Newport News Shipbuilding
A Division of Huntington Ingalls Industries

A Matrixed Approach to Model-Based Product Implementation

(Change Management for Disruptive Technology)

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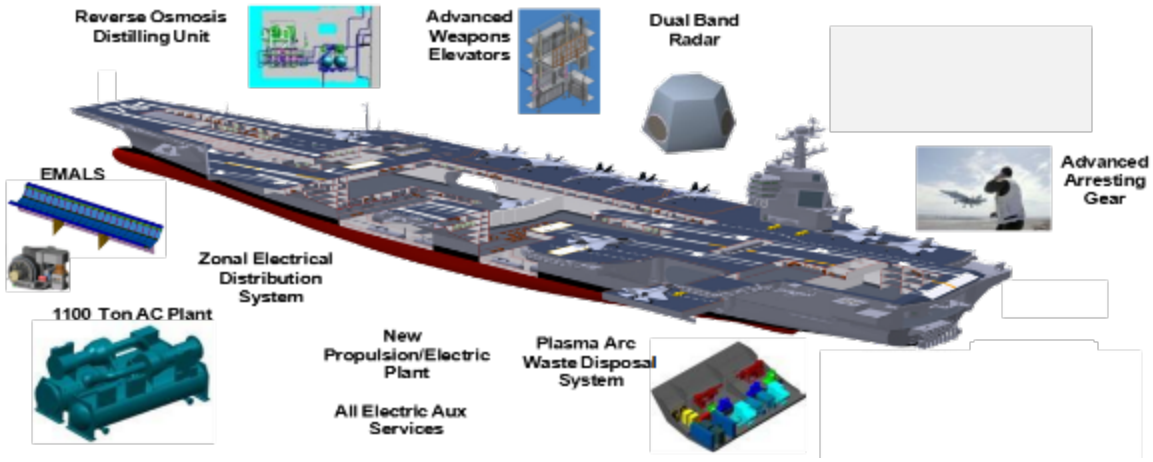
Newport News Shipbuilding

- Sole Supplier of U.S. Navy Aircraft Carriers
- One of Two Builders Constructing *Virginia* Class Nuclear Submarines
- Largest Industrial Employer in Virginia – More Than 23,000 Employees
- Transforming our 130+ year company's paper-based processes to the Digital Age
- Eliminating drawings and moving towards a Model-Based Enterprise
- Adopting technologies like laser scanning, digital twin, mobile computing , and augmented reality

Aircraft Carrier " GERALD R. FORD" the Big Picture

(10+ Year Build Cycle, with a 50 Year Life)

Our Challenge is Managing Complexity while implementing Disruptive Technologies.



Design

- Just Under 3 Million Piece Parts
- Over 30,000 TeamCenter Assemblies
- 55,000 Catalogue Parts
- Over 15,000 Drawings

Purchasing

- Over 2,000 Suppliers
- Over 70,000 Part Numbers

Manufacturing

- 150,000 Shop Work Packages
- Over 110,000 Pipe Assemblies
- 50,000 Tons of Fabricated Steel Assemblies

