NPP TECHNICAL DOCUMENTATION MANAGEMENT

THE GENTILLY 2 PERSPECTIVE ON TAMING THE PAPER TIGER

Paul Lafrenière

Paul Lafrenière
Technical manager
Gentilly 2 NPP

June 1992

TABLE OF CONTENTS

1. INTRODUCTION

The "paper tiger" is a suitable metaphor to describe the current difficulties associated with technical documentation management at the Gentilly 2 NPP.

The steadily increasing and evolving needs of NPP personnel in the area of technical documentation are not being satisfied. However it is becoming increasingly difficult to manage with traditional methods, technical documentation in the paper medium. The tremendous volume of paper, the wide diversity of information and the high degree of technical specialization involved are combined with a great variety of user needs driven by constantly rising quality expectations. Inefficiency has been institutionalized!.

It is suggested that a gradual move towards a centralized computer-based technical document management system be initiated. It is the author's opinion that the full benefit of modern technology and methods can only be realized by the development of a user-friendly NPP document management tool which enables a rapid grasp of the general nature of technical documentation and its identification by non-technical personnel.

This paper describes such a "Person-information Interface" tool and provides some insight into possible applications.

2. THE ISSUE

"Information management and transfer between Design and Operations occupied a major role in the Chernobyl accident" (1). This statement by the former station manager of the ill-fated Chernobyl NPP speaks for itself.

It is possible to say that no nuclear plant operator is totally satisfied with his technical document management system. It is probable that many stations are apprehensive in this area for various reasons, including safety, and feel that improvement is necessary. The Gentilly 2 NPP falls in the latter category.

3. THE PAPER TIGER

Documentation management may be defined as the filing, storage, identification, distribution, verification, approval, consultation, classification by storage life, standard forms, purchase and loan of documents. The term technical document is "all-inclusive" and includes all information of a technical nature.

These functions have traditionally been performed manually for most technical documents in a decentralized environment at the Gentilly 2 NPP. It has become increasingly apparent in recent years that the present way of doing things is not adequate for a modern nuclear power plant.

REF: Nuclear Engineering International, November 1991, "How it was: an operator's perspective, Anatoly Dyatlov.

The visible results of this inadequacy are not comforting! These results include numerous instances of lost documents, revision control breakdown, operation errors, equipment maintenance problems associated with "lost" information, an important amount of document rework by both clerical and professional staff and a general inefficiency associated with delays in document updating, information retrieval etc. It is certain that quality work at Gentilly 2 and as a result safety, has been hampered by the paper tiger. An excellent example of a Gentilly 2 technical document plagued by many of these deficiencies is the Gentilly 2 operating manuals. In fact it may be said that our current program of revision of the (131) operating manuals would not have been required, had modern documentation management methods been used all along.

At Gentilly 2 the paper tiger sprang into existence under the following conditions:

i) The limited financial and human resources of the documentation management unit only permitted centralized administration of a limited number and type of technical documents.

ii) The "Human Factor" has prevented significant progress in technical document centralization. Approximately 50% of the station technical documentation is located in the technical unit among (20) satellite documents areas and numerous personnel cubicles (NOTE 1). This decentralization has fostered document duplication, non-uniformity and revision control problems. The later two points are of safety significance. Another irritant is that specialist information is often accessible only with the aid of the particular specialist.

iii) Gentilly 2 has witnessed a phenomenal growth in the volume of accumulated technical documentation since the in-service date of October 1983. The current total volume of technical documentation occupies the equivalent of (11 000) standard boxes or (900) standard "6 drawer" wall units. These units alone, would occupy about 5000 square feet of floor space.

NOTE 1: Only 15% of the technical documentation has been centralized of which 9% is in storage.

The institutionalized inefficiency of this arrangement had a direct bearing on operating costs. This is reflected not only in floor space and clerical costs (typically 2300 $ per wall unit - year), but also in increased professional labour costs. This is due in large part to the difficulty of most clerical to retrieve and file technical documentation with reasonable precision. The engineer is required to get involved in clerical tasks. A rule of thumb in the technical document management industry is that an engineer spends 40% of his time in locating and assembling data necessary to his work. However high this figure may be, the importance of documentation management in a NPP cannot be taken lightly.

