

A 21st Century Approach to MBSE

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<http://www.smalltowndjs.com/images/1968-mustang-interior-326-1968-mustang-interior-view-800-x-562.jpg>

50s to 80s: Documents



The worse thing that happened to requirements was the death of the typewriter. Now there is a near zero cost in changing a requirement.

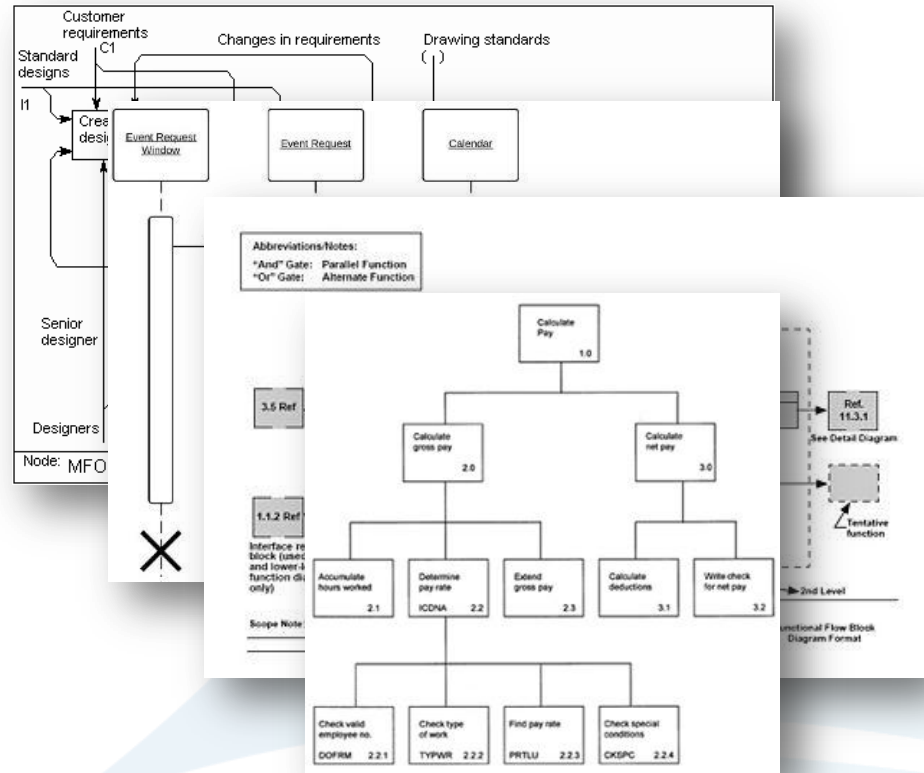
- Unknown Systems Engineer



GTcarlot.com

<http://images.gtcarlot.com/pictures/26998714.jpg>

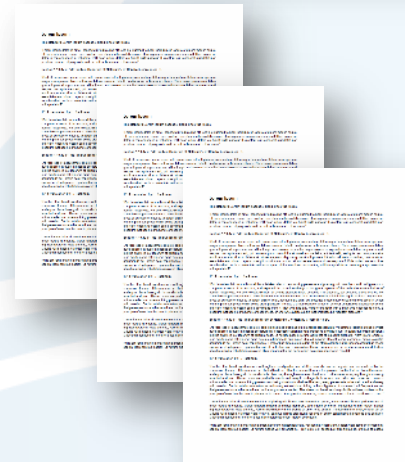
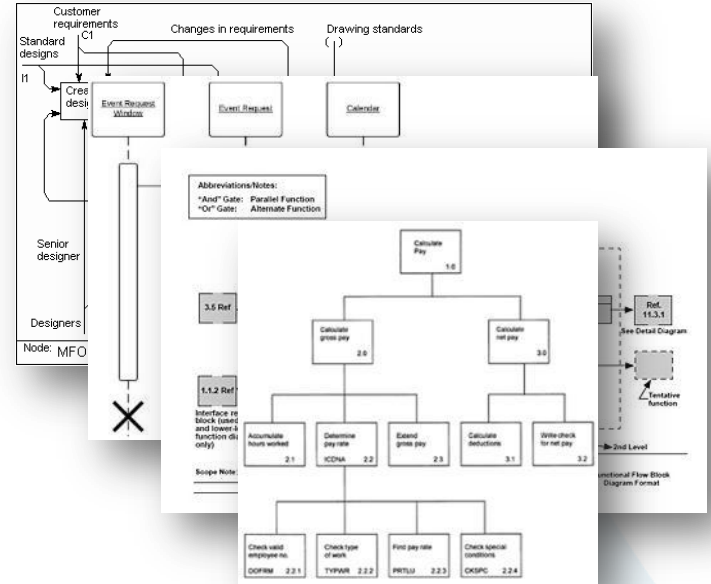
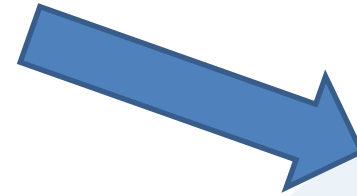
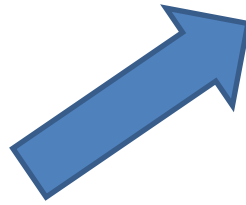
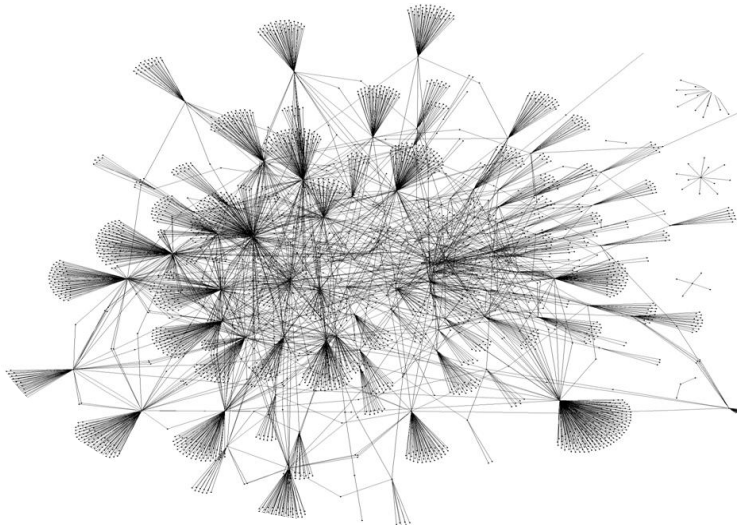
80s to 00s: Diagrams





