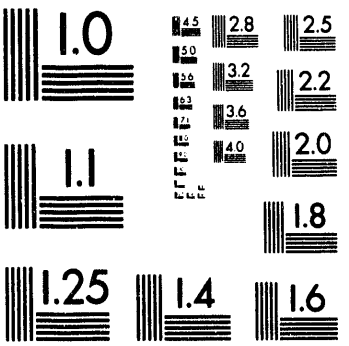
1.0
2.8
2.5
3.2
2.2
3.6
4.0
2.0
1.1
1.8
1.25
1.4
1.6

1 of 1

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# Understanding Requirements via Natural Language Information Modeling

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## Abstract

Information system requirements that are expressed as simple English sentences provide a clear understanding of what is needed between system specifiers, administrators, users, and developers of information systems. The approach used to develop the requirements is the Natural-language Information Analysis Methodology (NIAM). NIAM allows the processes, events, and business rules to be modeled using natural language. The natural language presentation enables the people who deal with the business issues that are to be supported by the information system to describe exactly the system requirements that designers and developers will implement. Computer prattle is completely eliminated from the requirements discussion.

An example will be presented that is based upon a section of a DOE Order involving nuclear materials management. Where possible, the section will be analyzed to specify the process(es) to be done, the event(s) that start the process, and the business rules that are to be followed during the process. Examples, including constraints, will be developed. The presentation will step through the modeling process and show where the section of the DOE Order needs clarification, extensions or interpretations that could provided a more complete and accurate specification.

## Natural Language Modeling

Natural language modeling has developed from early work done by Nijssen that focused on graphical presentations of binary facts into a precise description of natural language facts that are created and validated by the responsible user or manager. Four axioms provide the foundation of natural language modeling [1].

| | |
|---|---|
| 1 | All information communicated can be expressed as a set of elementary natural language sentences. |
| 2 | In discussions with the user, the only language used is the jargon of the user. |
| 3 | Decisions can only be made upon a number of concrete examples. |
| 4 | For every activity in universal informatics, there is a precise prescription such that activities can be reproduced. |

Axiom 1 is based on the realization that all information system activities are done in order to communicate information among people. Communication among end users is always language based and if desired all communication can be in elementary sentences. Elementary sentences are needed so that every individual fact is precisely understood and that no part of the fact can be removed without altering the meaning. Axiom 2 acknowledges that each user community has a natural language jargon that allows the users

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to communicate their technical information to one another. Although these facts may not be commonly understood outside of a specific user community, the jargon makes communication efficient within the community. Meeting user needs should be the primary objective of all information system projects. Natural language modeling provides a precise mechanism for the user to understand and approve all of the system requirements that are necessary to meet his needs.

Axiom 3 requires that every fact be validated through multiple examples of how the fact is used to communicate information. By requiring concrete examples, this methodology forces the user and modeler to define precisely what is being communicated. Individual facts which do not include examples can be misinterpreted by either the user during the validation phase or the information specialist during the creation of the application. Axiom 4 provides for the complete definition of information requirements. If activities can not be reproduced, then the facts pertaining to the activity can not be validated. This axiom may appear to be unachievable early on in the design process because the user experts have not looked in detail at the processes and facts that guide their work. The analysis process provides them with a detailed understanding of their processes and facts, and it may require them to select between multiple approaches or to implement redundant approaches. The precise understanding of activities is the core of the current push for reengineering the business environment, which targets radical changes in the business practices. If activities are precisely understood then the value added by the activity can be determined and permission to make radical changes in processes can be obtained.

Universal informatics is the set of knowledge that can be communicated as precise statements. The universal informatics modeling process creates a natural language model that completely defines all of the processes, events, facts and constraints that apply to the activity under study. The model then fully specifies the requirements for an application, which can be created through the use of an algorithm that generates the information system's table structures and the associated technical specifications[2]. This paper focuses only on the initial capture of the model contents through the application of the natural language modeling process.