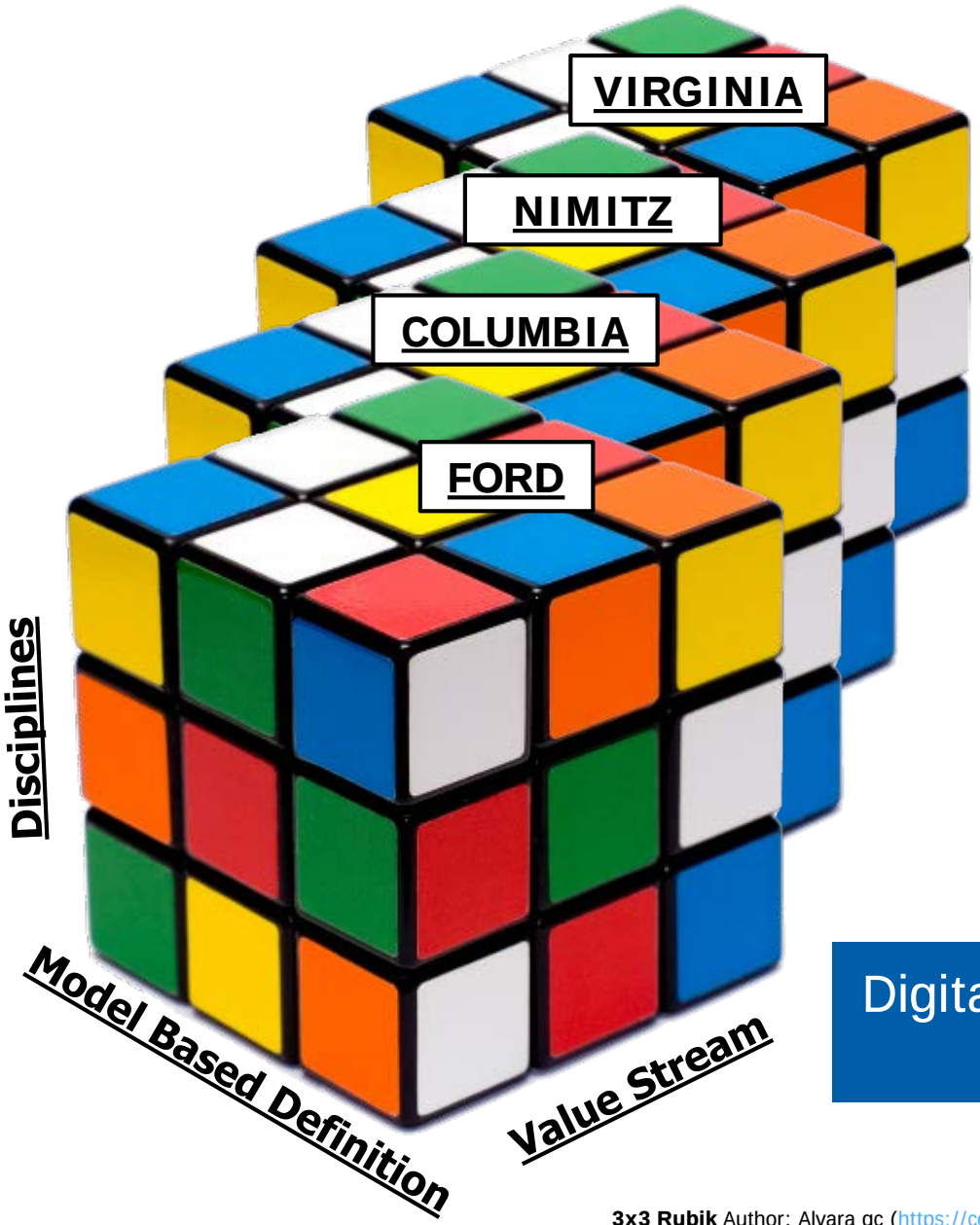
Shipboard

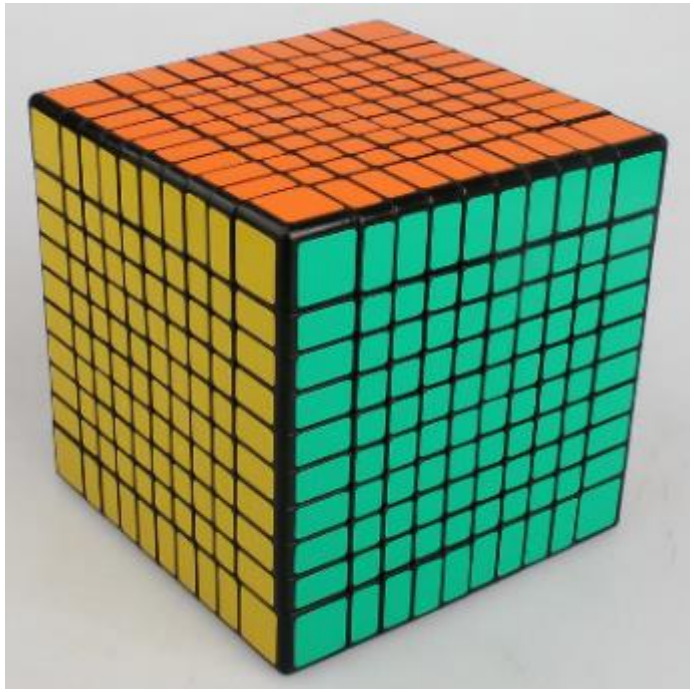
- Over 50,000 Ship Work Packages
- 10 Major Trades / Hundreds of Specialized Skills
