The intersection of Design and AI

@ TorCHI - September 30, 2019

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Watson Internet of Things

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IBM Design for AI

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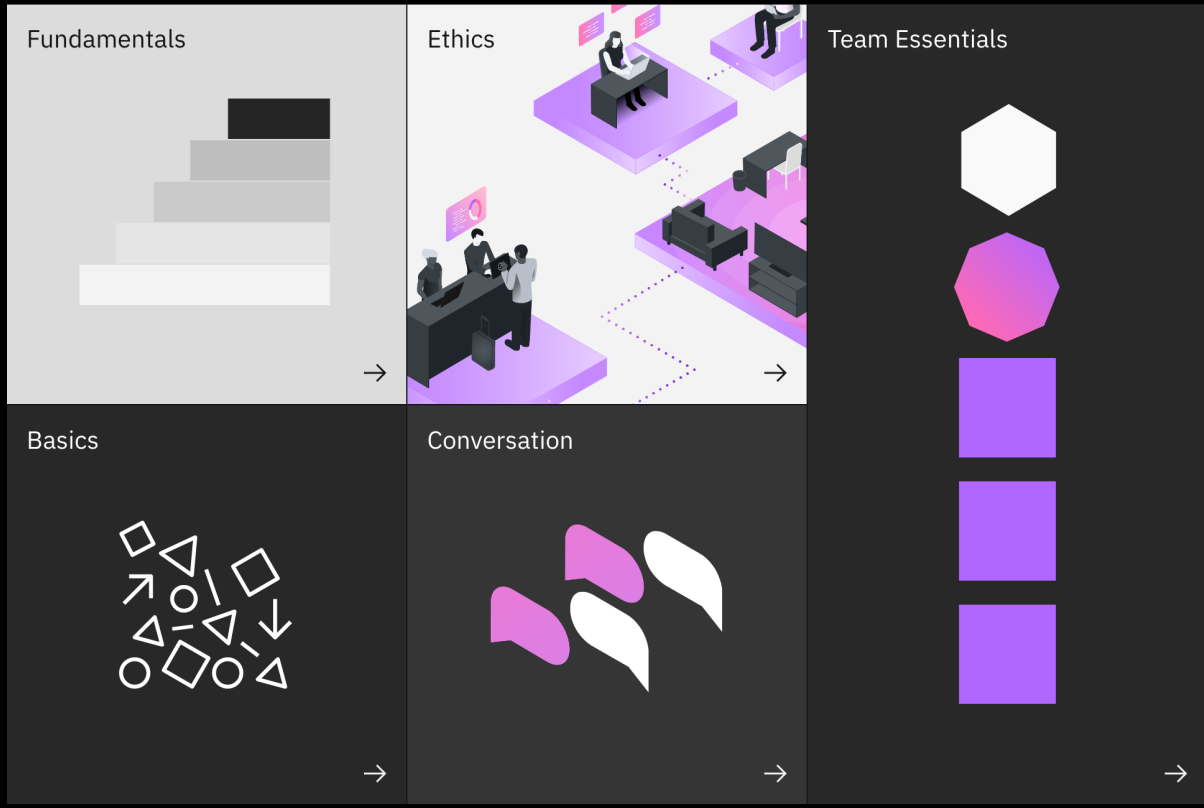
ibm.com/design/ai/



