology and business information." (...) "Proprietary technology is distinguished from business information in part by its general application - it may pertain to an entire class of businesses. Examples of proprietary technology include: a method of mixing structural concrete; an electronic circuit diagram; computer software; a chocolate chip cookie recipe; and a process for stretching wire. Proprietary business information consists of data concerning the specifics of how you make, and plan to make, money. It is not necessarily applicable to other businesses, although their knowing it could help them compete effectively against your business. Examples of proprietary business information include: a customer list; marketing plans; competitive studies; financial reports; and a sealed bid."

Related to the concept of proprietary information is 'protected information' and includes information that can be patented, copyrighted or classed as trade secrets[16, 35, 38]. There is also information that companies can't formally protect, but must be treated confidentially:

1) business information;
2) employee information;
3) customer and supplier information;
4) and future plans[6].

Uses of 'confidentiality' can include contract clauses, or stamping the term on documents. Further along in the spectrum of protecting intellectual property, there are laws governing contracts[2]. Related to this is the formal 'exchange of patents and technical information,' and 'technology transfer[24, 25].'

Typical[1] reasons for preparing proprietary information for public presentation include:

1) Providing (or locating) 'benchmarking' or 'best practices' information and data, where it should be noted that companies, business and professional organizations exist to provide this information.
2) Advertising and/or discussing breakthroughs[26].
3) Expanding business contacts through employee contacts at technical presentations.
4) Participating in technology transfer[25].
5) Providing information – such as performance measurements[8] - in state or national manufacturing or industrial award processes, such as the Malcolm Baldrige Award Application, and various state awards. Related to this is the observation by Weimerskirch[49] that "there are very good Baldrige applications that are very proprietary and are only released to the public in a whitewashed form that removes much of the information."
6) Participating in trade shows[50] and presentations[15].
7) Developing 'e-business' content, such as found on manufacturing, technical or governmental organizations' home pages[20].
8) Presenting technical papers in university classes[3, 4].
9) Managing technical information releases[26].
10) Marketing activities[43].
11) Preparing and publishing a technical thesis or dissertation. For example, Chandler's thesis[5] `A Critical Dimension Scanning Electron Microscope Cost of Ownership Model for a Specialty Wafer Fab,' with work supported by Honeywell's Solid State Electronic Center (SSEC), Plymouth, MN. Formal negotiation with several levels of management

[1] An interesting contrast that came out of the literature searches associated with this paper is that pharamacology literature has a current discussion as to whether papers should be printed if they refer to unpublishable proprietary data[41].

at SSEC and several technical reviews had to occur before a non-proprietary thesis could be published. There were mechanisms in place for 'proprietary thesis' at the University of St. Thomas[48], and through Honeywell, Inc.[20] (as well as other companies with employees that had done technical thesis at the University of St. Thomas[48]).

III. Tools and Techniques

As previously stated, manufacturers have a prudent concern for business intelligence, and maintenance of trade secrets and intellectual property. Even so, a primary reason for information dissemination is to attract potential customers, and customers require enough detail to appreciate how a new technology might meet their needs. Probably the most available technique used to prepare proprietary information is expressing information qualitatively, rather than quantitatively[29, 34]. From a potential customers' point of view, this may be as much detail as they need to develop an interest. Techniques for 'constraining information' in graphs, tables, and other 'information structures' include:

1) Distort significant differences by selective use of scale[21;] in one technical article, the y-axis was labeled 'CD (arbitrary scale).
2) Utilize a cut in the y-axis[21].
3) Use the simplest or least detailed form of representation that still meets the information communication need[46].
4) Use of 'suppressed zero' (when the scale of the independent variable starts at any value above zero), in particular, see Ulman and Gould[46], p. 233, Fig. 9 and p. 234, Fig. 11 for good examples.
5) Use of 'synthetic data,' which could be generated by the author or taken from a relevant publication or source (or a random number generator); this is such a straightforward procedure - take an example from the open literature. Related to this is making up a convenient example. As stated by Mahoney and Mack[28] "Consider the following example (typical numbers are assumed)…". Related to this is the use of appropriate data, such as found in Nag's example[36].
6) Relevant data could be manipulated by various means on a spreadsheet, including multiplication by a constant or constants, rounding numbers up or down, transposing numbers, etc.
7) A number of standard statistical transformations exit for altering the shape of graphical distributions[23].
8) 'Normalize' x- and/or y-axis by dividing data by largest number of data set. From Maltabes, et al[30], "Data normalized so that yield impact of 1% = 1".
9) Present data/graph in 'non-technical' or 'non-engineering' units, such as operator/year, without carefully defining the terms.
10) Use 'bound data[28],' the upper and lower bounds of the date, not the specific data - for instance 'typical costs are $1/lb to $5/lb.'