<http://st.motortrend.com/uploads/sites/5/2011/12/2013-Ford-Mustang-interior.jpg>

90s to 10s: Models



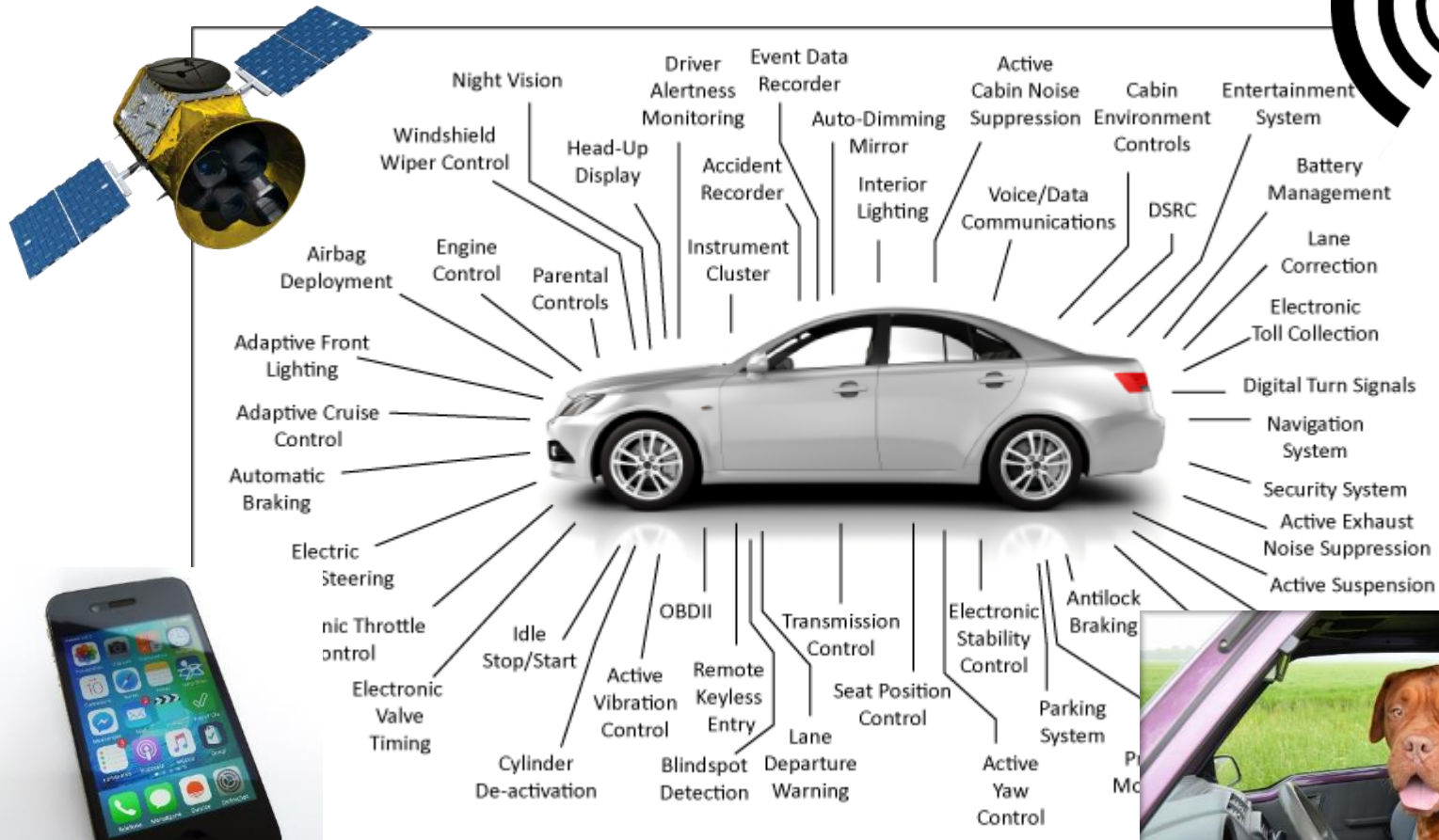


<http://st.automobilemag.com/uploads/sites/11/2015/10/2016-Tesla-Model-X-interior.JPG.jpg>