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- 9 lessons
- Individual

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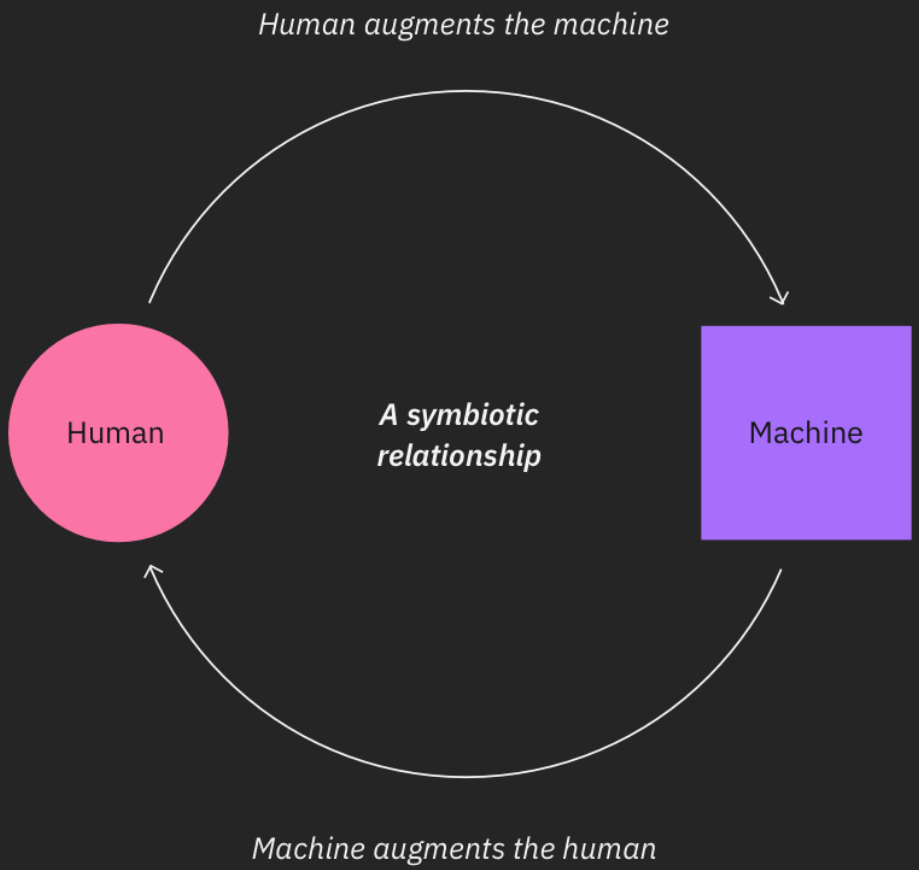
IBM Design for AI

A symbiotic relationship



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IBM Engineering Lifecycle Management
Requirements Quality Assistant

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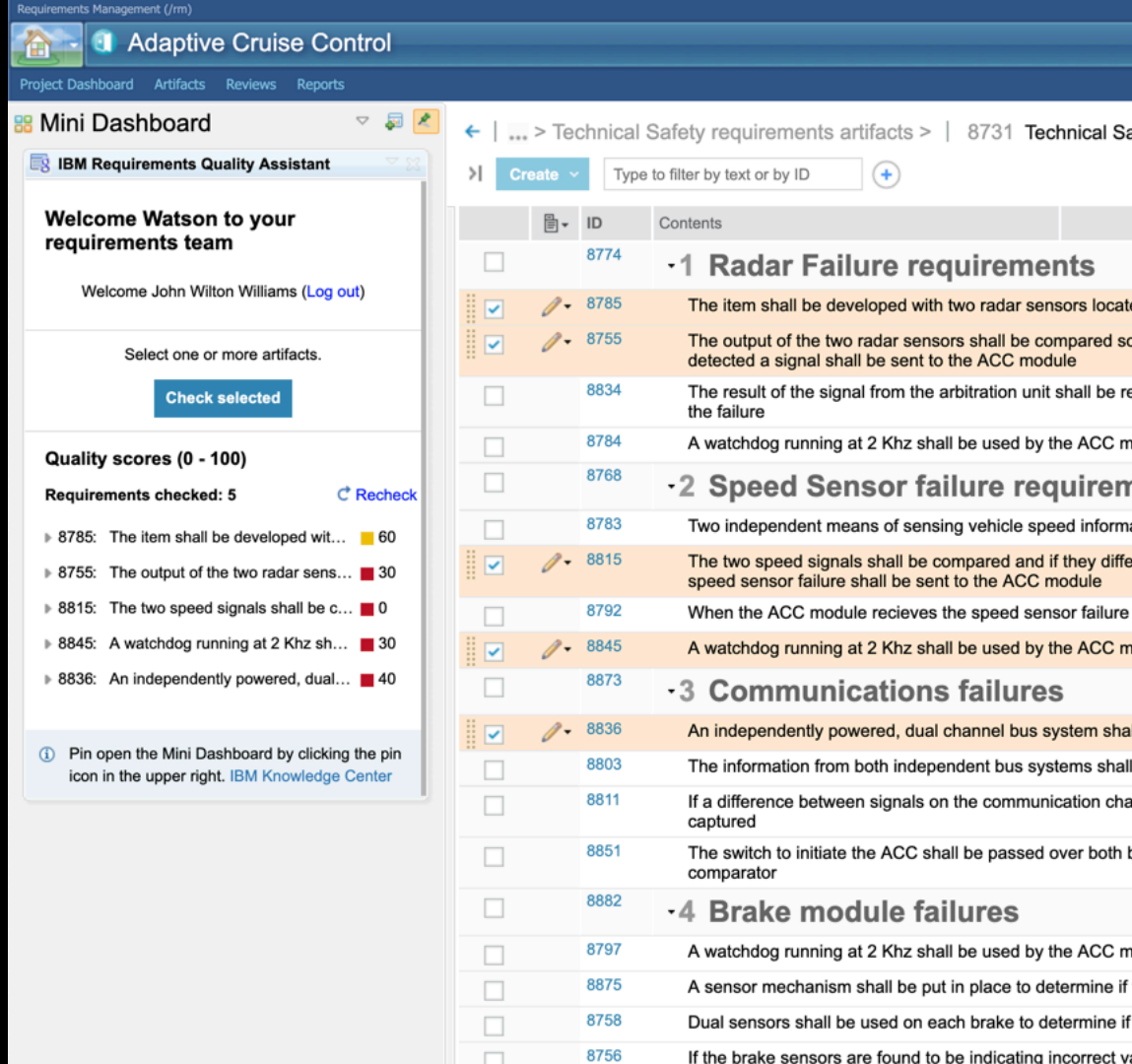
AI Assistant