4. A VISION OF THE FUTURE

The management of Gentilly 2 recognizes the problem of technical documentation management at Gentilly 2. "It is our vision that Gentilly 2 shall be equipped with a modern document management system for all important technical documents within 10 years.

5. STRATEGY FOR CHANGE

It is recognized that our long-term objective is to evolve towards a central computerized document management system. This is to be in step with modern technology as employed at numerous world class, engineering-related companies.

It is required that this evolution be driven by specific station needs. The first such need is an operational document management system to provide a document management of the operating manuals, operating flow sheets and overall operating procedures.

It is highly desirable that this evolution be coordinated with other CANDU stations to achieve optimum cost, quality and schedule benefits. It is also preferable to take advantage of the current "user-driven" climate, free of regulatory interference. Recently several CANDU stations have participated with Gentilly 2 in the definition of a "common needs" statement for an operational document management system.

It is further suggested that the starting point for a major and permanent improvement is a complete rethinking of how we manage our documentation. An integrated technical document management strategy based on strong physical/electronic document centralization may be essential to meet current and future needs. However it is not enough! All integration and centralization techniques (eg: computer, microfilm, manual, etc...) quickly run up against the person-information interface (or filing system) stumbling block. This specific problem results from the combination of many factors. They include the large volume, technical specialization, extreme diversity, variability of format and interdependence of technical documentation and the multiplicity of user needs and of course, the "human factor". The nature of NPP technical documentation is such that a formidable barrier to its access and management by non-technical personnel is difficult at best and sometimes impossible.

This difficulty extends to technical personnel. The existence of several different partial or specialized filing systems does not facilitate matters. Naturally the "subjective" nature of document identification by many individuals does not help either.

6. SIMPLIFICATION OF THE PERSON - INFORMATION INTERFACE

Commencing in 1989, it was attempted to develop a single integrated NPP document index to simplify the person-information interface problem. The **Function Nature Index** is designed to be used in conjunction with the existing USI code for equipment. It is essentially complementary to the USI system and both of these codes would be combined to form a complete station document code system.

The three digits of the Function Nature Index basically describe:

1) The function or ownership of the document
2) The physical or intrinsic nature of the document
3) The specific subject

The **Function Nature Index** or "FNI" constitutes a concise inventory of the roughly (1000) major subjects and/or unique documents which one commonly finds in a CANDU NPP.

The inventory is essentially a cartesion matrix (eg: "Top-Down" or hierarchical based) collection of subjects. The subjects are assembled according to the following hierarchy (top-down):

1) Function eg: document utility
2) Nature eg: document type, format, subject domain or relation to time (or phase).
3) Item eg: specific subject.

This FNI attempts to integrate all existing "non-equipment" document codes and is intended to complement the existing USI (on SCI) code. Essentially the FNI emulates the USI code in an attempt to maximise the "periodic" nature of its subjects.

The primary criteria associated with FNI development is the **KISS** principle (Keep It Simple Stupid). **ALL** station personnel must be able to quickly understand the general nature and identify technical documentation with the aid of simple concepts. Only then can they be expected to file and retrieve NPP documentation efficiently.

The graphic matrix presentation of the FNI is designed to accommodate the human factor. It is generally accepted that 70% of the population in North America perceive information in an essentially visual manner.

7. POTENTIAL APPLICATIONS OF THE FUNCTION NATURE INDEX

The FNI can be easily adapted for numerous applications. These include:

- Identification of relevant station reference plan(s) via a specific subject.
- Identification of the station work group having overall document responsibility.
- Use as a learning aid for the training of new station personnel.
- Use as the basis for station change control (ex: check list). Note that change control is required both for document and hardware changes.
- Identification and indexing of all station technical documents.
- Use as a compendium of standard document identification nomenclature.

8. CONCLUSIONS

Much work remains to be done at Gentilly 2 to tame our paper tiger. Station management has adapted an aggressive position with respect to modernizing the management of important technical documents.

A person-information interface tool has been developed and proposed as a solution to the document identification and filing stumbling block. The **Function Nature Index** is an inventory of 1000 common key words (or subjects) arranged in a top-down hierarchy. It is presented in a tabular matrix to provide a user-friendly roadmap to technical document identification. It is considered that the FNI may be the key in overcoming the "human factor" resistance to document centralization.