## Other Modeling Techniques

A detailed comparison between modeling methodologies can be found elsewhere [3], but in general when natural language modeling is contrasted with other more popular techniques, two main differences become readily apparent. The first is that the natural language model has much more detail because of the multiple concrete examples of each fact. The second is that users can directly evaluate a natural language model without the need of an interpreter to tell them what the model states. When experienced ER (Entity Relationship) modelers initially work with natural language modeling their first objection is that it creates too much detail. They do admit that during application development the detailed knowledge created by the natural language technique is useful. The ability to directly evaluate the model increases the users' commitment to the requirements more than when a graphical model is described to them. The additional commitment ensures that users are more directly involved in solving their information needs.

## Natural Language Modeling of DOE Orders

Natural language modeling can help in creating and evaluating compliance with DOE Orders. A DOE Order is created to establish a set of business rules that can be monitored to assess compliance. Most of the rules are buried in text that requires local interpretation,

and then local processes are set up to monitor local compliance. In some cases local compliance results in multiple responses to a single DOE Order within a particular site. This multiple interpretation of the same text is costly because all the multiple responses are planned, developed, reviewed locally and then finally assessed at DOE. Providing a DOE Order that is methodically developed from a mission or objective statement through to a defined set of business rules that can be processed by computer as well as read by a human, would allow an integrated approach to compliance assessment and provide individual sites with a way to determine the direct cost of compliance.

The general process to create a DOE Order that has defined rules that are derived from a stated mission and objective is:

1. Establish the Mission Statement and Objectives
2. Define the Facts that apply to the Order
3. Capture Examples that verify Facts and identify Constraints
4. Define the Processes that provide compliance with the Order
5. Define the Events that require a Process to be initiated

This is a very simplified process, but the creation of DOE Orders in this manner will allow implementation of the DOE Order across all sites. The creators of the Order will be more accountable for the effect of the Order because all sites can evaluate local costs and possibly project benefits. Metrics can be identified that will allow DOE Headquarters to measure compliance with the Mission Statement and Objectives that are the basis of the Order.

## Initial Analysis of an Existing DOE Order

A particular DOE Order will now be evaluated to initially identify the facts, processes, events, and constraints that make up the business rules that are to be complied with. Several DOE Orders involving nuclear material were reviewed, and one which dealt directly with compliance data was selected. This Order, DOE-5660.1A, establishes rules for the management of nuclear material. The analysis presented here is only an initial effort based on only the stated text and does not include input from technical and administrative experts who have created the Order or have compliance responsibilities.

DOE Order 5660.1A has three sections:

1. NEED FOR ACCURATE FORECASTS.
2. PREPARATION AND TIMING OF FORECASTS.
3. PROCEDURES FOR PREPARING FORECASTS.

Section 1 is the closest thing to a Mission Statement in this DOE Order. It is reprinted here to provide some context for the model contents that will follow.

> Nuclear materials production, processing, or procurement involves the expenditure of large sums of money and generally is based on the determination that requirements for material will exceed availability or that a need exists to resolve problems, such as those associated with storing and handling scrap or irradiated fuel. Accurate forecasts of material requirements are essential in optimizing nuclear material inventories for competing programs as well as determining the total resources needed to meet program objectives.

**Facts with Fact Instances (Examples)**

The facts were created from the DOE Order text and the example form that is appended to the Order. The paragraph number that the fact references is listed above the fact.

Sec 3. a. (1)
1. NUCLEAR MATERIAL ... includes the FORECAST MATERIAL ... .

| with MATERIAL TYPE | with MATERIAL IDENTIFIER |
|---|---|
| enriched uranium | U-235 isotope |
| plutonium | total Pu |
| U-233 | U-233 isotope |
| heavy water ($D_2O$) | $D_2O$ equivalent |
| Pu-238 | Pu-238 isotope |
| tritium | tritium |
| normal uranium | total U |

Sec 3. a. (1)
2. FORECAST MATERIAL ... has the REPORTING UNIT ... .

| with MATERIAL IDENTIFIER | with UNIT VALUE |
|---|---|
| U-235 isotope | kg |
| total Pu | kg |
| U-233 isotope | kg |
| $D_2O$ equivalent | kg |
| Pu-238 isotope | kg |
| tritium | g |
| total U | metric ton |

Sec 3. b. (3)
3. NUCLEAR MATERIAL _____ has the MATERIAL-TYPE CODE _____.