IBM Engineering Lifecycle Management

Requirements Quality Assistant



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Mini Dashboard

IBM Requirements Quality Assistant

Welcome Watson to your requirements team

Welcome John Wilton Williams (Log out)

Select one or more artifacts.

Check selected

Quality scores (0 - 100)

Requirements checked: 5 Recheck

- 8785: The item shall be developed wit… 60
- 8755: The output of the two radar sens… 30
- 8815: The two speed signals shall be c… 0
- 8845: A watchdog running at 2 Khz sh… 30
- 8836: An independently powered, dual… 40

Pin open the Mini Dashboard by clicking the pin icon in the upper right. IBM Knowledge Center

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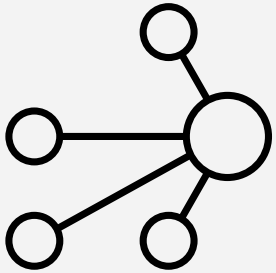
Create | Type to filter by text or by ID

ID	Contents
8774	**1 Radar Failure requirements**
8785	The item shall be developed with two radar sensors located at the front on the left and right side of the vehicle
8755	The output of the two radar sensors shall be compared so that if a difference of distance +/- 15 metres between the sensors over 5 sample periods is detected a signal shall be sent to the ACC module
8834	The result of the signal from the arbitration unit shall be received by the ACC module and it shall force the item into a safe state and warn the driver of the failure
8784	A watchdog running at 2 Khz shall be used by the ACC module to determine if the radar subsystem fails due to loss of power
8768	**2 Speed Sensor failure requirements**
8783	Two independent means of sensing vehicle speed information shall be developed
8815	The two speed signals shall be compared and if they differ greater than +/-5% over a period of 5 samples (running at 5 Hz) then a signal indicating a speed sensor failure shall be sent to the ACC module
8792	When the ACC module recieves the speed sensor failure signal it shall put itself into a safe state and warn the driver of the sensor failure
8845	A watchdog running at 2 Khz shall be used by the ACC module to determine if the Speed sensor subsystem fails due to loss of power
8873	**3 Communications failures**
8836	An independently powered, dual channel bus system shall be used to ensure a redundancy of information being passed between all the susbsystems
8803	The information from both independent bus systems shall be compared to determine that the signals are not different to within a range of +/-3%.
8811	If a difference between signals on the communication channels is detected then a warning signal shall be indicated to the driver and an error code captured
8851	The switch to initiate the ACC shall be passed over both bus systems to ensure that if the signal fails then it is captured by the bus system signal comparator
8882	**4 Brake module failures**
8797	A watchdog running at 2 Khz shall be used by the ACC module to determine if the brake subsystem fails due to loss of power
8875	A sensor mechanism shall be put in place to determine if the brakes are worn to an unsafe degree
8758	Dual sensors shall be used on each brake to determine if the brake sensors are working sensing correctly
8756	If the brake sensors are found to be indicating incorrect values then an error code shall be logged and a brake warning light signal given to the driver

