IPRO 303 : Information Design for Plant Management

Fall 2007

Illinois Institute of Technology

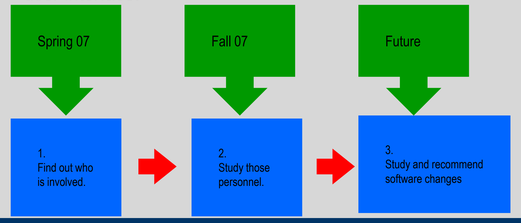
Sponsored by: SmartSignal

About the Project

The overall project goal is to recommend a user interface scheme at maximizing product usefulness and perceived value within the operation staff of a coal fired electric power plant.

To accomplish this objective certain key steps are required:

1. Develop an understanding of the decision making culture within these power plants, determine the personnel involved and what are their responsibilities.
2. Study the key personnel involved, how do they conduct their daily activities and what are the challenges they face.
3. Study the software and based on information acquired about the "potential users" recommend modifications to the current user interface.



Spring 2007 IPRO's Findings

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Last semester's IPRO concluded concluded that regarding power plant maintenance there are two key players:

The Engineering Specialist: A typical plant has 4-8 Specialists, each being responsible for a difference segment of the plant. If a piece of equipment is in need of attention, it is the job of the Specialist to identify the potential failure and schedule corrective action.

Shift Supervisor: is responsible for the operation of the plant during one 8 hour shift. Reporting to the Shift Supervisor are the Operators of each individual unit. It is the job of the Operators to look for equipment abnormalities and alert the Shift Supervisor. If the situation warrants further action, the Shift Supervisor will contact the Engineering Specialist responsible for that piece of equipment and eventually the Operations Manager. The Shift Supervisor will then decide if the situation is severe enough to take the plant down to perform immediate service actions.

Fall 07 IPRO's Objective

This semester's IPRO objectives were to perform a "Day-in-the-Life" study for the two personnel categories mostly likely to use the SmartSignal product. The sponsor would like to know the scope of daily activities for these two individuals. What are their top priorities? Which tasks are most challenging and which are most cumbersome? Which software do they use on a regular basis? Are there certain tasks that have been made substantially easier through application of some software package? Going more to the equipment failure question, what is the life-cycle of a maintenance event? How is a potential issue identified? How is it flagged or logged for further investigation. If maintenance is warranted, how does it get prioritized against other maintenance needs? Who helps with this prioritization? Is there specific software used to track this maintenance life-cycle?

Research Methodology

In order to conduct the research , preferred method was by direct solicitation of information from plant personnel by conductions of interviews and plant tours.

The Questionnaire group develop, questions that would be asked of the key personnel during plant tours and interviews.

Contact group contacts various power plants to schedule interviews and tours.

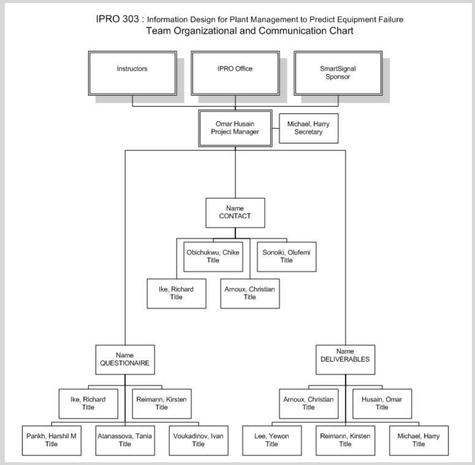
After first few interviews, the questions were optimized to be able to acquire better information from target personnel.

After the accumulation of the interview data, common information and answers were extracted from theses interviews.

The extracted information was quantified in order to show what are the major concerns that faced these the engineering specialists and shift supervisors, their daily activities and how they distribute the time during their work shifts.

Team Structure

The Team was divided into three main groups:
- **Questionnaire Group:** Responsible for design of interviews and deciding on what information needs to be extracted.
- **Contact Group**: responsible for contacting various power plants and scheduling in person or telephone interviews.
- **Deliverables Group**: Responsible for creation and timely submission of all IPRO office deliverables.



