Statement of Interest for AAAI-2005 Workshop on Contexts and Ontologies

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Statement of Interest

Since the early 1990s Ford Motor Company Vehicle Operations has utilized a knowledge-based system utilizing description logics to manage the vehicle assembly process planning at Ford's assembly plants. The heart of this system is a knowledge base that contains all of the manufacturing knowledge that is needed to build vehicles at our assembly plants. The following type of knowledge is contained within the system: information about the assembly work, time required to perform an assembly operation, required tooling, part information, a lexicon of terminology that is used by the engineers to describe the assembly build instructions, ergonomic constraints [1] and associated manufacturing information. This knowledge is utilized by Ford engineers and assembly plant operators throughout the world using a global enterprise system known as the Global Process Allocation Study System (GSPAS) [2].

The GSPAS knowledge base is a description logic-based implementation containing knowledge about Ford's vehicle manufacturing domain, including information about tools, parts, assembly instructions, ergonomics issues and lexical information about Standard Language. Standard Language is a controlled language developed at Ford that is used to describe manufacturing instructions in a restricted syntax that is processed by GSPAS. The knowledge within GSPAS is being constantly being updated due to the dynamic nature of the automotive industry [3].

Our current focus is to expand the capability of our systems by tapping into the relevant knowledge that is available throughout the corporation but cannot be easily found or integrated into our existing systems. This type of knowledge includes information about manufacturing best practices, "lessons learned", safety and local plant issues and other related information. All these other knowledge sources cannot be easily integrated due to many factors including missing or incorrect context information, different structure of knowledge bases, mismatched terminology, missing terminology and other related reasons. In many cases we need to deal with unstructured data and text that resides in internal web sites, documents, spreadsheets, existing databases and other knowledge sources.

Figure 1 depicts our current approach to build a structured knowledge representation scheme for manufacturing. The list of knowledge sources that needs to be integrated is listed on the left-hand side under the title of "VOME Knowledge". This contains various sources of knowledge that are relevant for manufacturing. Some of these are already contained in knowledge bases, others may be in databases, spreadsheets or in other formats. Our goal is to develop a structured ontology that will be able to access this knowledge from various sources and make it available for our users at the appropriate time.

Therefore, I am very interested in this workshop to see how different context and ontologies can be combined in terms of integrating information and sharing knowledge across a broad spectrum of application areas.

References

1. Rychtyckyj, Nestor (2004), "Ergonomics Analysis for Vehicle Assembly Using Artificial Intelligence", *Proceedings of the 16th Conference on Innovative Applications of Artificial Intelligence*, July 25-29, 2004, San Jose, CA, pp. 793-798.
2. Rychtyckyj, N., (1999), "DLMS: Ten Years of AI for Vehicle Assembly Process Planning", *AAAI-99/IAAI-99 Proceedings*, Orlando, FL, July 18-22, 1999, pp. 821-828, AAAI Press.
3. Rychtyckyj, N., and Reynolds, R., (2000), "Long-Term Maintenance of Deployed Knowledge Representation Systems", *Proceedings of the Seventh International Conference on the Principles of Knowledge Representation and Reasoning*, April 12-17, 2000, Breckenridge, CO, pp. 494-504, Morgan Kaufmann Publishers.

Manufacturing Knowledge Description

Build a structured Vehicle Operations Manufacturing Engineering (VOME) knowledgebase

VOME Knowledge

• Mfg Issues
• Virtual Builds
• Quality
• Lessons Learned
• Best Practices
• Must / Wants
• Guidelines
• Ergonomics
• Safety Concerns
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Maintain
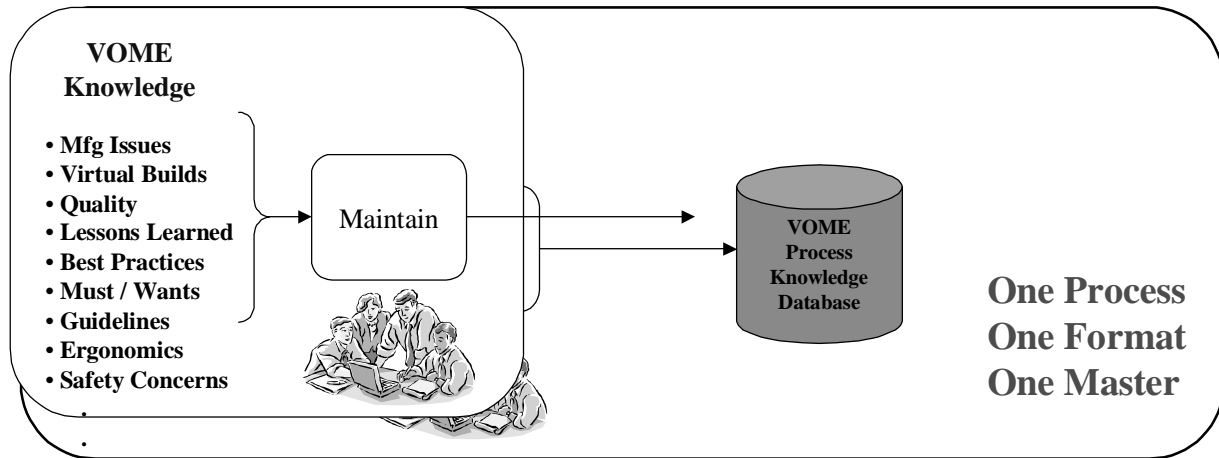
VOME Process Knowledge Database

One Process
One Format
One Master

Figure 1: Knowledge Sharing Environment in Manufacturing