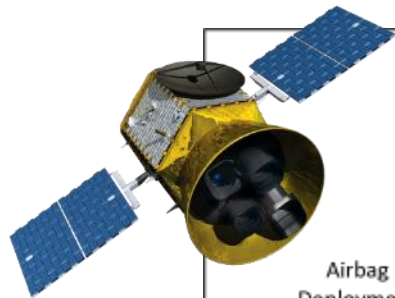
20s and 30s: Interconnections

- Software dependent system
- Internet of Things (IoT)
- Interactions
 - Machine to machine
 - Machine to human
 - Human to human
- Security
- Quick Feedback/Interacts

Modern Systems Are Systems of Systems



<http://www.cvel.clemson.edu/auto/systems/auto-systems.html>



Software is King

25th anniversary
annual INCOSE
international symposium

Seattle, WA
July 13 - 16, 2015



Nature of Product Innovation is Shifting

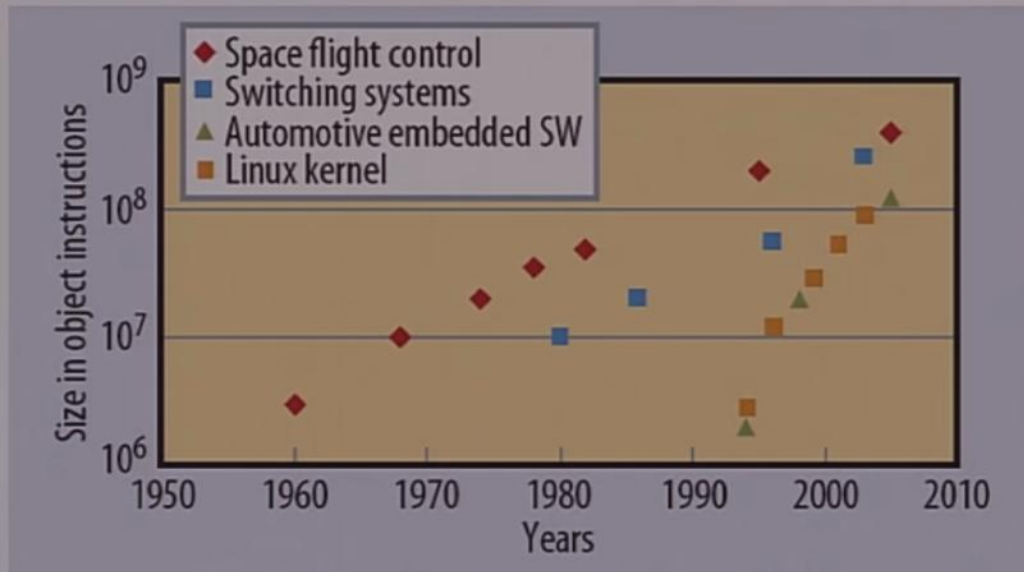
- More than 80% of R&D is related to software according to Ericsson
 - The world's 5th largest software company
- 70% of all innovation is related to software according to AB Volvo
- 80-90% of all innovation in a car is related to electronics (HW & SW) according to Volvo Cars