Station Document Code
Function Nature Index

SDC Structure: NPP-USI-PROJECT / FNI-D-SERIAL

NPP -Nuclear Power Plant Number
USI -Universal Subject Index
PROJECT -eg SLAR
FNI -FONCTION NATURE, INDEX
D -Doc. type, eg: D -Dossier, U -Unique, P -Policy
SERIAL -Serial number or Date
R -Reference Plan

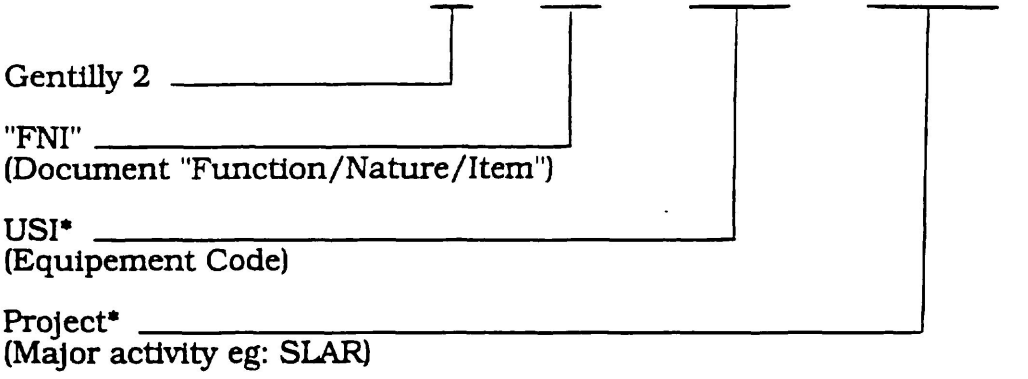
FUNCTION ↓ / NATURE →	0 GENERAL	1 ADMINISTRATION	2 STRATEGY	3 REAL TIME	4 COMPUTER AIDS	5 DATA	6 PROCEDURES	7 REPORTS	8 CHECKS & EQUIPMENT	9 REQUESTS
0 CORPORATE ADMINISTRATION		PERSONNEL	BUDGET	PUBLIC & LEGAL AFFAIRS	COMPUTER SYSTEMS & HARDWARE	INFORMATION SYSTEMS & COMMUNICATION	CORPORATE POLICIES & PROCEDURES		ADMINISTRATION SERVICES	RESEARCH & DEVELOPMENT COG R & D PROGRAMS
1 OPERATIONS MANAGEMENT			STRATEGIC PLANNING	GOVERNMENT AND REGIONAL BODIES	R & D AND STANDARDS BODIES	MONITORING AND INFORMATION SYSTEMS	CONSULTANTS & CONTRACTORS	NUCLEAR BODIES NATIONAL & INTERNATIONAL	NUCLEAR UTILITIES	COG ADMINISTRATION
2 PLANNING	[illegible] & END OF LIFE PLANNING		STATION ENVIRONMENTAL PROGRAM	STATION ANNUAL PROGRAM	OUTAGE PLANNING & MANAGEMENT	PLANNING DATA BASE	WEEKLY PLANNING	PREVENTIVE MAINTENANCE PROG	MODIFICATION PLANNING	PLANNING, ACTIONS,
3 QUALITY ASSURANCE & NPP PROJECT RECORDS	NPP PROJECT OFFICE RECORDS	NPP CONSTRUCTION RECORDS	TENDER	PROCUREMENT	MANUFACTURE	NPP COMMISSIONING RECORDS	QUALITY ASS. PROCEDURES	SURVEILLANCE	AUDITS	NONCONFORMANCE REPORT
4 ENGINEERING	DESIGN STANDARDS & CRITERIA	PROJECT/FABRICATION ENGINEERING ADMINISTRATION	DESIGN DOCUMENTS	DRAWINGS	CALCUL. ANALYSIS & COMPUTERS	P & M DESIGN STUDIES	DETAILED DESIGN	INSTALLATION	P & M COMMISSIONING	CHANGE CONTROL & CLOSURE
5 TECHNICAL SUPPORT	TECH. SUPPORT GENERAL	TECHNICAL SUPPORT ADMINISTRATION	DESIGN CONCEPT EVALUATION STATION MODIFIES	WORK PREPARATION STATION MODIFIES	SYSTEM SURVEILLANCE (S/S) AIDS	SYSTEM SURVEILLANCE HISTORY RECORDS	TECHNICAL PROCEDURES	TECHNICAL REPORTS	SYSTEM PROJECT EQUIPMENT	TECHNICAL ACTIONS
6 PRODUCTION	HEALTH PHYSICS & ENVIRONMENT	PRODUCTION ADMINISTRATION	PRODUCTION PRACTICAL TRAINING	STATION CONFIGURATION CONTROL	CONTROL ROOM COMPUTER AIDS	PRODUCTION HISTORY	OPERATING PROCEDURES	PRODUCTION REPORTS	STATION WORK CONTROL	PRODUCTION ACTIONS
7 MAINTENANCE	INDUSTRIAL SECURITY & ENVIRONMENT	MAINTENANCE ADMINISTRATION	OUTAGE MAINT. PREPARATION	PREVENTIVE & CORRECTIVE MAINTENANCE	MAINTENANCE MANAGEMENT SYSTEM	MAINTENANCE HISTORY RECORDS	MAINTENANCE PROCEDURES	MAINTC. WORK REPORTS	MAINTENANCE & CALIBRAT EQUIP	MAINTENANCE ACTIONS
8 TECHNICAL TRAINING	TECH TRAINING GENERAL	TECH TRAINING PROG ADMINISTRATION	TECH TRAINING SUBSIDIARIAL PLAN	TECH TRAINING ANNUAL PROG DESCRIPTION	SIMULATOR TRAINING & TEST APPARATUS	SHIFT SUPERV/IC OPER TIME FROM HISTORY	SHIFT SUPERV/IC OPER TIME PROCED & MANUAL	TECH TRAINING REPORTS	TECH TRAINING PROG HISTORICAL RECORDS	TECH TRAINING ACTIONS
9 SAFETY	SAFETY GENERAL	REGULATORY REQUIREMENTS REGULATIONS & LICENCES	DETERMINISTIC SAFETY ANALYSES	REAL TIME SAFETY	SAFETY COMPUTER CODES & MISC. SAFETY TECHNIQUES	SAFETY DESIGN BASES & NSS RELIABILITY DATA BASE	SAFETY & ASM PROCED. DEVELOPMENT & TRAINING	PRESCRIBED REPORTS	PROBABILISTIC SAFETY ANAL. DESIGN BASES & LICENS PSA	ACCB ACTIONS

