IPRO 303

Information Design for Plant Management to Predict Equipment Failure
Our Sponsor: SmartSignal

- SmartSignal – Software company which provides early warning of equipment failure in power, oil and gas industries

- Unexpected equipment failures affect profits and may also impact environment and safety
Problem

- Delivered warnings of equipment failure are only useful for select experts.

Objectives

- Define what decisions must be made during a planned outage
- Research who is making the decisions and what information they use
- Make recommendations that will make SmartSignal their product more useful to plant personnel
## Project Plan

<table>
<thead>
<tr>
<th>Task</th>
<th>Start Date</th>
<th>End Date</th>
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<tbody>
<tr>
<td>iPRO First Class Briefing Session</td>
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<td>Set up iKnow and iGroup accounts</td>
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<td>iPRO games</td>
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<td>General iPRO briefing about the purpose</td>
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<td>Presentation of Smart Signal</td>
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<td>iPRO Project Management Workshop</td>
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<td>Determination of Overall format and First Research</td>
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<td>Writing Project Plan</td>
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<td>Slack Time</td>
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<td>Learning Objective test</td>
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<td>Determine the questionnaire and target company</td>
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<td>Determine the method of interview and survey</td>
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<td>Start Interview and Survey (Visit or phone interview)</td>
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<td>Korean Interview, Translation and Interpretation</td>
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<td>Spring Break (Prepare Midterm Report)</td>
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<td>Complete the Mid-term Report and summit</td>
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<td>Interview result interpretation</td>
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<td>The Final Project Report</td>
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<td>iPRO Exhibit</td>
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<td>The One-Page Abstract</td>
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<td>Team Work Product &amp; Team Minutes</td>
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<td>Comprehensive Deliverables CD</td>
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<td>Prepare Poster</td>
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<td>iPRO Day Presentation</td>
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<td>Smart Signal Presentation</td>
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<td>iPRO Debriefing Session</td>
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Project Plan Overview

- Debriefing with SmartSignal
- Finding contacts
- Writing an interview scrips
- The interviewing process
- Data analysis
- Results and conclusions
Teams

- **IPRO 303 team leader** - Jamie
- **Contact team** — John, Mohhammed
- **Interview team**
  - **US** — Michael, Kevin T., Kevin H., Sarunas
  - **Korea** — Taeho, Migun, Chihwan
- **Analysis team** — Amanda, Mohhammed, Kevin T., Kevin H., Taeho, Migun, Chihwan, Jamie
- **Deliverables and Monitoring** — Jamie, Michael, Amanda, Sarunas
Contacts

- IIT Faculty with connections to power plant industry
- Personal Contacts
- Department of Energy
Faculty with connections to power plant industry

- Professor Mohammad Shahidehpour
- Professor Ali Emadi
- Professor Alexander J. Flueck
- Professor Gerald Saletta
- Professor Joe Pinnello
- Professor Javad Abbasian
- Professor Jamal Yagoobi
- Professor Herek Clack
Hurdles for contact team

- Power Plants with in and out of state.
- Excessive mails and calls.
- Networking.
- Scheduling interviews.
- Forwarding questionnaire and code of confidentiality.
Develop Interview Questions

- Develop a list of questions for interview
- Obtain guidelines for interviewing from Business and Psychology department
- Get feedback from Smart Signal
- Revise & complete interview questionnaire and translated for foreign interview
Interview Methodology

- Correct Interview Format
- Clear Question Phrasing
- Active Listening
- Confidentiality
Sample Interview Questions

- How are you involved in selecting equipment to be maintained during planned outage?
- What information do you use to make the selection?
- How do you get this information?
- What other factors do you take into consideration?
Interviews

- A total of 20 interviews from various power plants
Positions Interviewed

- Plant Managers
- Maintenance Managers
- Operations Managers
- Engineering Managers
- Process Specialists
- Shift Supervisors
- Planners
- Others
Interview Methods

- Power Plant visits
- Teleconference
- E-mail
Ethical Problems Encountered

- Anonymity of our sponsor
- Privacy of interviewed power plant personnel
Analysis

- Table of answers
- Table of statistics
- Identify decision making groups
- Map information flow
- Map decision making flow
Result Interpretation

- Power plant personnel who will most likely benefit from SmartSignal
  - Operations Manager
  - Maintenance Manager
Conclusion

- Hierarchy of:
  - Power plant groups
  - Information (data) flow
  - Decision making flow

- Identified groups who would benefit the most from SmartSignal solutions.
Progress

- Contacts
- Decision flow
- Identified groups of interest
A day in the life of planned maintenance

- A story of decision making and information flow in three acts
Act 1 – Something Breaks

- Unit Operator
- Preventive Maintenance Specialist
- Boiler Process Specialist (Our Hero)
Act 2 – The Maintenance Meeting

- Operations manager
- Turbine and Water Process Specialist
- Boiler Process Specialist (Our Hero)
Act 3 – Money Talks...

- Plant manager
- Operations manager
- Boiler Process Specialist (Our Hero)
Smart Signal – Just in time!!
Questions