How it works

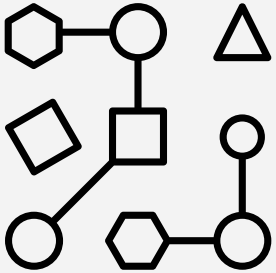
Pre-train Watson Natural Language Understanding to check requirement quality

Watson Services



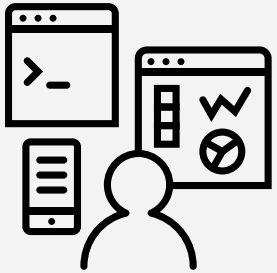
Watson Natural Language Understanding

+



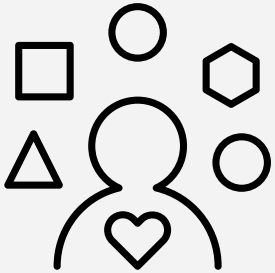
Architecture and pre-built NLP model – ability to tweak for your needs w/ IBM services team

+



Requirements Public Domain Data

Customer Solution



IBM Requirements Quality Assistant

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Results

The GPS System shall receive when in Power On mode. 70

Incomplete: Missing object

Hide Details

This requirement is incomplete because the person or thing that receives the action is missing or unclear. Rewrite the requirement to clearly identify the object of the action.

Learn more

The GPS System input voltage 5V +/- 0.5V. 40

Incomplete: Missing action

View Details

The GPS System shall be able to display distance to the next junction. 80

Imprecise verb

Look for: to be

View Details

Road junction layouts shall be displayed within 100 m of junction. 60

Passive voice

Look for: be displayed

View Details

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Links for IBM Engineering Lifecycle Management - Requirements Quality Assistant

Product page: https://www.ibm.com/us-en/marketplace/requirements-quality-assistant

Documentation: https://www.ibm.com/support/knowledgecenter/en/SS3UPN/com.ibm.help.rm.assist.doc/helpindex_rm_assistant.html

YouTube: https://youtu.be/RcKVxWjWFF8

Demo: https://requirements-quality-assistant-demo.reqadvisorprod-cluster.eu-de.containers.appdomain.cloud/

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IBM Maximo Asset Performance Management Predictive Maintenance Insights

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IBM **Maximo Asset Management** Reliability Engineering

Overview | Preventive Maintenance | Risk Reduction | Repair or Replace

Pumps | Pumps With Sensors | Pumps With Meters at Alarm Level | All | Add Cards | Switch View

Pumps (15)

Collection List

Search

23% Asset Health: POOR
Status: **Active**

11430 Pump, Centrifugal Pump,
HS 3 Centrifugal Pump,
Location: Pumphouse3

Work | Take Actions

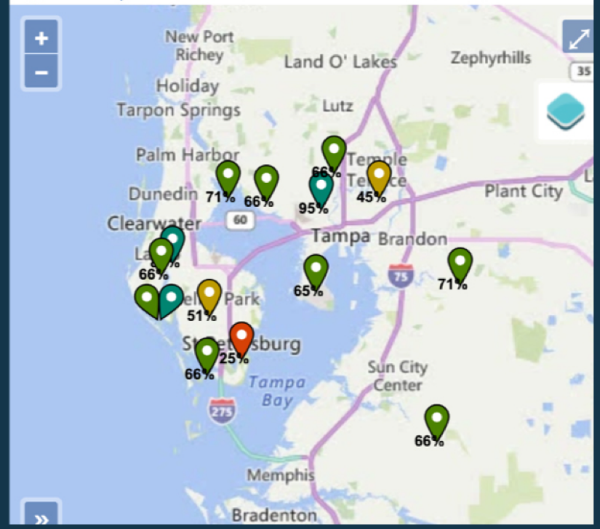
32% Asset Health: FAIR
Status: **Active**