Software is King

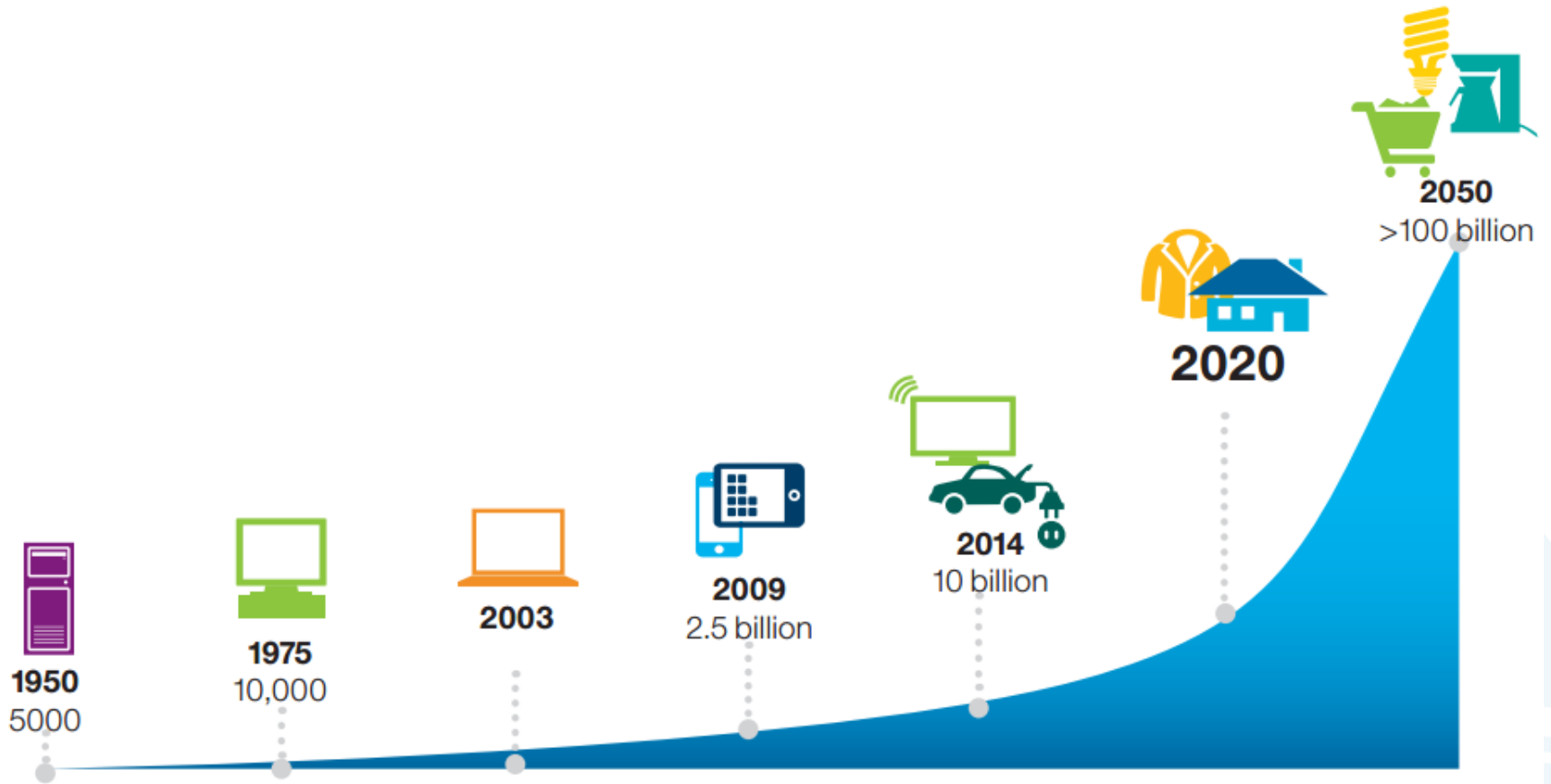
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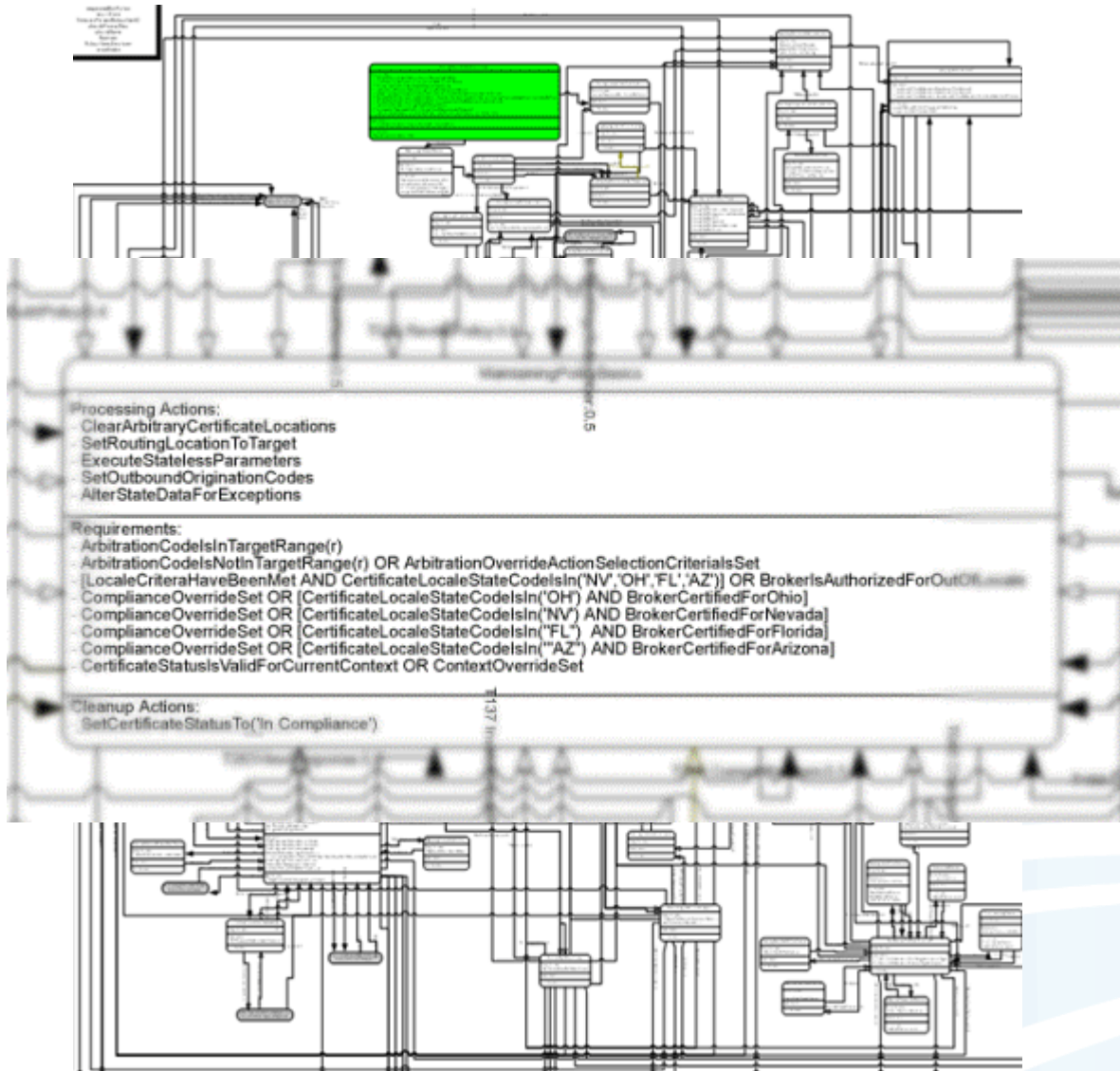
10x every ~7 years