- Over 1,000 Structural Steel Units with the 1,050 tons being the maximum size
- 9 Million Feet of Cable
- 4 Million Feet of Fiber
- 4 Million Pounds of Weld Metal

Lifecycle

- 50 Year Life
- Obsolescence Management
- Continuous Modernization Throughout
- Multi-Billion Dollar Midlife Refueling and Modernization

The Challenge





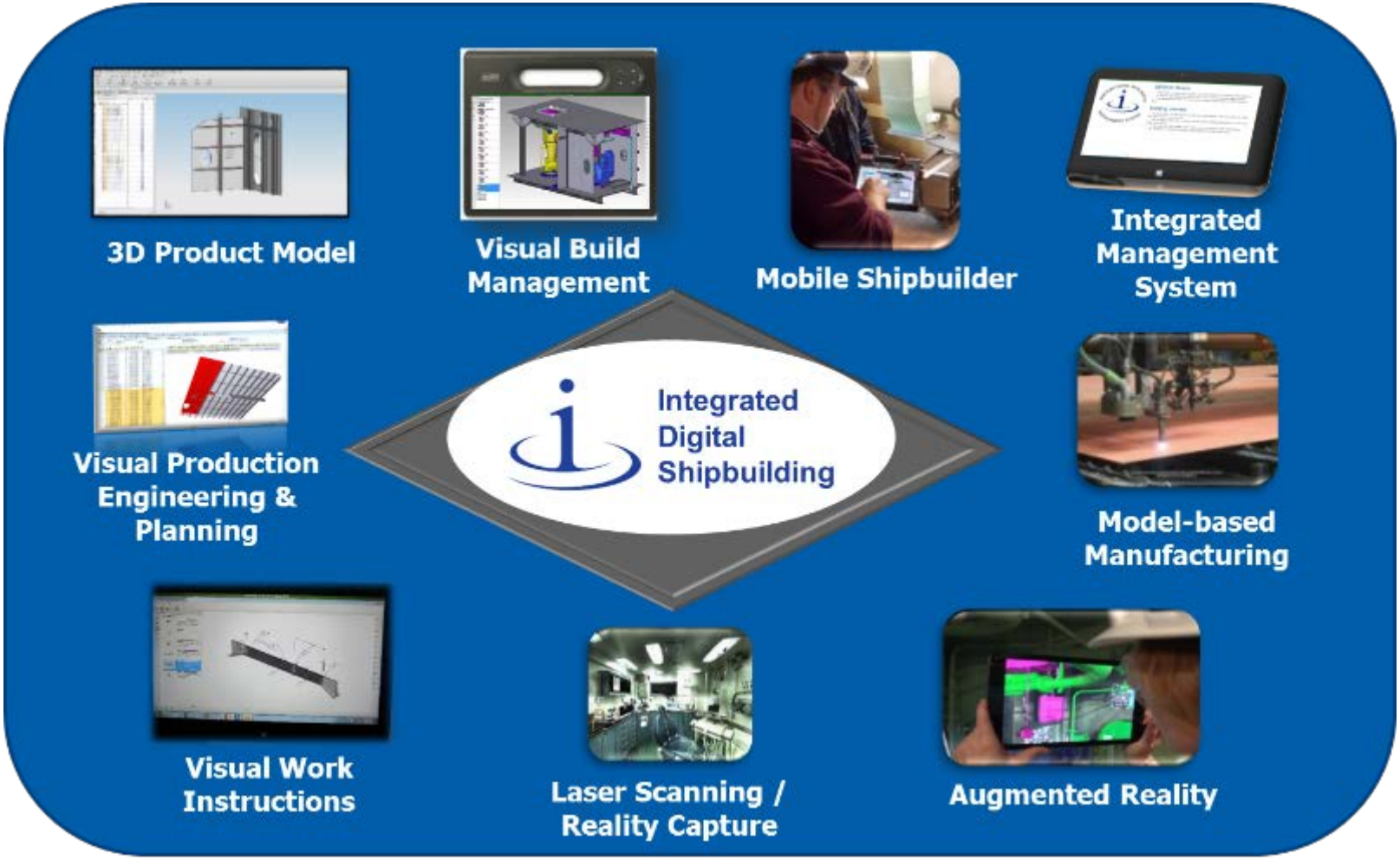
Digital Data from Multiple Ship Programs must become aligned.