AH001 Pump, Vertical
Turbine HS1 Vertical

Location

Map | **Drilldown**

Pumps

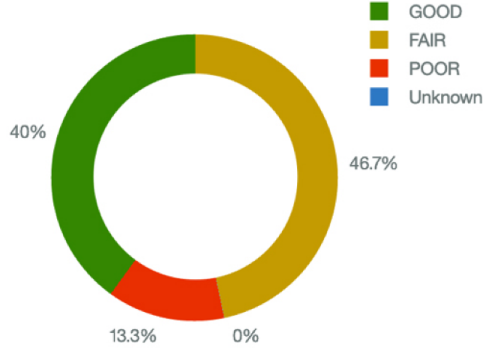


Health Summary

Asset

Average score: 48%

Pumps



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About

Asset Detail for 11430

Asset Health | Weather | Meter Reading | Predictive Maintenance

23%

Asset Health: **POOR**

Scoring System

PUMP,Centrifugal Pump, HS 3 CENTRIFUGAL PUMP,
Status: **Active**
Location: PUMPHOUSE3:Pump House 3

BRANDON FL 33510
Hillsborough County

23%	8%	35%	18%	22%
Temperature	Vibration	Cost vs. Budget	Life	Predicted Survival
Weight 30%	Weight 10%	Weight 10%	Weight 20%	Weight 30%
Use Factors? N	Use Factors? N	Use Factors? N	Use Factors? N	Use Factors? N

Time Period

Month (Default)

Health and Driver History

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Asset Detail for 11430

Asset Health | Weather | Meter Reading | Predictive Maintenance

Failure Probability

Current Failure Probability

This asset

78% ▲ 3.3%

in next 3 Months

Asset group average

56.7%

Assessment date

2018-04-23

Failure Contribution Breakdown

Lead Attribute	Importance	Effect
Vibration	0.44307	
Pressure	0.25482	
Pump Speed	0.23069	

View All Attributes in Analysis Tree

Historical Trend

Predicted Failure Date

Predicted Failure Date

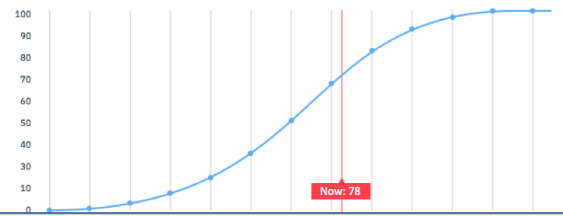
08 JUNE 2019

45 Days Remaining

Next maintenance date

2019-06-17

Probability of Failure



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Links for IBM Maximo Asset Performance Management Predictive Maintenance Insights

Product page: https://www.ibm.com/products/ibm-maximo-asset-performance-management/predictive-maintenance-insights

Predictive Maintenance 101 recipes: https://developer.ibm.com/recipes/author/trisogor/

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The more things change, the more you see the recurring patterns.

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Publications

A UX Lens on AI Model Accuracy and Precision
Michael Zuliani and Paul McInerney
March 2019 - Medium - Design at IBM

Trust by design: information requirements for appropriate trust in automation
Pierre P. Duez, Michael J. Zuliani, Greg A. Jamieson
October 2006 - CASCON '06: Proceedings of the 2006 conference of the Center for Advanced Studies on Collaborative research

DB2 advisor: an optimizer smart enough to recommend its own indexes
G. Valentin ; M. Zuliani ; D.C. Zilio ; G. Lohman ; A. Skelley
March 2000 - Proceedings of 16th International Conference on Data Engineering

"Lee and See identify a continuum of attributional abstraction – information based on which an operator may attribute a sense of trust in an automated tool. Three categories along this continuum are defined: **purpose-, process-,** and **performance-**related information are described as being necessary to achieving appropriate trust."

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Thanks

IBM Engineering Lifecycle Management - Requirements Quality Assistant
Chanelle Augustine
John Williams
Kirk Grotjohn

IBM Maximo APM - Predictive Maintenance Insights
Karen Gosciminski
Steven Tsung Che Chiang
Thiago Barcelos
Tristan O’Gorman

Paul McInerney
Anne Stevens

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