Growth of IoT




IBM Institute for Business Value

Complex Interactions



Security

- “Newly discovered hack has U.S. fearing foreign infiltration” (Juniper) – CNN
- “Hackers Remotely Kill a Jeep on the Highway—With Me in It” – WIRED
- Facebook’s \$10,000 Bug Bounty
- “Hacks of OPM databases compromised 22.1 million people, federal authorities say” – Washington Post

A photograph of Ray Ozzie, Microsoft's Chief Software Architect, speaking. He is wearing a dark suit jacket, a light-colored shirt, and glasses. His hands are clasped in front of him. The background is a blurred presentation slide with a light blue and green color scheme.

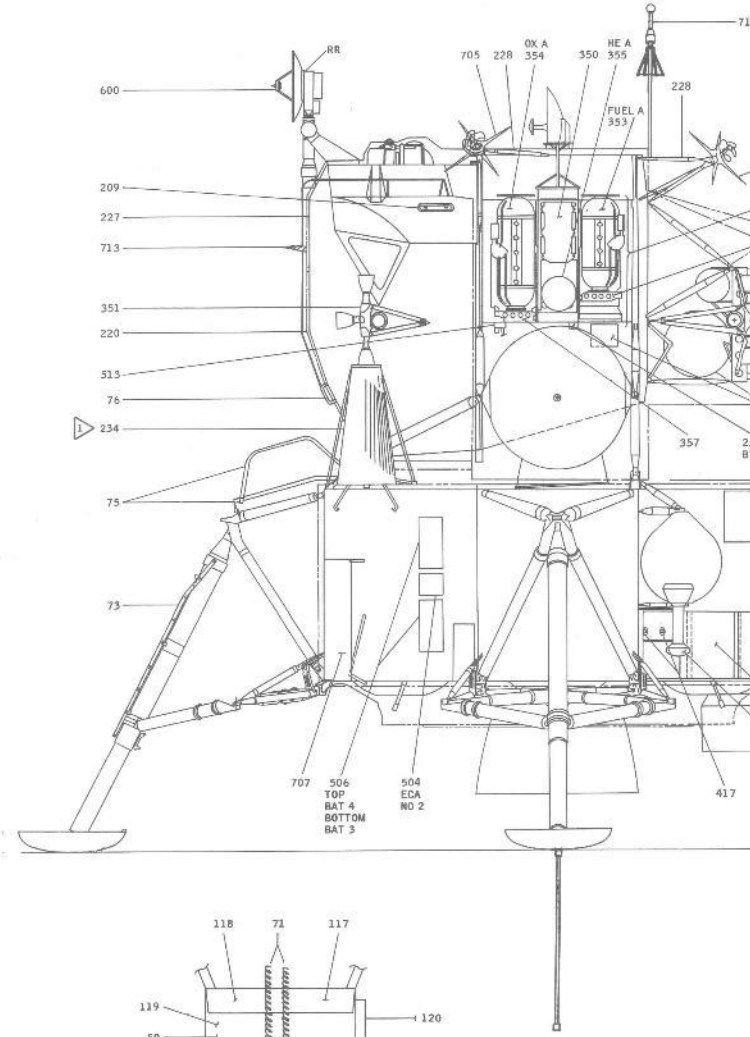
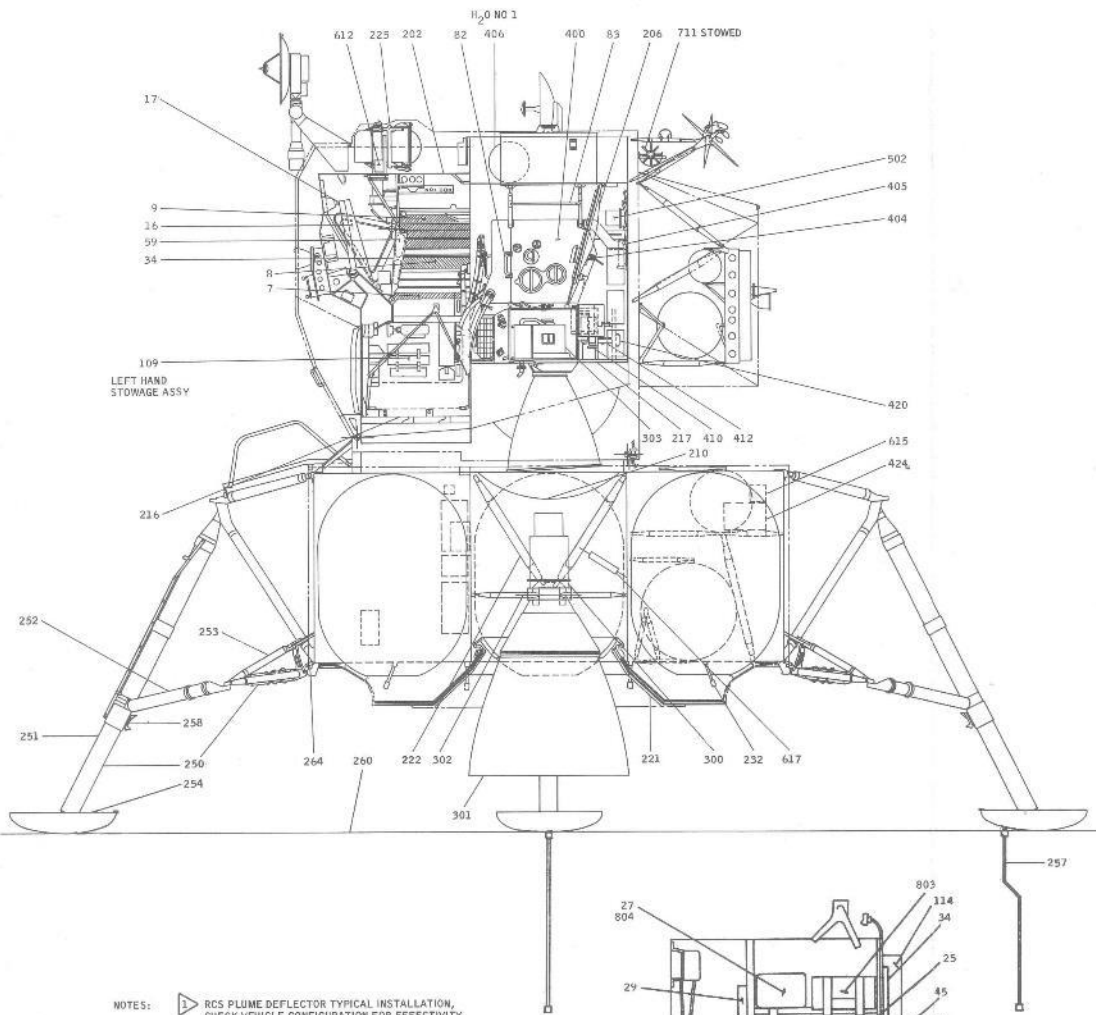
We have an unprecedented opportunity to run A/B tests with online users and **innovate more quickly** based on actual user responses. Microsoft needs to shift the culture from planning the exact features to planning a set of possible features, and **letting the customers guide us**.