GENTILLY 2

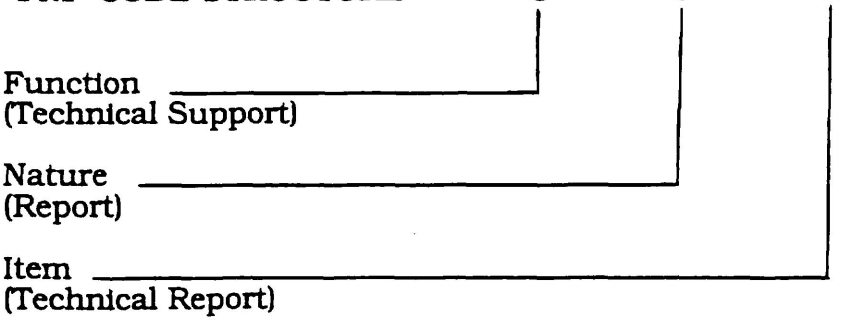
STRUCTURE OF THE STATION DOCUMENT CODE AND FUNCTION NATURE INDEX

1. **BASE STRUCTURE: Station # - FNI - USI - (PROJECT)**

2. **EXAMPLE:** **66** **571** **31100** **(SLAR00)**



3. **"FNI" CODE STRUCTURE** **5** **7** **1**



* **The USI and Project codes are optional. Often only a "FNI" code can be applied.**

GENTILLY 2

DOCUMENT IDENTIFICATION WITH THE 'FNI' CODE