| with MATERIAL TYPE | with CODE VALUE |
|---|---|
| enriched uranium | 1 |
| plutonium | 2 |
| U-233 | 3 |
| Pu-238 | 4 |
| heavy water ($D_2O$) | 5 |
| tritium | 6 |
| normal uranium | 7 |
| other (specify) | 8 |

Sec 3. a. (4)
4. FORECAST ... is supplemented by the RELEVANT ASSUMPTION ... .

| with PROJECT NO/MATERIAL-TYPE CODE | with TEXT |
|---|---|
| HAF80100FF / 1 | --- |
| HAF80100FF / 1 | --- |

Sec 3. b. (2)
5. PROJECT ... has the TITLE ... .

| with PROJECT NO. | with TITLE TEXT |
|---|---|
| HAF80100FF | FFTF Fuel |

Attachment I-1

6. FORECAST ... includes PAGE ... .

| with PROJECT NO/MATERIAL-TYPE CODE | with NUMBER |
|---|---|
| HAF80100FF / 1 | 1 |
| HAF80100FF / 1 | 2 |

Attachment I-1

7. FORECAST ... was prepared on the DATE _____ .

| with PROJECT NO/MATERIAL-TYPE CODE | A.D |
|---|---|
| HAF80100FF / 1 | 1/29/87 |

Attachment I-1

8. FORECAST ... was prepared by the REPORTING ORGANIZATION ...

| with PROJECT NO/MATERIAL-TYPE CODE | with LEGAL NAME |
|---|---|
| HAF80100FF / 1 | RL-Westinghouse Hanford Co. |

Attachment I-1

9. FORECAST ... includes the ENTRY ... .

| with PROJECT NO/MATERIAL-TYPE CODE | with LINE NUMBER |
|---|---|
| HAF80100FF / 1 | 1-1 |
| HAF80100FF / 1 | 1-2 |
| HAF80100FF / 1 | 2-1 |
| HAF80100FF / 1 | 2-2 |

Note: This section-line numbering scheme allows for the lack of correspondence between the first and second sections of the form.

Attachment I-1

10. ENTRY ... corresponds to an ENTRY TYPE ... .

| with LINE NUMBER | with TITLE |
|---|---|
| 1-1 | Withdrawal |
| 1-2 | Withdrawal |
| 1-3 | Withdrawal |
| 1-4 | Irradiated Return |

Sec 3. b. (4)

11. ENTRY TYPE ... corresponds to ENTRY-TYPE CODE ...

| with TITLE | with NUMBER |
|---|---|
| Beginning Inventory | 1 |
| Withdrawals | 2 |
| Unirradiated Returns | 3 |
| Irradiated Returns | 4 |
| Transfers In | 5 |
| Transfers Out | 6 |
| Burnup, Losses, and Expended in Nuclear Tests | 7 |
| Formation | 8 |
| Launch | 9 |
| Ending Inventory | 0 |

Sec 3. b. (5) (a)...(i)

12. ENTRY TYPE ... has the DEFINITION ... .

| with TITLE | with TEXT |
|---|---|
| Beginning Inventory | --- |
| Withdrawals | --- |
| Unirradiated Returns | --- |

Sec 3. b. (6) (a)

13. NUCLEAR MATERIAL ... requires ASSAY DATA ... .

| with MATERIAL TYPE | with ASSAY DATA FORM |
|---|---|
| enriched uranium | Wt U-235 to nearest 0.1% |
| plutonium | Wt Pu-240 to nearest 0.1% |
| U-233 | Ppm U-233 in uranium |
| Pu-238 | Wt Pu-238 to nearest 0.1% |

Sec 3. b. (6)

14. ENTRY ... corresponds to the LOWER ASSAY VALUE ... .

| with LINE NUMBER | with QUANTITY |
|---|---|
| 1-1 | 400 |
| 1-2 | (blank) |
| 1-3 | (blank) |

Sec 3. b. (6)

15. ENTRY ... corresponds to the UPPER ASSAY VALUE ... .

| with LINE NUMBER | with QUANTITY |
|---|---|
| 1-1 | 420 |
| 1-2 | 390 |
| 1-3 | 340 |
| 1-12 | (blank) |

Sec 3. b. (7)