11) Use a service provider or vendor to provide contemporary cost numbers or ranges.
12) Use case study data, such as found in open literature or contemporary texts or publishers (such as case studies from the Harvard Business School) or special sources (such as Honeywell's TBT case study for Quality Examiner training). Related to this is the use of benchmark data; user industry and business databases (and reference where numbers can be found); use government numbers, such as from the U.S. Department of Commerce (and again, reference these numbers).
13) In special circumstances with some technical topics it is possible to present information in an equation format that allows readers (or the audience) to input appropriate data (i.e., information known industry-wide, such as basic manufacturing costs or typical defect levels for a well known process) and calculate a number, such as $/hr for an industry-specific cost model. From Chandler[5], "One example of a Cost of Ownership cost model has the form: cost/wafer = (metrology cost/wafer) + (fixed cost/wafer) + variable cost/wafer), and the three quantities to the right of the equation sign would be known by (or readily available to) industry participants."
14) Specifically use qualitative, rather than quantitative, words and terminology in the graphics, text and presentation; words such as: typical, average, about, industry average, normalized, etc.; Juran[23] provides "methods of summarizing data" which provides a technical transition from quantitative to qualitative data.

IV. Specific Considerations

'Information structures,' including Ulman and Gould's reference to "other forms of visual presentation(s)"[46] need to be considered, and include:

1) working or assembly drawings;
2) schematic diagrams;
3) block diagram;
4) photographs;
5) exploded views; and
6) models (physical, CAD, or virtual).

Other related information structures include:

7) flow diagrams and flowchartings (others)
8) force field analysis;
9) Ishikawa diagram;
10) Pareto diagram;
11) histogram;
12) trend chart;
13) scatter diagram;
14) affinity diagram;

15) control charts;
16) animations;
17) interactive software;
18) compact disks; and
19) web pages.

Due to their ubiquity, graphs – and associated graphics – will be briefly addressed. Types of graphs include[32]: 1) table; 2) pie chart; 3) 100 % bar chart; 4) bar graph; others. As Markel[32] points out:

1) "graphics are more interesting than words;
2) graphics are easier to understand and more memorable for many kinds of material;
3) graphics give you an opportunity to emphasize particular information;
4) graphics can save space; and
5) graphics are the best way to communicate most kinds of numerical and statistical relationships."

It is worthwhile to point out that the purpose of preparing proprietary information for public presentation is not "to present information at a glance[46]", but rather to provide an industrial or technical reader selected information without revealing other information.

A particularly useful technique used to provide appropriate information is to use (and cite) relevant data from previously published technical articles or information sources[1, 17]. In this context it is important to state that sanitized data is being discussed - in particular, begin statements relating to sanitized proprietary data with some phrase such as: 'From equivalent (or related, etc.) relevant data taken from XYZ database...'or 'Using relevant data published by Author X in ABC Journal...'.

In addressing corporate needs to communicate, risks[27] will have to be balanced with benefits. A business or government agency can view public disclosure as having both advantages and disadvantages: the advantage of favorable public disclosure of significant technical and manufacturing abilities and the disadvantage of competitors learning of such significant technical and manufacturing abilities. In some businesses this takes the form of 'technical information releases[26]', and can have a formal process associated with it. Honeywell, Inc.[19] has a substantial brochure, referencing the employee's line supervisor, and Honeywell's Security and Legal Departments. Some companies utilize a disclaimer at the end of an employee's publications[13]. Through both anecdotal and documented evidence, "Vested interest and narrow points of view thus result from specialized functions and these in turn impede successful lateral communication[11].

