



DRIVING AN ENTERPRISE PART CENTRIC STRATEGY WITH THE THINGWORX PLATFORM

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AGENDA

- ❑ Raytheon: Who We Are
- ❑ Our Journey – Enterprise Systems
- ❑ Our Future
 - What it looks like (Vision)
 - How we will get there (Strategy)
- ❑ Q&A

RAYTHEON: WHO WE ARE



- A technology and innovation leader specializing in defense, security and civil markets throughout the world
- 2015 sales: >\$23 billion; 61,000 global employees
- Headquartered in Waltham, MA
- Businesses



Integrated Defense Systems (IDS) Headquarters in Tewksbury, MA

Intelligence, Information and Services (IIS) Headquarters in Dulles, VA

Missile Systems (MS) Headquarters in Tucson, AZ

Space and Airborne Systems (SAS) Headquarters in McKinney, TX

RAYTHEON: WHO WE ARE



Raytheon Company

Integrated Defense Systems



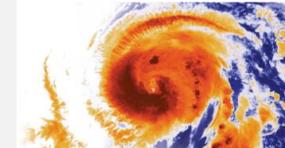
Intelligence, Information and Services



Missile Systems

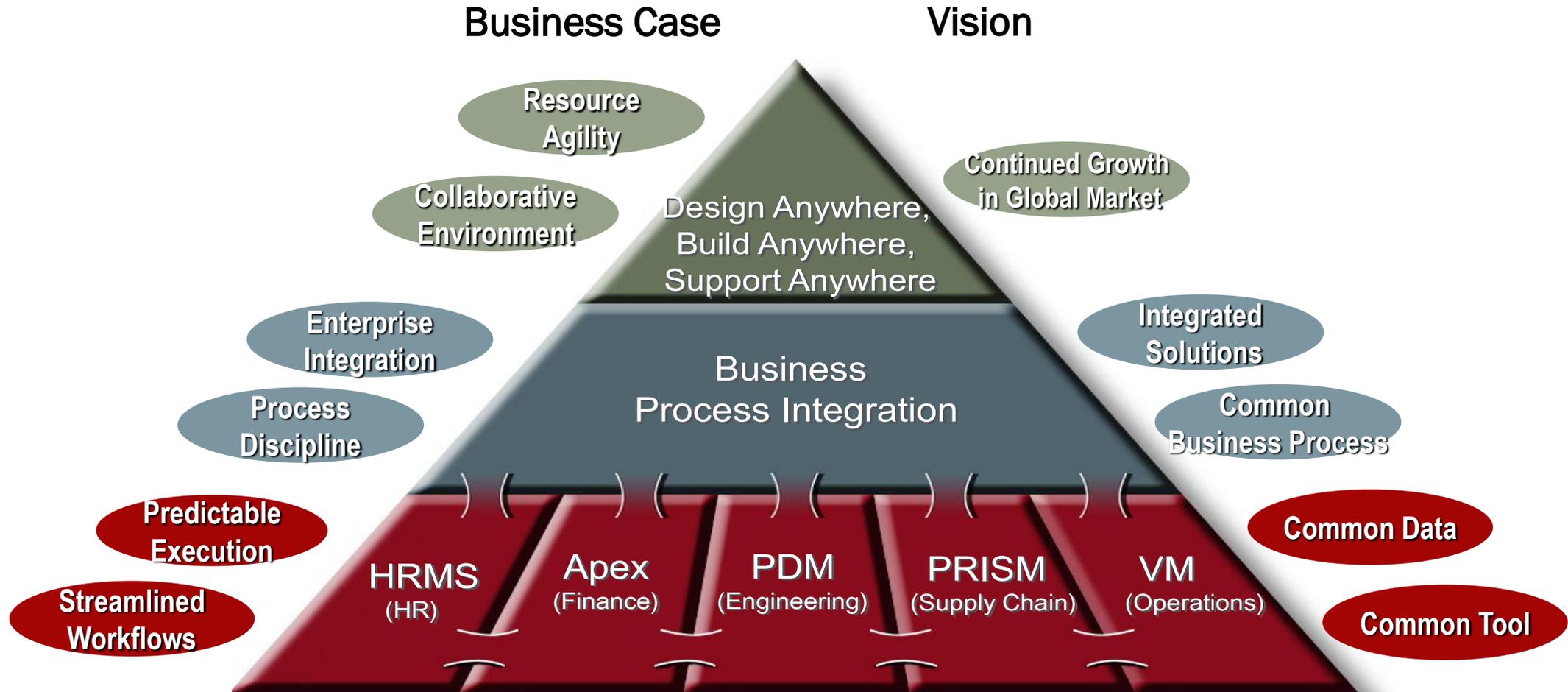


Space and Airborne Systems

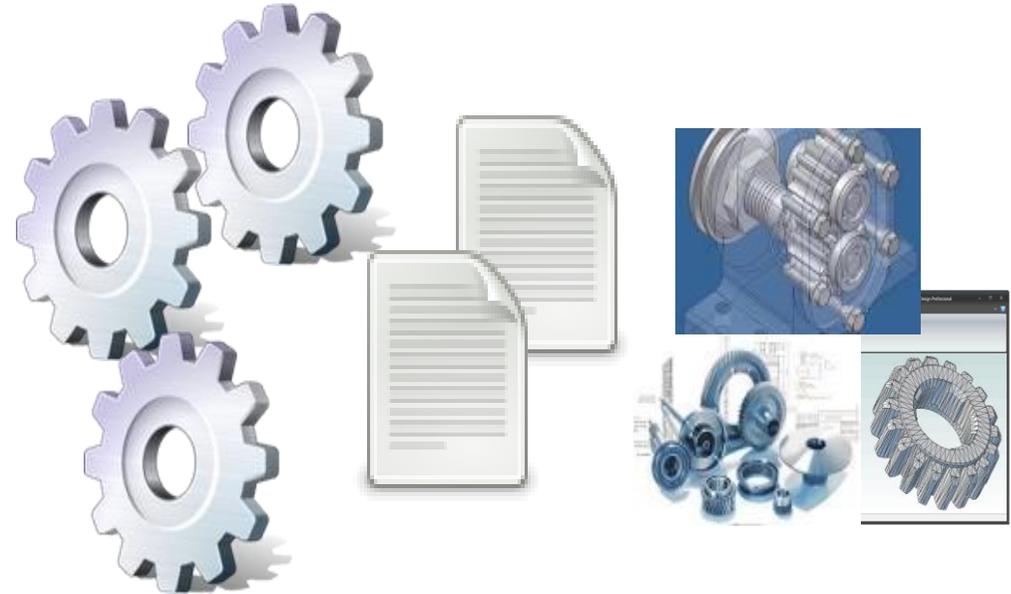


Core Markets: Missile Defense, C5I, Cyber, Electronic Warfare, Precision Weapons, Training Solutions

OUR JOURNEY: 15 YEARS IN THE MAKING



RAYTHEON'S PDM IMPLEMENTATION



- Named Users: 33,600
 - US Employees: 94%
 - US Contractors and Business Partners: 4%
 - International Employees: 1%
 - International Contractors and Business Partners: 1%

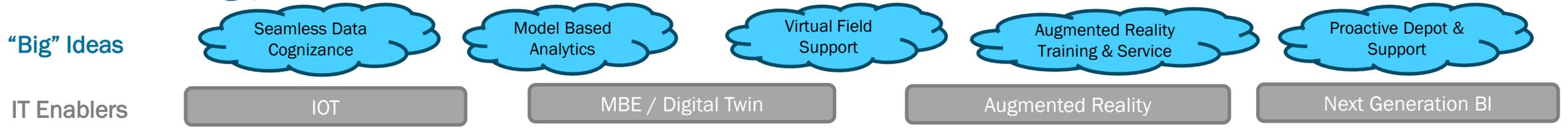
	Masters	Versions
Parts	4,010,518	11,537,972
Documents	5,084,020	8,859,578
CAD Documents	5,762,311	13,987,311
Changes	2,318,138	2,340,346
Packages	391,319	407,420

Raytheon has one of the largest single instance deployments of Windchill in the world!

