Center for Intelligent Maintenance Systems (IMS)

University of Wisconsin at Milwaukee (lead institution) and University of Michigan at Ann Arbor

Intelligent maintenance systems enable products and systems to achieve near-zero-downtime and six-sigma performance in the 21st century

A National Science Foundation Industry/University Cooperative Research Center since 2000

Center Vision and Mission

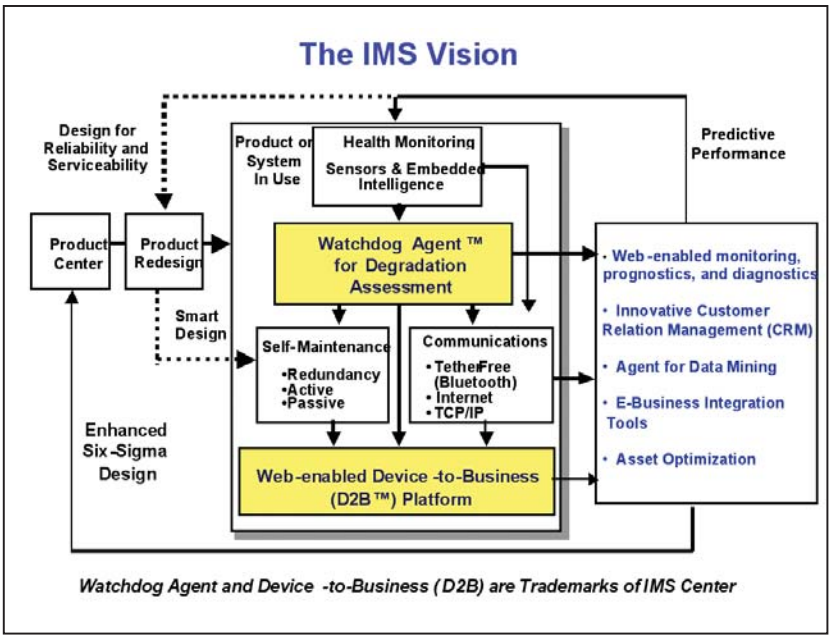
The vision of the Center is to enable products and systems to sustain near-zero-downtime performance through the advancement of web-enabled predictive infotronics and tether-free technologies, including *Smart Computational Prognostics Agents, Device-to-Business (D2B™) Platform,* as well as self-maintenance design methodologies.

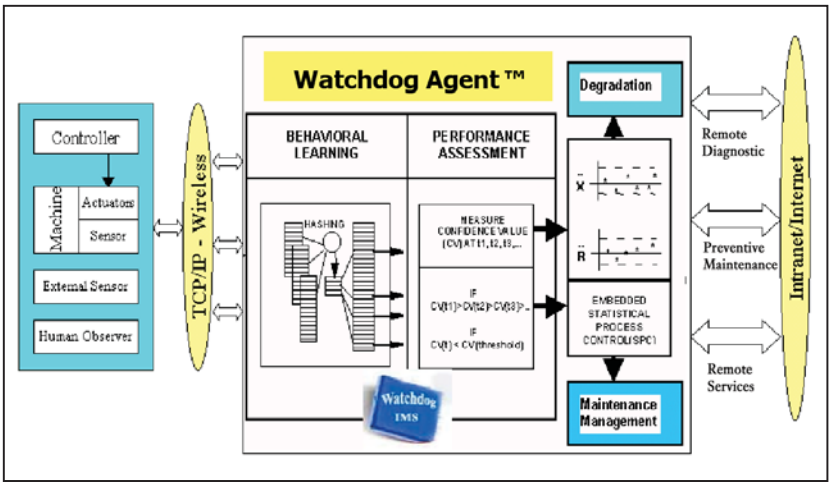
Its mission is to serve as a center of excellence for the creation and dissemination of a systematic body of knowledge in intelligent e-maintenance systems and ultimately to impact next-generation product, manufacturing, and service systems with six-sigma quality. The Center plans to bring value to its members by validating high-impact emerging technologies as well as by harnessing business alliances through collaborative testbeds.