3x3 Rubik Author: Alvara qc (https://commons.wikimedia.org/wiki/File:Rubik_cube.png)
10x10 Rubik Author: Dhrm77 (https://commons.wikimedia.org/wiki/File:Rubik10x10x10_userbox.jpg)

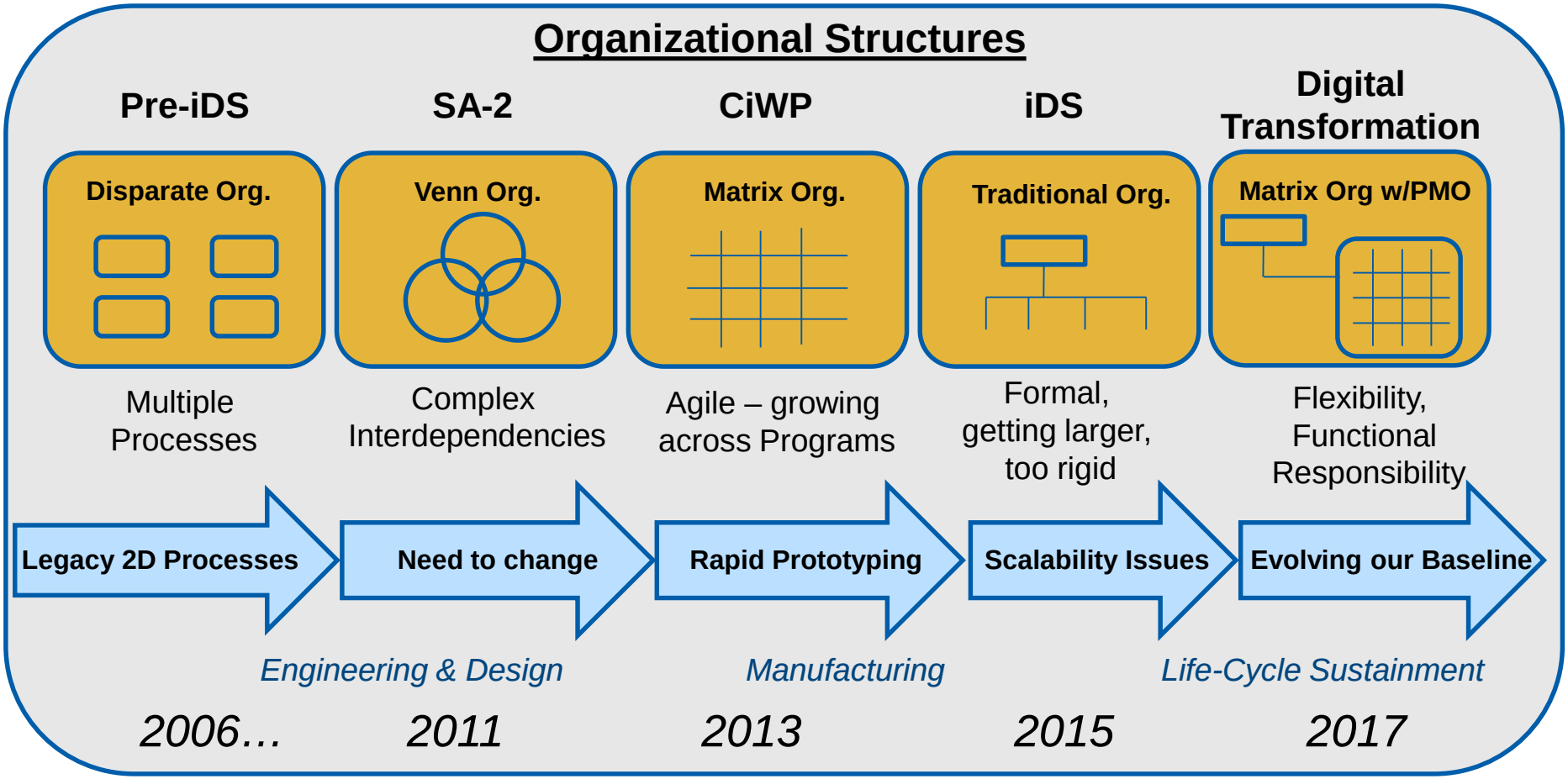
A Matrixed Approach to Model-Based Implementation