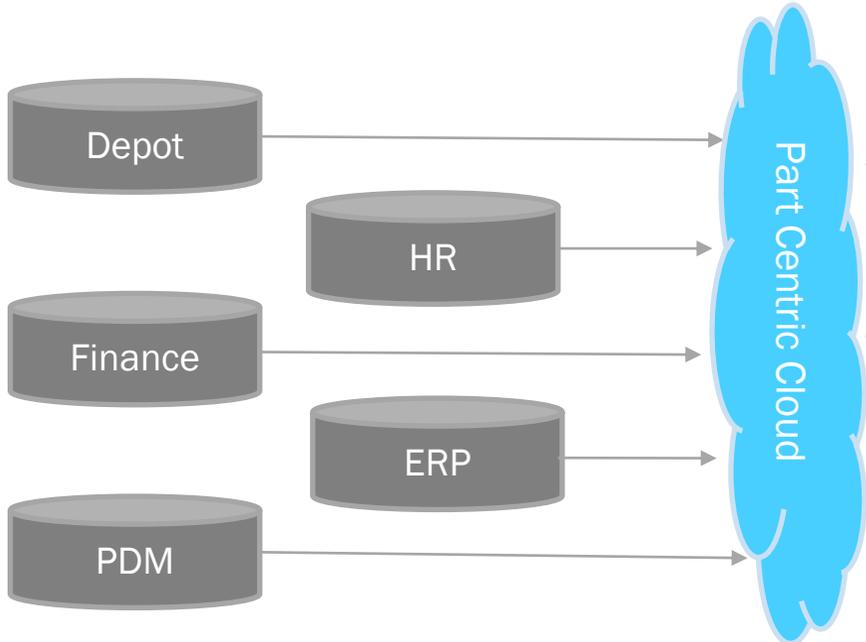
WHAT'S NEXT?

New Vision: Integrated Product Development & Support

Strategy: Integrate foundational business data with embedded sensor data to drive market discriminating processes and tools.



Foundational Business Data



Embedded Sensor Data



HOW TO GET THERE: BABY STEPS



- **Step 1: Add ThingWorx to the IT Ecosystem**
 - Native Environment Data Consumption: For PDM, consider ThingWorx as the UI enabler to integrate data from the Part Centric Cloud seamlessly into the Windchill / Creo interface
- **Step 2: Drive a Model Based Culture**
 - Model Based Data Analytics: Leverage ThingWorx to interrogate the Part Centric Cloud and display results back in a 3D context instead of a historical 2D table report (ie. excel)
- **Step 3: Prototype Market Discriminating Next Generation Processes**
 - Augmented Reality: Partner with one program to develop a working prototype for a small sub-assembly that can demonstrate the power of augmented reality when you have an integrated BOM w/ animated model driven manufacturing and support processes
 - Embedded Sensors in the Product: Partner with Whole Life Engineering to show how embedded sensor data and foundational business data can combine to improve the entire product development and training process.

STEP 1: ADD THINGWORX TO THE IT ECOSYSTEM



- Native Environment Data Consumption
 - Need For Change:
 - Foundational systems designed for heavy weight user, not the casual user
 - Solution:
 - Create light weight UI(s) for the casual user accessing Windchill utilizing ThingWorx

The screenshot displays a web-based interface for a 3D model of a derailleur assembly. The interface includes a search bar at the top with the ID '6289427' selected. Below the search bar, there are tabs for 'View 3-D', 'Section', and 'Exploded'. The 3D model is shown in a perspective view. To the right of the model is a 'Property Summary' table with the following data:

Property Summary			
6289427	Derailleur Assembly	Version C.4	Released
Last modified:	12/20/2014	Cost:	\$52.36
Last modified by:	Jim Smith	Quantity In Stock:	507
		Manufacturer:	SRAM

Red text annotations highlight specific features: 'WebGL-based 3-D Visualization component. No browser plug-in required.' points to the 3D model; 'Attributes aggregated from ERP, or SCM system' points to the cost and stock data; and 'Selected format is displayed when selected or displayed automatically if it is the only format for the role' points to the 'PDF' icon in the 'Formats' section.

STEP 1: GETTING THINGWORKS INTO OUR IT ECOSYSTEM



- Native Environment Data Consumption

- Need For Change:

- End users want to see enterprise data in the context of their native tool they use day to day

- Solution:

- Enhance existing Windchill UI's to contain appropriate enterprise data from the Part Centric Cloud utilizing ThingWorx

