Using AI to Simplify Provisioning of Navy Standard Requirements

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Category B Data -Unlimited/Approved for Public Release



Agenda:

Project Overview Statement of Work **Project Schedule** Next Steps

Questions

Project Overview



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Static Immediately out of date Impossible to use while driving Dynamic Easy to use Provisions directions as needed Provide insights from other drivers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 Aware / Provisioning

Knowledge Packets

Existing Documentation & Know-How



Assessment Controls



Knowledge Provisioning Fundamentals



Knowledge Packet Rule Processing Engine

Assessment Control

Auros Core Technology



Knowledge Packet

Edit K-PAC - Google Chrom	e		-		×
nsrp.aurosks.com/kpa	c/edit/2019_BR-84				
019_BR-84			ABS I	Rule	AB
Save Draft Chapters	Properties + - 🕱				
Title	Thickness of Strength Decks with Transverse Beams in Barges Over 91.5 m (300 Thickness of Strength Decks with Transverse Beams in Barges Over 91.5 m (300 Thickness of strength decks with Transverse beams in barges over 91.5 m (300) ft) up to 183 m (600 ft) in Length) ft) up to 183 m (600 ft) in Length ft) up to 183 m (600 ft) in length is to be not less than 3-2-3/1.1.1(a) and 3-2-			
	3/1.1.1(b) below:				
	t = 0.01 s + 2.3 mm	for s ≤ 760 mm			
	t = 0 . 0066 s + 4 . 9 mm	for s > 760 mm			
Description	t = 0.01 s + 0.09 in.	for s ≤ 30 in.			
	t = 0.0066 s + 0.192 in.	for s > 30 in.			
	1.1.1(b)				
	t = (s((L+45.73)))/(25L+6082)mm				
	t = (s((L + 150)))/(25L + 19950)in.				

Value Table

Deck Type	Strength Deck Spacing	Length of Barge	Required thickness of strength decks with transverse beams	Required thickness of strength decks with transverse beams
"Strength Decks with Transverse Beams"	≤30	[300 - 600]	0.01*s_strengthdeck+0.09	s_strengthdeck*(L+150)/(25*L+19950)
"Strength Decks with Transverse Beams"	>30	[300 - 600]	0.0066*s_strengthdeck+0.192	s_strengthdeck*(L+150)/(25*L+19950)
ELSE	ELSE	ELSE	"Not Applicable"	"Not Applicable"
Reference	Reference: Range in	Reference: Range ft	Minimum in	Minimum in
deck_type	s_strengthdeck	L	L_strengtrideck_1_actual	t_strengthdeck_2_actual



Auros Core Technology



2019_BR AC-264 2020 Steel 2020 Steel Barge	Barge								1				
Options 👻 Issues 👻 Rep	iorts 🔻	Filter 👻 Views 👻 View Opt	tion 2019_BR AC-264 2020 Steel Barge										
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Parameter View		Compliant Non Comp	Assessment Header LineItem Sheet	EVALUATIONS INPUTS									
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Conformance State Filter		NE		Parameter List	K-PAC	Reported Value	Computed Values	Minimum	Nominal	Maximum	Units	Precision	Last Modified On
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	9	Req Clar	3	t_deckplatingatends_required		0.004							19-Mar-202 <mark>1</mark> 09:14:34
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- 1		NE	- 5	t_htsdecks_required		138.2932	0.45075	0.45075					19-Mar-2021 09:16:17
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0		Req Clar	5	t_msdecks_required		0.2628906016609906	0.26289060166099	9C					19-Mar-2021 09:16:01
NE Cour	-11	NA	Out Of Bounds	+ t_platformdeck_actual		0.5		0.0847					19-Mar-2021 09:13:54
NE Compliant		NE	Pass InComplete	+ t_platformdeck_noncargo_actual		15		0.1792					19-Mar-2021 09:14:11
NA	Compliant	NE Fail	t_platformdeck_noncargo_required		0.1792	0.1792						19-Mar-2021 09:13:56	
		Non Comp		+ t_platformdeck_required		0.0847	0.0847						19-Mar-2021 09:13:56
		Req Clar		t_plating_adjacent		0.375							19-Mar-2021 09:15:10
		NA		t_plating_outboardcorners_actual		0.5	0.46875	0.46875					19-Mar-2021 09:16:50
		Compliant		t_strengthdeck_1_actual		0.75		0.0					19-Mar-2021 09:11:42
		Non Comp		t_strengthdeck_2_actual		0.75		0.0					19-Mar-2021 09:11:42

Knowledge Aware for Navy Requirements



Bulk K-PAC Creation / Classification



Document Ingestor Overview

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



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

06 **Develop Implementation Plan**

• Develop Implementation plan for industry as guide for future implementations

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

Project Schedule



Schedule

Project Tasks

Team Preparation for Project Kick-off

Develop Technical Requirements

Develop Solution - Alpha

Develop Solution - Beta

Develop Implementation Plan

Verify Solution

Pilot with FMM

Develop Final Report

Document FMM Existing Process & Pain Points

Investigate Navy Digital Engineering Road Map

Develop and Document FMM Future Operating Model

7/1/21 8/1/21 9/1/21 10/1/2111/1/2112/1/21 1/1/22 2/1/22 3/1/22 4/1/22 5/1/22 6/1/22 7/1/22

Period of Performance: August 2021 thru July 2022

Technology Transfer

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

Next Steps



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



In Process

Questions?