Data Gathered

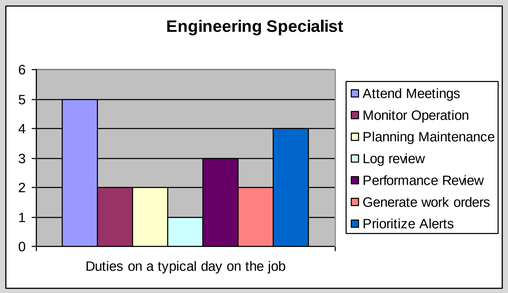
Overall Interviews conducted: 13

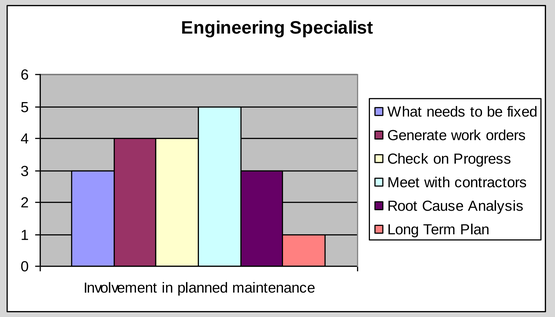
Engineering Specialist Interviews : 8

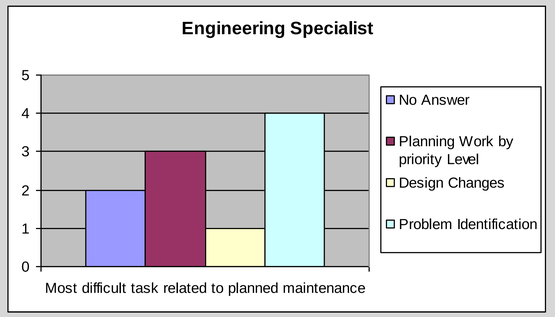
Shift Supervisor Interviews : 5

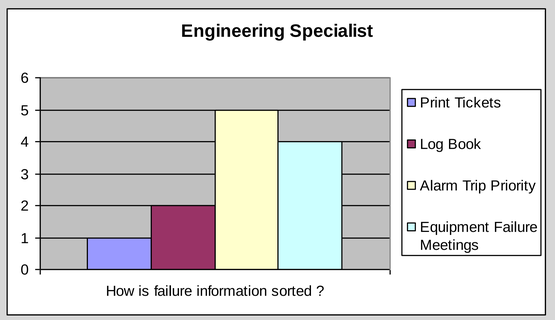
Interview Findings

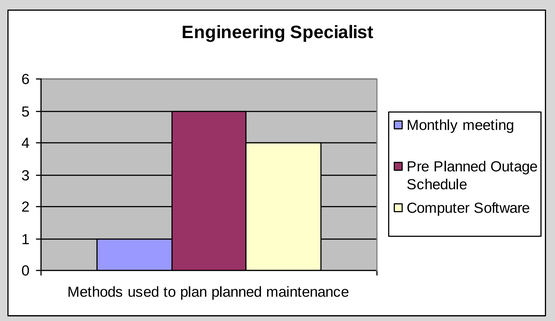
Engineering Specialists











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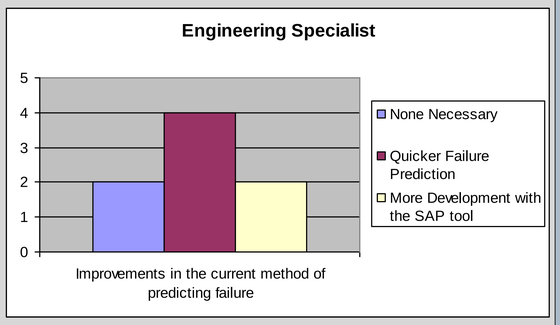
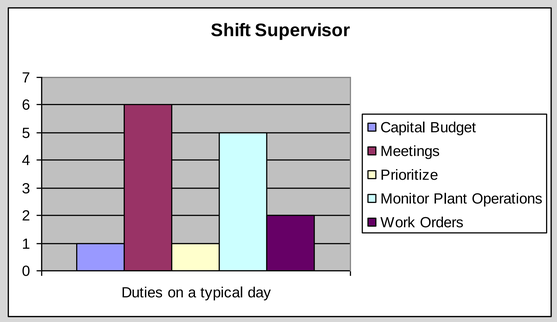
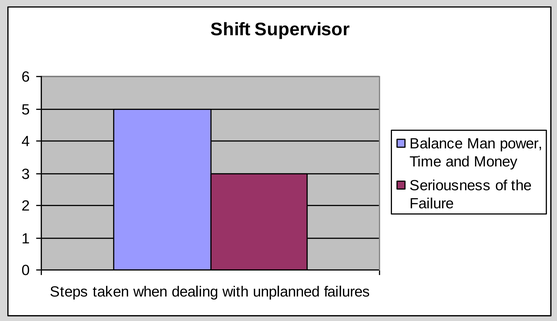
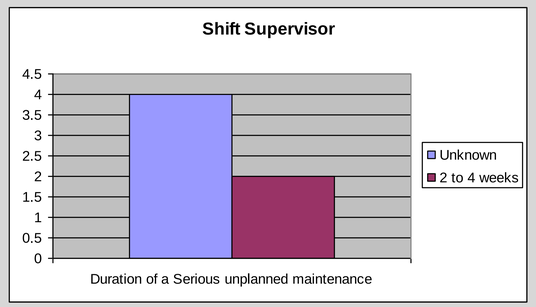
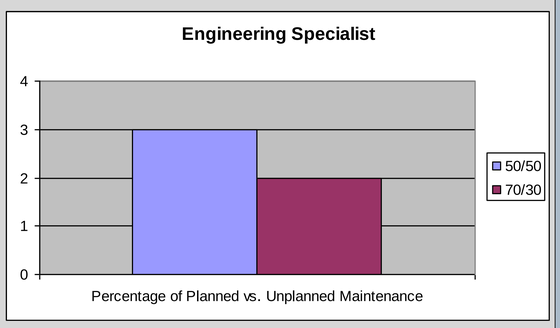


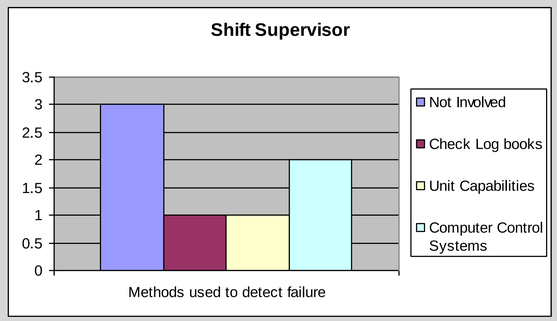
Shift Supervisor

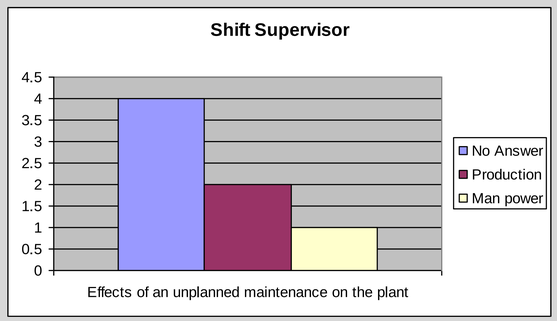












Conclusions

Our primary finding were regarding

Engineering specialists:

- Their main daily tasks were attending meeting and Prioritizing Maintenance alerts.
- They are largely responsible for Generating work orders, meeting with contractors, and scheduling planned maintainence tasks.
- They commonly agree that the toughest part of maintainence is problem identification.
- They plan maintainence based on computer log information and a pre planned outage schedule.
- They also are responsible for startup after an outage.

Shift Supervisors:

- Their main duty is to monitor plant operation during their 8 hour shifts maintaining a log of the events and periodically monitor the control room.
- They are not involved in failure detection but may take an action during off hours to avoid a safety hazard.
- They believe that the main problems faced with unplanned outages is production loss and detection of where the failure occurred.
- They commonly agree that the best method to detect equipment failure is early detection.