		Primary Attributes				
Name:	Power Supply	Efficiency:	92%			
Size:	36*3, 2*X3*X6"	Power Out:	1000V			
Weight:	2.1 lbs	UCC:	7663443			
Input Voltage:	+/- 135VDC	Type:	Power Supply			
Output Voltage:	28VDC	Sub Type:	AC/DC Low Voltage			
Config Object Name	Object Number	Rev	Last Modified	Native File	File Name	Other Representations
VDD - POWER SUPPLY, SSHP	VDD12-34567	G	10/14/2014		VDD12-34567_D.PDF	
PL - POWER SUPPLY, SSHP	PL12-34567	C	8/1/2014		PL12-34567_C.PDF	
NL - POWER SUPPLY, SSHP	NL12-34567	E	8/9/2014		NL12-34567_E.PDF	
POWER SUPPLY, SSHP	12-34567	A	7/12/2014		12-34567_A_1of2.drm	
POWER SUPPLY, SSHP	12-34567	A	7/12/2014		12-34567_A_2of2.drm	
SSHP Software	5738634589v7	G	10/14/2014		5738634589v7_G.ccc	
SSHP GERBER	SSHP_R7.gbr	F	6/15/2014		SSHP_R7_F.gbr	
MODULE ASSY-Assembly Instruction	AI12-34567	A	7/16/2014		AI12-34567_A.doc	
MODULE ASSY-Test Procedure	TP03-07522	D	7/17/2014		TP03-07522	
Hanging CN12-34567r5	CN12-34567r5	-	8/1/2014		CN12-34567r5.ppt	
Hanging CN12-34567r6	CN12-34567r6	-	8/9/2014		CN12-34567r6.ppt	
Object Number	Cage Code	Rev	Name	State	Last Modified	
PS12-34567	12345	G	Power Supply	Released	10/14/2014	
C12-34567	12345	A	Chassis	Released	8/1/2014	
CA12-34567	12345	D	Cable Assy	Released	8/9/2014	
CC12-34567	12345	B	Circuit Card	Released	7/12/2014	
Support Object Name	Object Number	Rev	Last Modified	Native File	File Name	Other Representations
Pwr Module Assembly Specification	H2464328	G	1/14/2014		H2464328_G.doc	
Pspice sim transient only line current	PS12-34567	F	6/15/2014		PS12-34567_F.prb	
SSHP Reliability Analysis	REL12-34567	A	7/16/2014		REL12-34567_A.mcd	
SSHP Efficiency Analysis	EFF12-34567	D	7/17/2014		EFF12-34567_D.mcd	
SSHP Power Conditioning	PC12-34567	-	8/1/2014		PC12-34567.mcd	
SSHP Stress Analysis	ST12-34567	A	7/17/2014		ST12-34567_A.mcd	
SSHP Thermal Analysis	TH12-34567	G	8/1/2014		TH12-34567_G.mcd	
Test Report SSHP	TR987654	F	12/9/2014		TR987654_F.doc	
Test Report SSHP	TR987654	F	12/9/2014		TR987654_F.ppt	
Test Report SSHP	TR987654	F	12/9/2014		TR987654_F.xls	
Reference Object Name	Object Number	Rev	Last Modified	File Qty	File Name	Other Representations
Gate 10 Package SSHP	PRR12-34567	G	8/21/2014	26	PRR12-34567.pdf	
Test Readiness Review SSHP	TRR12-34567	Z	10/14/2014	13	TRR12-34567.pdf	
Customer Direction	NAVY12-34567	E	11/14/2014	3	NAVY12-34567.pdf	

No.	Part	Desc	Sup	Discl	Last Report	EU RoHS	China RoHS	REACH	Conflict Minerals	Obsole scence	GIDEP Alert	NASA Alert	FRACAS	RCAS	MRB	PCAT	Pref Supplier	Pref Prt No	Avg Sched	Avg Cost
1	00000001				04/04/2013								0	0	0	87%			14	\$10
2	00000002				04/02/2013								0	0	1	25%			90	\$15
3	00000003	L BRACKET			04/02/2013								1	1	0	33%			180	\$35
4	00000004				04/04/2013								0	0	0	99%			10	\$14
5	00000005	HEPE COVER			04/02/2013								1	1	0	54%			Stock	\$28
6	00000006	CONNECTOR			04/02/2013								4	3	3	89%			21	\$121
7	00000007	CONNECTOR			03/29/2013								0	0	0	90%			320	\$1,000
8	00000008	CLIP			04/02/2013								0	0	0	32%			21	\$7
9	00000009				04/02/2013								0	0	0	N/A			21	\$96
10	00000010	CRIMP RING BRASS			04/02/2013								1	5	0	N/A			72	\$22
11	00000011				04/04/2013								0	0	1	67%			Stock	\$61
12	00000012	CRIMP RING BRASS			04/02/2013								1	1	0	65%			1	\$18



