SRS OVERVIEW OF ARTIFICIAL INTELLIGENCE(U)

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I hereby delegate my signature authority to RUSS BECKMEYER

for the period from 9/10 to 9/27/91

for the reason of Business Travel

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cc: J. D. SPENCER
SCS Managers
Text to accompany slide:

There are five areas of artificial intelligence work being conducted at SRS. Some of this work is new and some is a continuation from previous years. The five areas are Compliance Management, Process Control, Human Factors, Decision Support, and education.

We are proficient in the areas of process control are beginning to expand our applications. The IRIS project (Intelligent Reactor Information System) was the first attempt at SRS to automate process controls for the new production reactor. While the IRIS project as R&D is complete the technology is being implemented in other site activities.

Compliance management was first considered in the IRIS project and later considered as a new initiative referred to as the CTI. There are two new projects which have been spawned from the original project called the Information Prioritization System.

Decision support and human factors analysis is embodied in a new project called the Vital Safety functions Monitoring System. DWPF is also considering ways to automate decision support tools in the Diagnostic Expert System for the Electrical Distribution System.
First Priority
FP

- Continuation of the Information Prioritization System
- Creates prioritizing systems for complex lists
- Operates in interactive or standalone mode
- Can run in single user or committee formats

Text to accompany slide:

The compliance technology initiative created the Issue prioritization system. This was a method to rank unrelated goals to ascertain objectives based on cost to benefit ration.

This program has grown to be an expert system which creates a ranking system for a novice user.

The program is called First Priority and it has now been prototyped.

The objective of this system is to create an interactive priority system or a standalone version.
Text to accompany slide:

The Defense Processing Facility is exploring advanced techniques for control room monitoring and decision support tools for process operators.

The electrical distribution system at the plant has been problematic while in the construction phase of the plant. The system is highly complex and few individuals have knowledge about the plant complexity. Routine maintenance requires detailed analysis of lockout points to assure efficient operation of the plant. Intermittent failures have caused power outages. Inadvertent errors have caused lose of power to the entire plant.

DWFP has created a prototype diagnostic tool to assist operators and maintenance personnel to find the root cause of component or system failures and help plan routine maintenance functions.

The complexity of the feed system at DWFP is so large that the prototype was only successful at modeling a small subset of the entire electrical distribution system.
Text to accompany slide:

XSAP is a long term R&D project to help the Analytical Development Section devise methods to more accurately and efficiently develop agendas for the analysis of materials at the laboratory.

One objective of XSAP is to explore techniques useful for creating a robust user interface to the laboratory tracking system. The current system is overloaded and not intuitive for users.

Another objective is to use the most appropriate tool and technique for every analysis. This implies that not only should cost and quality be an issue but availability is also consideration for analysis. The manpower required to make these dynamic decisions is enormous. Analytical planners have narrow expertise in one or maybe two various analysis methods. It is not plausible to coordinate the scarce expertise to always perform the most appropriate technique.
The Vital Safety Functions Monitoring System
VSFM

- Automated version of 105-MC-29-K
- MC 29 is a K reactor procedure for NRC regulations
- Provides useful data during normal operations
- Displays five vital safety functions during emergencies
- Prioritizes safety functions for the operators
- Suggests corrective actions

Text to accompany slide:

The Vital Safety Functions Monitoring System has been prototyped to implement a high level monitoring system for determining a global plant safety status and provide guidance when the plant is in an unsafe situation.

The VSFM is an automated version of DPSOL-105-MC-29-K which is the procedure for monitoring the prescribed safety functions. Making this information available to an operator alleviates the rigor of verifying rigid written procedures in a high tension emergency situation.

Two different human factors groups have iterated on the interface design. The interface tracks 80 safety related parameters continuously to the operator. The system is color coded to visually identify operating levels.
The system testing, at the program development center, is nearing completion. The next phase is installation on the C area simulator. And from the simulator the system will be available to implement in K reactor.

Phase I of this project has been to develop this interface. Phase II is the interactive portion of the project.
Product Composition Control System
PCCS

- Incorporates operating window concept, batch simulation program, knowledge of process variances, and appropriate control statistics to control product composition
- Track vessel compositions from waste tank feed to class product
- Provides accurate chemical composition control in DWPF

Text to accompany slide:

DWPF has researched expert systems for several years as useful tools to assist operators and to perform process control. The Product Composition Control System has been developed as an R&D item to control the product feed into the melter. The PCCS is an aggregation of much of the years of work in expert system research. The PCCS embodies knowledge of the operating window concept, batch simulation program, process variances and control statistics to control product composition. The PCCS is now being implemented at DWPF.
AI Short Courses

- 300 attendees for Object-oriented seminars
- 200 participants in Neural Computing short courses and seminars
- C++ classes developed

Text to accompany slide:

To continue our education of site personnel a series of short courses or seminars has been successful.

Over 300 engineers, scientists, and professionals attended inhouse seminars on object-oriented computing. These seminars were tutorial in nature and continue to be well received. Courses have been offered onsite to personnel who have continued interest in OOP techniques. C++ has become a very popular topic and all the classes offered to date have been filled.

Another rich topic has been Neural Computing. Approximately 200 employees have attended information sessions and short courses on this topic. A progressive program starting with a tutorial introduction and culminating with an intense programming course was created.

While the Neural Computing issues seem to be provocative no R&D or applications have been generated thus far.
END

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