In the context of regulating publications, Pooley[38] states "One area that needs attention is the screening of new documents that, by their nature, are available to outsiders. This material

includes promotional literature such as brochures, advertisements, press releases, and material distributed at trade shows." (...) "Require prior review of an employee's technical speeches and publications, (including university term papers)." (...) "Finally, examine product documentation and repair manuals that are given to customers. These should prominently display confidentiality legends, especially on drawings; don't depend solely on a copyright notice."

In a similar manner, "sales material, trade show exhibits, and professional presentations should be reviewed for sensitive information by responsible department heads. Employees should be instructed not to say anything at trade shows or in their outside presentations that they would not say to a competitor[15]". Pooley[38] also suggests "... examine in great detail and with great emphasis the trade show or convention. Such events, since they invite extensive socializing among industry competitors, can threaten trade secret preservation." "Educating employees on maintaining confidentiality is essential for several reasons (...and) must be continuous; an educational program is most effective[38]."

Special areas and circumstances for consideration in preparing proprietary information include:

1) Ethics[14 33] and ethical considerations[22] - "you don't want to cross over the fine line between influence and misrepresentation." But equally important may be the need for information to be presented in a constrained or restricted manner consistent with protecting intellectual and technical property while still providing information.
2) Legal[9, 31]; "Naturally, corporate attorney and managers often view the paper record as both a blessing and a curse.[33]"
3) Confidentiality.
4) Proprietary business.
5) Trade secrets[2, 6]; use of proprietary rights agreements and nondisclosure agreements between employee and company[42]; non-compete covenants[42].
6) Patent or pre-patent disclosure.
7) Supervisor approval - Markel[32] suggests 'Make sure your boss agrees with what you've decided.' Prepare an effective and sufficiently detailed 'request to present/publish' to your supervisor; including your understanding of the audience and purpose of the communication. This is a way to establish an informal contract with your boss, keep your boss informed, and solicit early assistance or warnings. If your priorities are later redefined, this will provide written documentation explaining what you have been doing with your time.
8) 'Permission to publish/present' in large companies.
9) Technology transfer; "This usage of defense programs for technology acquisition frequently entails the erection of plant, indeed often complete shipyards, and answers to the purpose of introducing a new industry into the economy. Argentina, Brazil, India, the Koreas and Thailand have all pursued naval expansion programmes which doubled for shipbuilding industrialization policies.[45]"

10) Organizational policies: Mathes and Stevenson[33] suggest organizations and individuals need to "discipline yourself to follow document-retention policies and to keep rigorous records."
11) The use of disclaimers[13].
12) 'Protect employer property[16]'.
13) Freedom of Information Act[12].
14) Communication of risk[7].

V. A Strategy for Communicating Technological Advances

In suggesting a corporate strategy for communicating technological advances without revealing proprietary information, several main points can to be addressed:

- Know exactly what information is proprietary and how exhibits, text or presentation material related to technological advances are developed/reviewed in your company.
- Know how to reference copyrighted information, and to indicate what of your material is copyright.
- Know your intended audience and their interests.
- Know your company's business strategies related to the technology you are discussing. Keep in mind that all companies have proprietary information. Protecting it is a normal business activity, and people outside the company expect it. If you are part of a government or public agency, there will be different considerations relevant to public agencies, which tend to focus on confidentiality issues, mitigated by 'the public's right to know.'
- Be creative in meeting both audience and business needs. The core proprietary information is probably very specific and focused (like a process or formula), while descriptive information about the technology applications can be extensive.

To draw many of the details, issues, and technical points regarding preparation of proprietary information together, a proposed communication strategy for an individual is outlined as follows.