- Ray Ozzie, Microsoft's Chief Software Architect

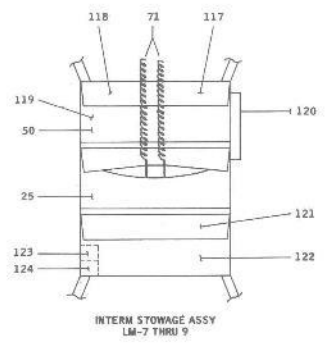
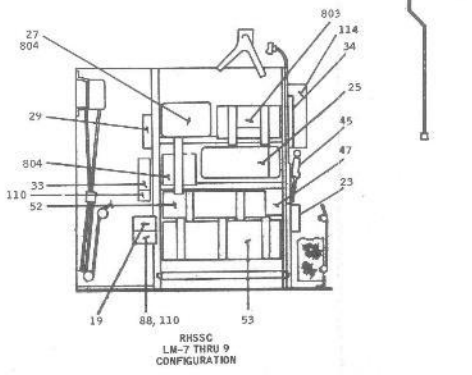
What This Means

- Innovation is happening quicker and quicker
- Decisions are being made with data and not opinions
- Systems can't just be “built to last” they need to be “built to evolve”
- Customer's are more involved

DD		CC	BB	AA	Z	Y	X
LTR/DCR	DR	ENGR	DATE	APPROVAL			
D	L.S.C.	C. J. ...	2/24/70	1/3 ...			
COMMENTS:							