16. ENTRY ... includes the MATERIAL-FORM CODE ... .

| with LINE NUMBER | with VALUE |
|---|---|
| 1-1 | 4 |
| 1-2 | 4 |
| 1-3 | 4 |
| 1-4 | (blank) |

Sec 3. b. (7)

17. NUCLEAR-MATERIAL FORM .. is represented by MATERIAL-FORM CODE .

| with TITLE | with VALUE |
|---|---|
| Hexaflouride | 1 |
| Nitrate | 2 |
| Metal | 3 |
| Oxide | 4 |
| Other | 5 |

Sec 3. b. (8)

18. ENTRY ... includes the SPECIAL-ASSAY CODE ... .

| with LINE NUMBER | with VALUE |
|---|---|
| 1-1 | (blank) |
| 1-2 | (blank) |
| 1-3 | (blank) |
| 1-4 | 01 |

Sec 3. b. (8)

19. SPECIAL-ASSAY CODE ... represents MEASURE ... .

| with VALUE | with RANGE |
|---|---|
| 01 | <1%U-236 |
| 02 | 1%<U-236<2% |
| 03 | 2%<U-236<3% |
| 50 | < 0.00005 Micro-Ci Tritium/ml |
| 51 | 0.0005 < Micro-Ci Tritium/ml < 30 |
| 52 | Micro-Ci Tritium/ml > 30 |

Sec 3. b. (9)

20. ENTRY ... includes the ANSI N15.1-1970/N15.10-1987 CLASSIFICATION ..

| with LINE NUMBER | with CODE |
|---|---|
| 1-1 | (blank) |
| 1-2 | (blank) |
| 1-3 | (blank) |
| 1-4 | C72 |

Sec 3. b. (10)

21. ENTRY ... includes the BEGINNING INVENTORY ... .

| with LINE NUMBER | with QUANTITY |
|---|---|
| 1-1 | (blank) |
| 1-2 | (blank) |
| 1-3 | (blank) |
| 1-4 | (blank) |

Sec 3. b. (11)

22. ENTRY ... includes CURRENT-YEAR FIRST-QUARTER FORECAST ...

| with LINE NUMBER | with QUANTITY |
|---|---|
| 1-1 | (blank) |
| 1-2 | (blank) |
| 1-3 | (blank) |
| 1-4 | (blank) |

Sec 3. b. (12)

23. ENTRY ... includes CURRENT-YEAR 2nd/3rd/4th QUARTER FORECAST

| with LINE NUMBER | with QUANTITY |
|---|---|
| 1-1 | (blank) |
| 1-2 | (blank) |
| 1-3 | (blank) |
| 1-4 | (blank) |
| 1-7 | 11 |

Sec 3. b. (13)

24. ENTRY ... includes FORECAST ... for FISCAL YEAR ... .

| with LINE NUMBER | with QUANTITY | A.D. |
|---|---|---|
| 1-3 | (blank) | 1988 |
| 1-3 | 150 | 1989 |
| 1-3 | 76 | 1990 |

**Fact Constraints**

Sec 3. a. (2)

1. Forecasts should be provided only for quantities of Forecast Materials that exceed the following minimums sometime during the forecast period.

| | |
|---|---|
| U-235 isotope | 2 kg |
| U-233 isotope | 2 kg |
| total Pu | 2 kg |
| Pu-238 isotope | 250 g |
| tritium | 10 g |
| $D_2O$ equivalent | 500 g |
| total U | 10 metric tons |

Sec 3. b. (1)

2. Material under DP-27 materials management control (projects prefixed with "M" and/or "E" designators) located at contractors for which the DOE field office has administrative responsibility should be listed separately.

Sec 3. b. (2)

3. Project number/title pairings must agree with those contained in the official Project Number-Title Index (NMMSS T-141).

Sec 3. b. (3)

4. Each Forecast should pertain to exactly one material type being used in exactly one project; thus, the project number/material-type code combination can be used as a unique identifier for each forecast.

Sec 3. b. (4)

5. On form DOE 5660.1, entry-type codes should be arranged in ascending numerical order; multiple entries for the same entry-type code should be listed in descending order of materials assay.