<u>Preliminary Steps</u>

a) Positively determine what, if anything, is proprietary information about a particular project/subject area.
i) How do you know with certainty? What are the available sources for guidance?
(1) Technical managers
(2) Corporate communications staff
(3) Legal staff
ii) Keep digging until you find someone who can give you a specific interpretation. That person will unquestionable appear if you inadvertently release proprietary information.

iii) If research was a joint effort, find out if any partner policies limit discussion or publication (they may be different from policies at your company).

b) Determine if there is a review process within the company for material produced for the public – allow time to complete that well before any publication or materials deadlines.

i) For a very specialized technical audience (like a professional paper): the review process may involve comments or review from technical managers and legal staff

ii) For more general audiences (like a trade show exhibit): the review may involve technical managers, marketing, and corporate communications staffs

c) Are there any copyright issues involved?

i) Will an entire product/article itself need to be copyrighted? If so, how do you do this?

ii) Is any other copyright material used that needs to be acknowledged?

d) Determine the business strategy for the project/subject from a big picture point of view

i) Communication activity or publication should support this strategy

ii) Factors to consider include:

(1) Timing of public release if announcing something new; who is making the announcement

(2) Involvement of stakeholders, if any (such as whether they expect an advance notice)

(3) Identification of targeted market and customers

(4) Impact on other parts of the company

(5) Effect on business partners

(6) Desired effect on competition

iii) Anything that describes technological advances is also sending these messages:

(1) Company X is a leader in the industry [because we produce developments like this]

(2) Company X has the top people working in it [who are capable of producing developments like this]

(3) Company X can apply this great new knowledge to make better products for you, the customer

e) Determine the specific audiences for an article or exhibit

i) Their education level – so you can use appropriate language, visuals, etc.

(1) Their current likely knowledge or background (marketing staff may have research)

(2) Suitability of acronyms and technical terms (technical vs. non-technical)

ii) Know their level of interest and reason for being interested (or is it being done to GAIN desired interest and attention?)

iii) Aside from the intended audience, who else is likely to have an interest in the material? (There may be unintended consequences of making information available and these should be anticipated as much as possible. Consider all worst-case possibilities, such as environmental concerns, aggressive actions by a competitor to gather intelligence, threats to your own company's workforce of lost jobs, awkward timing with other developments. Then consider best-case positive aspects, like a significant saving

in some public expenditure, widespread safety or health benefits, opening a new technology for an entire industry, etc. After considering both the best and worst possible outcomes, you'll be much more confident and comfortable with eventual real outcomes.

Approaches to organizing

a) Tell the story of what led to the new process or approach
    i) Describe the problem being faced
        (1) Why study/address this problem now?
        (2) If building on other knowledge, whose? From where?
        (3) Analysis, options, tests, dead ends, successes, surprises, innovations
        (4) Role of team members, possibly how a mix of skills were necessary and how they worked together
        (5) What did you think you'd find vs. what you really found
        (6) Chronological sequence where necessary
    ii) Describe the solution
        (1) How you knew you had found the solution
        (2) Verifying tests
        (3) Early applications and results

b) Explain research that advances understanding of a process. At this point, some of the techniques previously discussed for sanitizing proprietary data may be considered and used.
    i) Knowledge starting point
    ii) Objective, method, findings
        (1) Expected and unexpected steps, findings
        (2) Where necessary, use sanitizing techniques to protect proprietary information
    iii) Aspects requiring further research beyond this effort, or new areas discovered

c) Explain new applications found for existing knowledge/technology
    i) Historical uses and applications
    ii) Needs that were candidates
    iii) How knowledge was modified, added to, altered for other uses
    iv) Current and potential projects

d) Explain new applications for discoveries or breakthroughs
    i) Summary of new finding or approach
    ii) Immediate possible uses for it (doing something better, cheaper, etc.)
    iii) Potential uses for it

The underlying ideas in this strategy are to specifically develop public information for a business purpose, and have a suite of tools and relevant information available to use when developing and presenting proprietary information. Develop information with a particular audience and purpose in mind, minus any sense of apology for what is left out. Writing or information that

specifically meets an audience's need is a sound and honorable objective, and *effective* communication is always defined by the person on the receiving side. That approach can make the process much easier for the writer and more beneficial to the reader or audience.

IV. Conclusion

There is a wide range of business and manufacturing information that can and should be considered proprietary. There are a number of reasons and situations where business, and manufacturing information and processes need to be discussed and presented through a variety of public forums. It is possible to describe what something does, how it was discovered, how it works, or its commercial benefits at great length without saying exactly what "it" is. From a business point of view, those are the aspects that matter most. The suite of tools and relevant information presented in this article can be very helpful when developing and presenting proprietary information.

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