NOTES: RCS PLUME DEFLECTOR TYPICAL INSTALLATION, CHECK VEHICLE CONFIGURATION FOR EFFECTIVITY

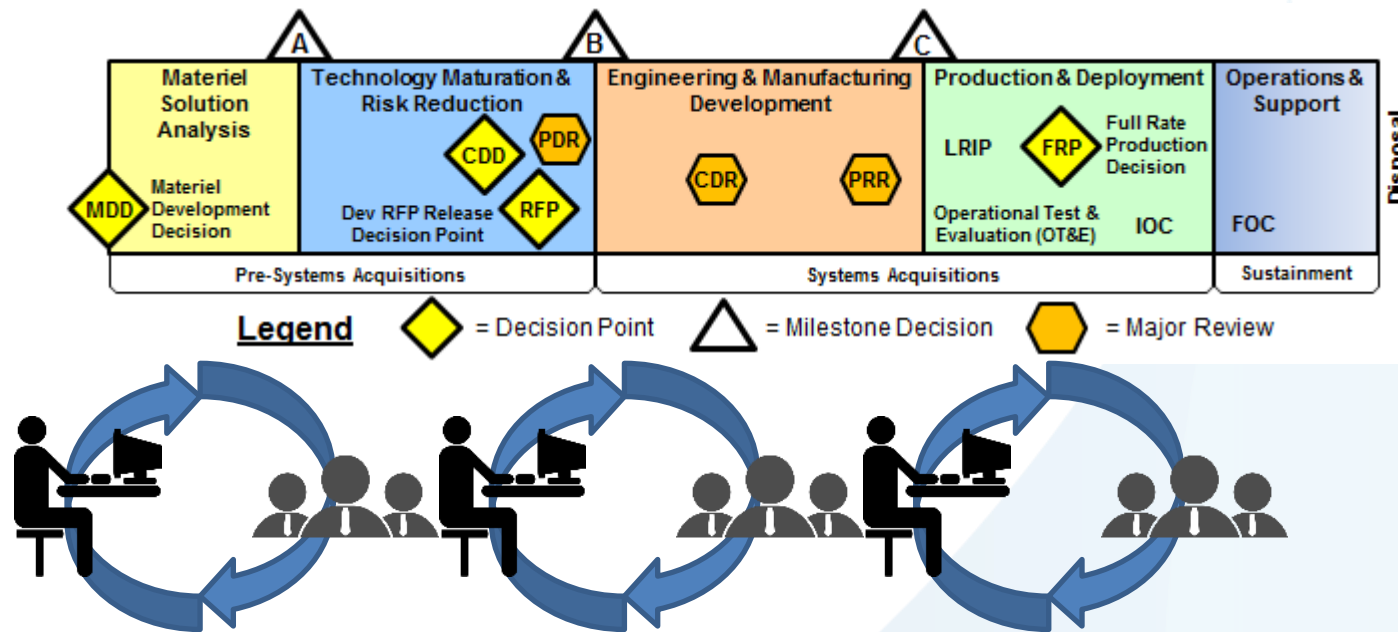


NATIONAL AERONAUTICS & SPACE ADMINISTRATION MANNED SPACECRAFT CENTER - HOUSTON, TEXAS		SIGNATURES		DATE
LM EQUIPMENT LOCATIONS		DR <i>James H. ...</i>		1-11-69
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		ENGR <i>...</i>		1-13-69
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AUTH <i>...</i>		1-13-69		
DWC NO FIGURE 2-2		SIZE J	LM UNIVERSAL	
SHEET 1 OF 2 PAGE		67.5 X 23.75		40 PERCENT

Clear Some Misconceptions

- A collection of diagrams is NOT a model
- Models have been used for generation, however the “M” in “MBSE” is about building a connected knowledge base
- A table/report/diagram/etc is a view into the model

21st Century Approach: Speed Up Feedback

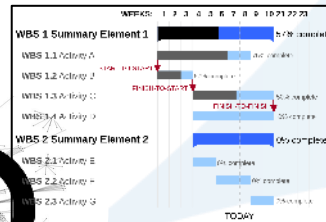
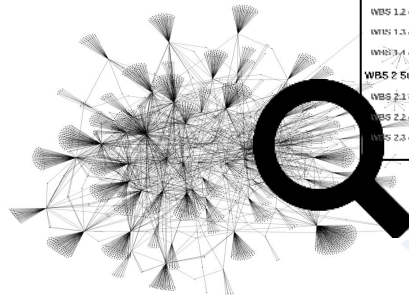