Sec 3. b. (5) (g)

6. An entry corresponding to entry type Formation should not include tritium reduced in $D_2O$ reactor moderation.

Sec 3. b. (6) (a)

7. Forecast relating to Nuclear Materials with material types heavy water ($D_2O$), tritium, and normal uranium should not include assay data.

Sec 3. b. (6) (b)

8. Single assay values should be provided in the upper-assay blocks for all entries except those pertaining to withdrawals. Ranges of assay values can be indicated for withdrawals by entering data in both the lower-assay and the upper-assay blocks, but only when necessary, i.e., "only where specific assays cannot be identified."

Sec 3. b. (7)

9. A material-form code need only be provided in block 19 for entries pertaining to withdrawals.

Sec 3. b. (8)

10. In blocks 20 and 21, Special-Assay Codes 01 through 15 are entered as appropriate for entries corresponding to irradiated U-235 returns; Codes 50 through 52 are entered as appropriate for $D_2O$ withdrawals and returns; and no Code should be entered in these blocks for any other kind of entries.

Sec 3. b. (9)

11. In blocks 22 through 24, the ANSI classification code should be entered for only returns of irradiated and unirradiated U-235, normal uranium, plutonium, Pu-238, and U-233.

Sec 3. b. (10)

12. The beginning-inventory value in blocks 25 through 29 should be included only for the single beginning-inventory entry in each forecast. (See Question 5 below.) Correspondingly, for the single beginning-inventory entry in each forecast, no quantities should be listed in any of the blocks corresponding to forecast quantities for the ensuing 11 fiscal years.

Sec 3. b. (13)

13. The forecast should cover the 11 consecutive fiscal years beginning with the current fiscal year.

**Processes**

Sec 2. a.

1. DOE Field Offices annually shall provide Headquarters program organizations and the Office of Weapons and Materials Planning (DP-27) with forecasts for each existing, authorized, and contemplated research, development, and reactor project having or needing nuclear materials during the ensuing 11 fiscal years.

Sec 2. b. (1)

2. Headquarters program organizations shall provide guidance to DOE field offices for preparation of the forecast described in PROCESS 1.

Sec 2. b. (2)

3. Headquarters program organizations shall review and evaluate the forecasts for their respective programs that have been prepared by DOE field offices and provide DP-13 with a consolidated copy of their approved forecast with appropriate comments.

Sec 2. b. (3)

4. DP-27 will consolidate DOE-wide forecasts and provide applicable DOE Field Offices with nuclear materials withdrawals and returns summaries.

Sec 3. a. (1)

5. Deuterium gas quantities should be converted to heavy water equivalent quantities by multiplying the deuterium quantities by five.

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**Events**

Sec 2. a.
1. The forecast described in PROCESS 1 shall be provided by 15 February of each year.

Sec 2. b. (1)
2. The guidance described in PROCESS 2 shall be provided by 1 November of each year.

Sec 2. b. (2)
3. The summary report and appropriate comments described in PROCESS 3 shall be provided by 1 March of each year.

Sec 2. b. (3)
4. The consolidation and delivery of summaries described in PROCESS 4 shall be provided by 1 April of each year.

**Initial Analysis**

As this Order was modeled a number of questions came up that suggested voids in the requirements or conflicts within the Order. These are the kind of questions that surface when analysts request detailed information from expert users and managers regarding ongoing processes that are well understood, or were assumed to be well understood prior to analysis.

1. The material types associated with the Nuclear Materials entity type and the material identifiers associated with Forecast Materials raise a number of unanswered questions. Is the Pu-238 forecast a subset of the plutonium (Forecast Material = total plutonium) forecast? Similarly, are the forecasts of enriched uranium and U-233 subsets of the normal uranium (Forecast Material = total U) forecast? Finally, no guidance is provided relating to Forecast Material (or reporting units) for Nuclear Material with material type "other,", which is introduced (and associated with code 8) on page 3 of the DOE Order.

2. Relevant assumptions referred to and requested in 3.a.(4). No examples are given. Examples of specific or generic relevant assumptions may provide more consistency in reporting data.

3. What is the point of FACT CONSTRAINT 2 above? All projects are listed separately because each forecast is for a single project.