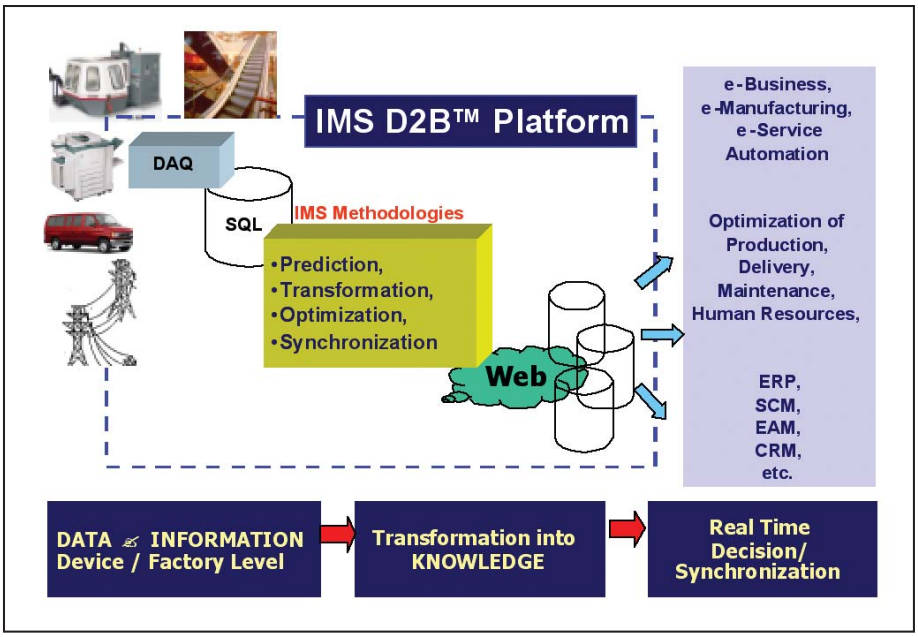
Research Program

The Center's core competencies fall into the following highly interdisciplinary categories:

- ***Smart Computational Prognostics Agent (Watchdog Agent™)*** — Embedded computational prognostics algorithms and toolbox for predicting the degradation or performance loss of devices and systems. Drawing from biological perceptual systems and machine psychology theory, a neural network-based "digital doctor" has been developed for machine degradation assessment and failure prognostics.
- ***Web-enabled Device-to-Business (D2B™) Platform for Transformation, Prediction, Optimization & Synchronization*** — System methodologies that enable (a) transformation of machine/product data into more useful formats, (b) optimization of maintenance and production/service scheduling, and (c) synchronization with other business systems, suppliers and customers. More specifically, projects under this thrust area involve the following: Multi-Media Maintenance Technologies (e.g., wearable computing systems, interactive voice







response, smart portable service tools, etc.); Web-Based Maintenance Technologies for Remote Monitoring, Prognostics, and Diagnostics for distributed and collaborative maintenance; Reliability-Centered Maintenance; Degradation Modeling for Service Value Chain Optimization; Asset Management; Customer Relation Management; Knowledge Acquisition & Data Mining; and Cognitive Science & Decision Making.

- ***Applied Wireless Systems and Development of Embedded Peer-to-Peer Networking Technology*** — Focus on enabling technologies for remote monitoring, wireless communication tools, and evaluation of wireless systems in production and service environments.

Industrial Testbeds

The Center is collaborating with its member companies to validate and deploy the developed core technologies through testbeds.

Industrial Members and Sponsors

The Center's research projects are conducted through sponsored partnerships with industry and government. A list of current members and sponsor companies is shown.

Harley-Davidson	ITRI	Servo Robots
Johnson Controls	Hitachi Seiki	DP Technology
Rockwell Automation	Eaton	Genex Tech.
Toshiba	GM	Industrial Objects
U.S. Postal Services	Rexnord	Lantronix
Citation Custom Pr.	Questra	GlobalCyberSoft
Ford Motor	API	PMC
A.O. Smith	ATOP	Cognex
Xerox	Dr. Machine.com	National Instruments
Intel	Eagle Technologies	Siebel Systems
Wisconsin Electric	Velicon Ltd.	
United Technologies	Endeavors	
Kone Elevators	Dualis	

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