Using AI to Simplify Provisioning of Navy Standard Requirements

SDMT and BT Joint Panel Meeting
Alameda, CA
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Hepinstall Consulting Group, Inc.

Category B Data -
Unlimited/Approved for Public Release
Agenda:

Project Overview
Statement of Work
Project Schedule
Next Steps
Questions
Team Introductions

- **Fincantieri Marinette Marine**
  - Dale Samples
  - Joe Harrison
  - Charlie Jackson

- **Auros Knowledge Systems**
  - Greg Burek
  - Steve Boisvert
  - Venkata Yedida
  - Vicky Dlugokecki

- **Hepinstall Consulting Group**
  - Lisa Elles

- **NSRP Technical Manager**
  - Nick Laney, ATI

- **NSRP Project Technical Representative**
  - Monika Skowronska, NASSCO
Project Goal

• Use Knowledge Provisioning to simplify and strengthen compliance tracking and verification of Navy Standard Requirements within shipyard workflows
Project Objectives

- Develop toolset to efficiently parse Navy Standard Requirements into logical individual rules
- Use Artificial Intelligence and Machine Learning to categorize each rule
- Programmatically construct Assessments of relevant rules for provisioning rules into shipyard workflows
- Track and capture compliance to Navy Standard Requirements to provide the Navy a more efficient mechanism to verify design
Project Business Value

• Eliminate inefficiency of manually parsing Navy Standard Requirements documents

• Avoid the need to manually develop and update design check sheets

• Eliminate design flaws due to human error overlooking or missing standards

• Provide single location for tracking compliance and capturing verification evidence
What is Knowledge Provisioning

Represents a fundamental shift in how specifications and requirements are managed and provisioned.

Static
Immediately out of date
Impossible to use while driving

Dynamic
Easy to use
Provisions directions as needed
Provide insights from other drivers
Knowledge Operating Model

Knowledge Ecosystem

Customer Requirements

Flow-Down

Flow-In

AI Assisted Capture

Unified Stream of Knowledge

(Readied for re-use)

Flow-Up

Controlled Crowd-Sourced Knowledge

(Best Practices, Lessons Learned, etc.)

Flow-Back

AI Assisted Learning

External Standards

(MIL STDS, ABS, IMO, etc.)

AI Assisted Delivery

CAD

PLM

Eng. Office

SIM

Planning

Shipyard Facility

Vessel Construction

Repair

Onboard Training

Maintenance
Knowledge Aware / Provisioning

• Knowledge Packets
  Existing
  Documentation
  & Know-How

Assessment Controls

Knowledge Packets (K-PACs)
Knowledge Provisioning Fundamentals

Knowledge Packet

Rule Processing Engine

Assessment Control
Auros Core Technology

Knowledge Packet

Value Table

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<thead>
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<th>Deck Type</th>
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<th>Required thickness of strength decks with transverse beams</th>
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Reference:
   - s_strengthdeck
   - t_strengthdeck_1_actual
   - t_strengthdeck_2_actual
Auros Core Technology

Assessment Control
Knowledge Aware for Navy Requirements
Bulk K-PAC Creation / Classification

Document Ingestor Overview

Project Knowledge Sources → Document Ingestor → Knowledge Packets → AI → IQ Suggestions → Extended Elements → Provisioned Knowledge
Project Background

• Related NSRP Projects

  • KP to Improve First Time Quality in Ship Design (2018 Panel Project)
    • Developed Translator to convert ABS rule XML files into Auros XML files
    • Not able to completely convert XML data (Images, MathML equations, Versioning)
    • Considered applicability to Government Standards – Translator not applicable

  • KP to Simplify ABS Regulatory Compliance (2019 Panel Project)
    • Extended capability of Translator to address Images, MathML equations, etc.

  • KP Using AI & AR for Ship Repair (2019 – 2021 RA Project)
    • Developed Document Ingestor to scan and parse PDF documents
    • Developed AI to categorize parsed rules for creating and managing assessments

  • Custom and Digitized ABS Rules (2021 – 2022 RA Project)
    • Extend capability of Translator for all ABS rule sets
    • Provide structure to allow ABS rules to be applied through CAD
Statement of Work
02 Develop and document future operating model

• Investigate and understand:
  • FMM’s current operating model for managing, applying and validating Navy regulatory standards
  • Navy’s Digital Engineering roadmap
  • Pain points in the existing process (design, build, repair)
  • Necessary metrics to document progress / success

• Develop and document the shipyard’s future state process for provisioning and compliance checking of Navy regulatory standards, taking advantage of the future AI capability within Auros for digitizing the standards as K-PACs.
03 Develop technical requirements

• Identify current technical gaps in the current Auros toolset for parsing and categorizing Navy standard requirements documents

• Document the requirements for the solution
  • Software requirements
  • Process requirements
04 Develop and Verify Solution

- Design and develop Navy regulatory standards/ Auros Rules parsing and categorizing prototype
- Implement security, accessibility, and data durability procedures
- Verify tool and process
05 Pilot with FMM

• Pilot software / process at FMM
  • Provide training session for shipyard pilot participants
  • Test the advanced functionality of the parsing and categorization features as applied to Navy regulatory standards
  • Pilot provisioning and compliance checking process defined in Task 2
  • Gather feedback and data for metrics
Develop Implementation Plan

• Develop Implementation plan for industry as guide for future implementations
07 Develop Final Report

- Develop Final Report consistent with NSRP standard Final Panel Project Report template
  - Project overview
  - Project results
  - Technology transfer
  - Implementation, conclusions and recommendations
Schedule

### Project Tasks

- Team Preparation for Project Kick-off
- Document FMM Existing Process & Pain Points
- Investigate Navy Digital Engineering Road Map
- Develop and Document FMM Future Operating Model
- Develop Technical Requirements
- Develop Solution - Alpha
- Develop Solution - Beta
- Verify Solution
- Pilot with FMM
- Develop Implementation Plan
- Develop Final Report

**Period of Performance:** August 2021 thru July 2022
## Technology Transfer

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<tr>
<th>Event</th>
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<tr>
<td>NSRP Joint Panel Meeting</td>
<td>SEPT 2021</td>
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<tr>
<td>Auros Users Conference</td>
<td>SEPT 2021</td>
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<td>NSRP Day at NAVSEA (if invited)</td>
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<tr>
<td>ShipTech / NSRP All Panel Briefing (?)</td>
<td>MAR 2022?</td>
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<td>Final Report with Recommendations</td>
<td>JUL 2022</td>
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<td>SNAME Maritime Convention</td>
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<td>Additional Tech Transfer Opportunities - TBD</td>
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Next Steps

• Auros training for project participants
• Install FMM Auros instance
• Engage Navy stakeholder community
• Evaluate FMM Operating Model
• Investigate Navy Digital Engrg Road Map
• Determine potential pilot programs
Questions?