STEP 2: DRIVING A MODEL BASED CULTURE



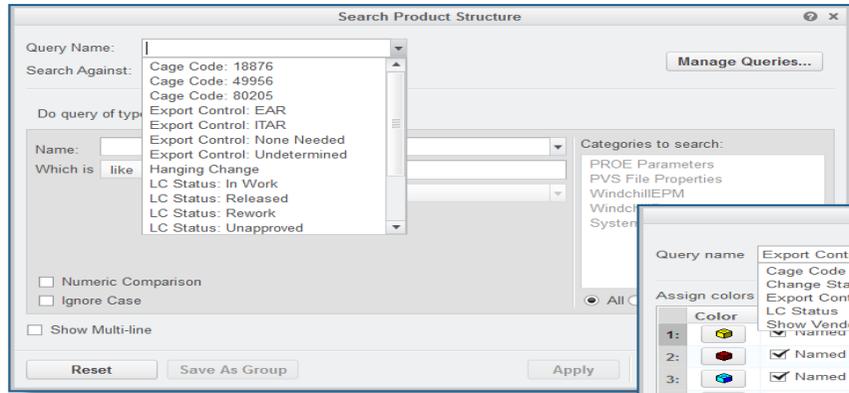
- **Model Based Data Analytics**

- Need For Change:

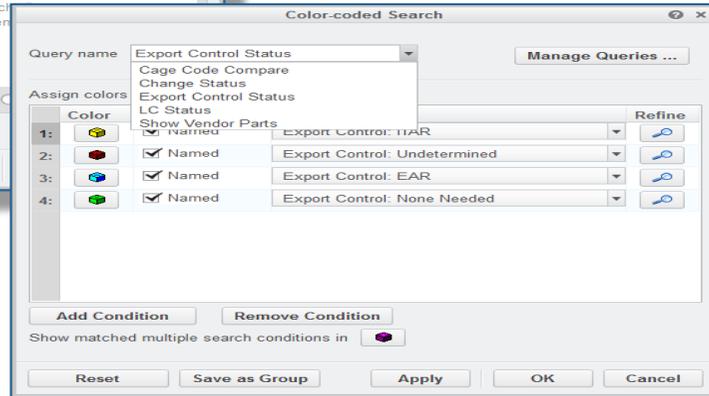
- Reporting and business / product analytics primarily driven off of 2D spreadsheets

- Solution:

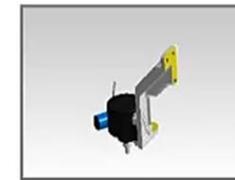
- Leverage CreoView and ThingWorx to create robust interactive 3D displays of complex data analytics from across the enterprise



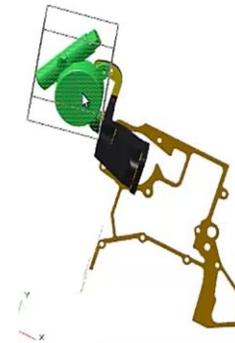
Defined Simple Searches



Defined Advanced Color-Coded Searches



Number 000003447
Name ps_pump
Version A.3 (EBOM)
State In Work



PART STRUCTURE					
Number	Name	Version	State	Last Modified	
000003447	ps_pump	A.3 (EBOM)	In Work	2/14/2015	
000003945	Hexagon Flange Nut, M6	A.2 (EBOM)	In Work	2/9/2015	
000003945	Hexagon Flange Nut, M6	A.2 (EBOM)	In Work	2/9/2015	
000003955	Hexagon Flange Bolt, M6X30	A.2 (EBOM)	In Work	2/8/2015	
000003818	ps_pump_skel	A.2 (EBOM)	In Work	2/14/2015	
000003624	ps_pump_body	A.3 (EBOM)	In Work	2/14/2015	
000003952	Hexagon Flange Bolt, M6X60	A.2 (EBOM)	In Work	2/9/2015	
000003736	ps_bracket	A.2 (EBOM)	In Work	2/14/2015	

3D Color-Coded Search Results with Part Specific Analytic Data

STEP 3: PROTOTYPE MARKET DISCRIMINATING NEXT GEN. PROCESSES



- **Augmented Reality & Embedded Sensors**

- Need For Change:

- Global expansion driving the demand for in country training and support by local citizens

- Solution:

- Leverage part cloud + embedded sensor data for on the job training & service (think video game how-to's)
- Virtualize help (think Amazon Kindle "Mayday")



Q & A