21st Century Approach: Speed Up Feedback

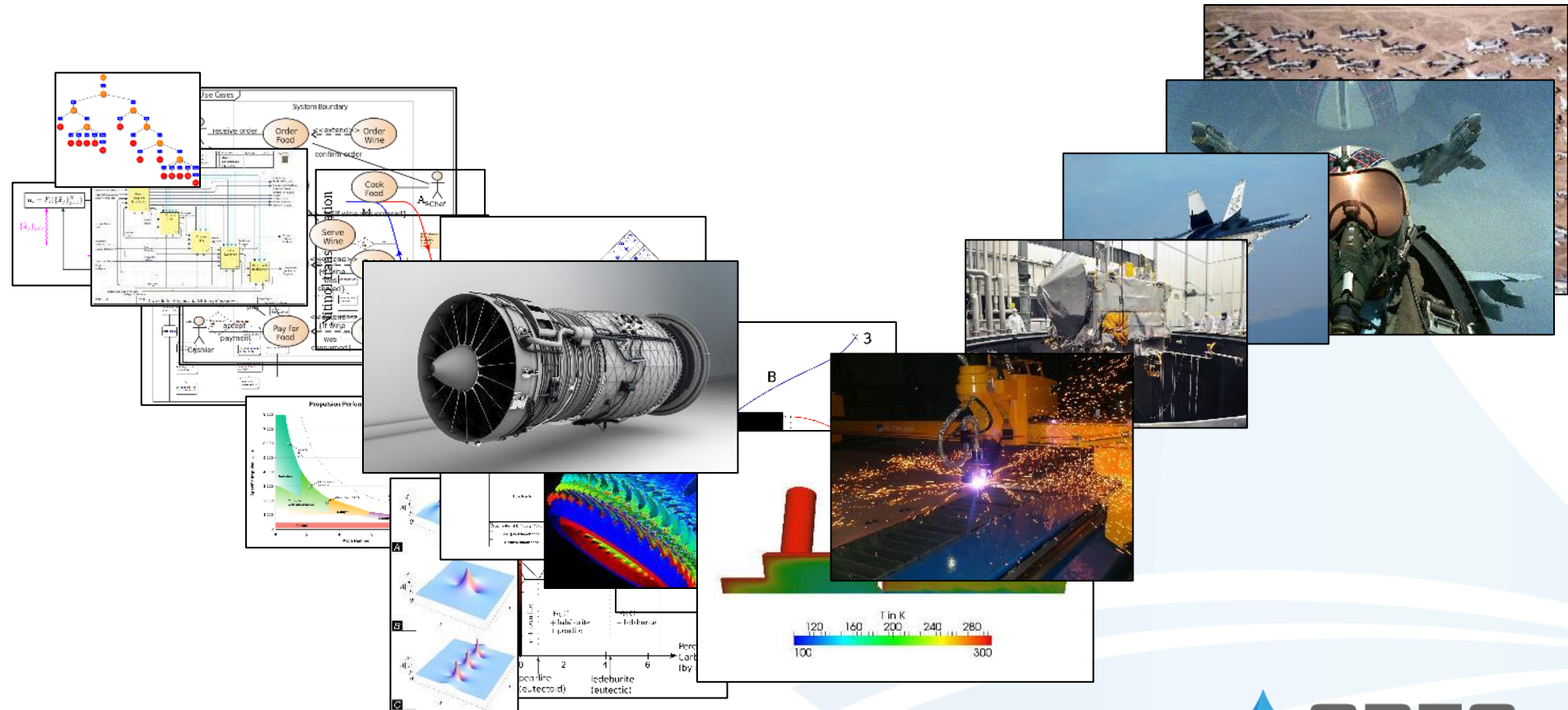
- Get your customers (or a representative) involved early
- Provide a quick landing/overview page for them to view the model
- Facility feedback **WITHIN** the model
- Show how the system connects to the bigger context (policy, 50k foot reqs, etc)

21st Century Approach: Only Deliver What They Want

- Most Developer's don't want our Class Diagrams or our pseudo code
- High level executives probability don't care how the sausage is made
- Provide them a place to learn and explore more

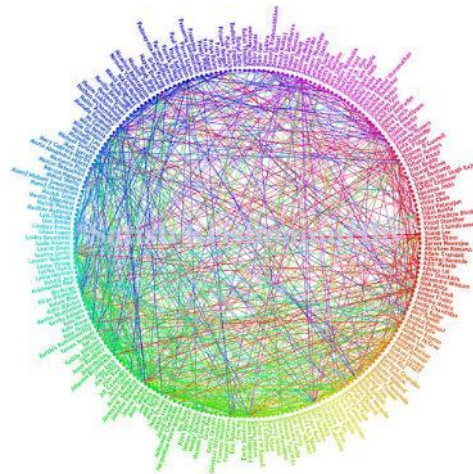


21st Century Approach: Build Connections

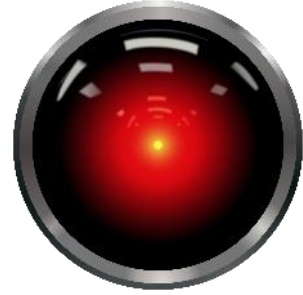


21st Century Approach: Building Connections

- Pull threads all the way back
- Let people use what they are familiar with
- Share information across disciplines
- Provide context to engineers

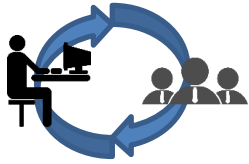


21st Century Approach: Think with Big Data & AI

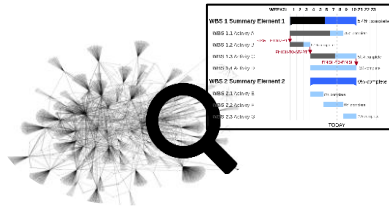


- Automate analysis
 - Requirement's quality, writing style, linkage
 - Auto parse documents for functions & assets
 - Compare models to historical models and provide recommended improvements
- Background simulations of complex model
 - Pull variables from other tools
- Auto build & sends docs or commands

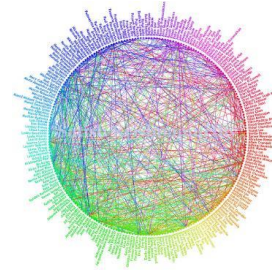
21st Century Approaches



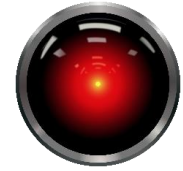
Speed Up
Feedback



Deliver What
They Want



Build
Connections



Big Data
& AI



Improves YOUR productivity



QUESTIONS?