4. The listing of U-235 as a material type in 3.b.(3) heightens the potential confusion over the distinction between the entity types Nuclear Material and Forecast Material. Also, in this same section, the listing of "titanium" is assumed to be a typo that should be "tritium" instead, but more errors like this are troubling in a document that is supposed to be followed precisely.

5. The Order clearly indicates that an ending inventory should be entered on the form for each fiscal year during the reporting period, but the issue of including a beginning inventory for the current fiscal year is unclear. The instructions in 3.b.(5)(a) and in 3.b.(10) seem to indicate that the beginning inventory and ending inventory would be required for strict accounting purposes.

6. The lack of correspondence between the lines on the two sections of the form is confusing. It appears that an entry in the first section of the form need not be continued in the second section if there is no further data to add; similarly, if there is no data to record for an entry until the time period covered by the second section of the form, then the entry can appear in just the second section and not in the first. The second section has only 10 lines for entries, but the first section has 12; what if all 12 entries in the first section need to be continued in the second section?

7. The potential confusion over the entity types Nuclear Material and Forecast Material continues in 3.b.(6)(a). As in 3.b.(3), U-235 appears to be listed as a material type, and "titanium" is again listed when "tritium" is probably meant. The Forecast Material associated with the Nuclear Material "Plutonium" has been previously identified as "Total Pu," but the assay data for Pu is specified in 3.b.(6)(a) as "Wt Pu-240...". Does this mean that Pu-240 is the same as "Total Pu"?

8. The table in 3.b.(6)(a) contains three other potential sources of uncertainty. The assay-data specification for three different materials includes the phrase "to nearest 0.1%;" to the nearest 0.1% of what? The assay-data specification for U-233 begins "Ppm U-232," which is apparently another typo. Finally, no guidance is provided relating to assay data for Nuclear Material with material type "other," which is introduced (and associated with code 8) on page 3 of the DOE Order.

9. Re FACT CONSTRAINT 8: The Order directs that "ranges of assays should be used only for withdrawals," but the sample Form F 5660.1 includes a range of assay values for a "Burnup & Loss" entry. Also, how can it happen that a specific assay cannot be identified?

10. The instructions about how assay data should be provided for entries relating to "Burnup & Loss" (see 3.b.(6)(b)) are confusing. What is weight percent? Should the entry of weight-percent values as the assay values for these entries supersede the previous instructions that U-235 assay data should be in the form of "Wt U-235 to nearest 0.1%," etc.? The use of the same three form columns (i.e., columns 13-15 and 16-18) for assay-data entries sometimes provided to the tenths place (for weight percent) and otherwise provided to the ones place is potentially confusing.

11. In 3.b.(7): What is meant by "standard form material"? If the Nuclear-Material Form requested by the entry in block 19 is "Other," does additional information need to be provided?

12. In 3.b.(8), is "Micro-Ci Tritium/ml" the unit of measure for the values listed below?

13. Why does the sample form show (or even provide space for) forecast data for 17 fiscal years, when the instructions clearly state that data is to be provided for the ensuing 11 fiscal years?

## Conclusion

This initial analysis of a DOE Order presents a process that can make the requirements more explicit and compliance better understood. Omissions, conflicts and inconsistencies were detected in this single seven page Order. If all of the DOE Orders pertaining to Nuclear Materials were analyzed even more discrepancies, some of which could put our handling policies in question, would be identified. DOE Orders which have a natural language information model that defines the facts, constraints, processes, and events would establish a uniform approach for compliance and allow the compliance cost to be more easily tracked. Redundant work at individual sites dealing with the interpretation of DOE Orders would be significantly reduced. Although natural language information analysis develops requirements for an information system, the inclusion of skilled natural language information analysts in the preparation of DOE Orders will increase the clarity and preciseness of the resulting Orders, even if an information system is never implemented.

## References


[1] G. M. Nijssen, The Essence of Universal Informatics, Nijssen Adviesbureau Voor Informatica bv, 1992

[2] G. M. Nijssen and T. A. Halpin, Conceptual Schema and Relational Database Design, Prentice Hall, 1989

[3] John K. Sharp, A Comparison of IDEF1X and NIAM ISDM, Proceedings of NIAM ISDM 1993 Conference, Utrecht, Netherlands, Sept. 93

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