NNS's Direction: Evolving to Integrated Model Based Processes

- Ford Class Program has implemented 3D design and is going drawingless
- Columbia Class pure Model Based
- Laser Scanning being deployed on legacy programs



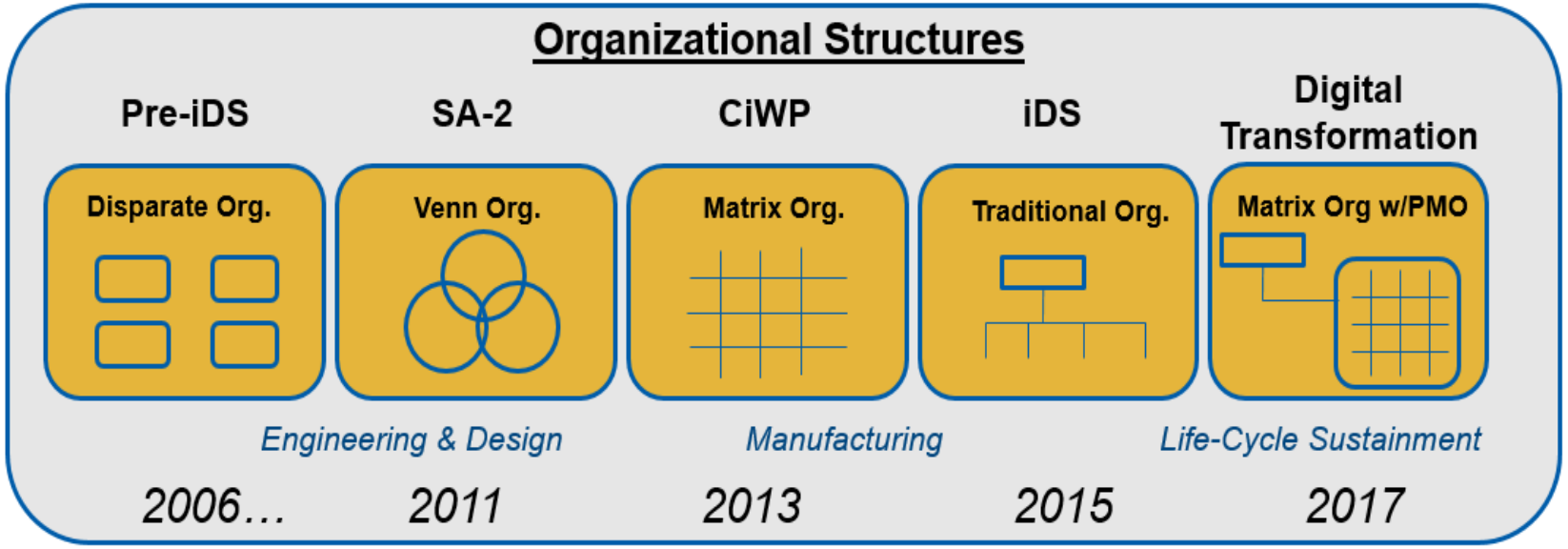
Our Changing Organizational Structures

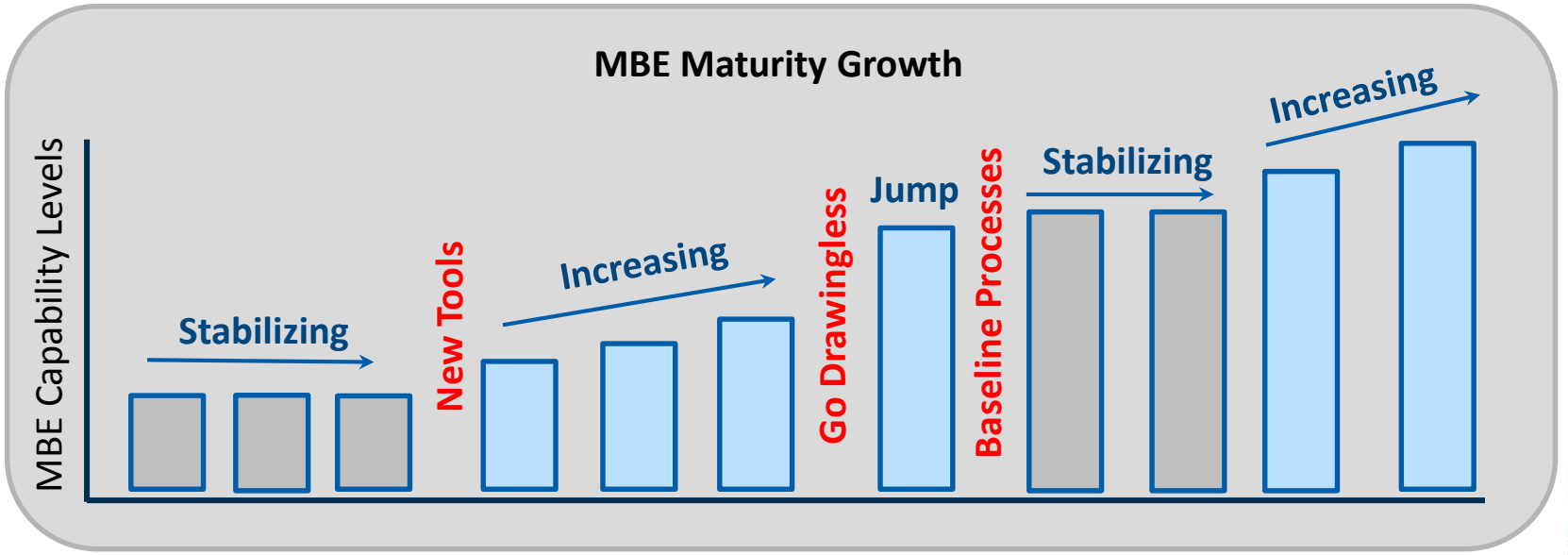


The organization needed to change rapidly to align with technology implementation.

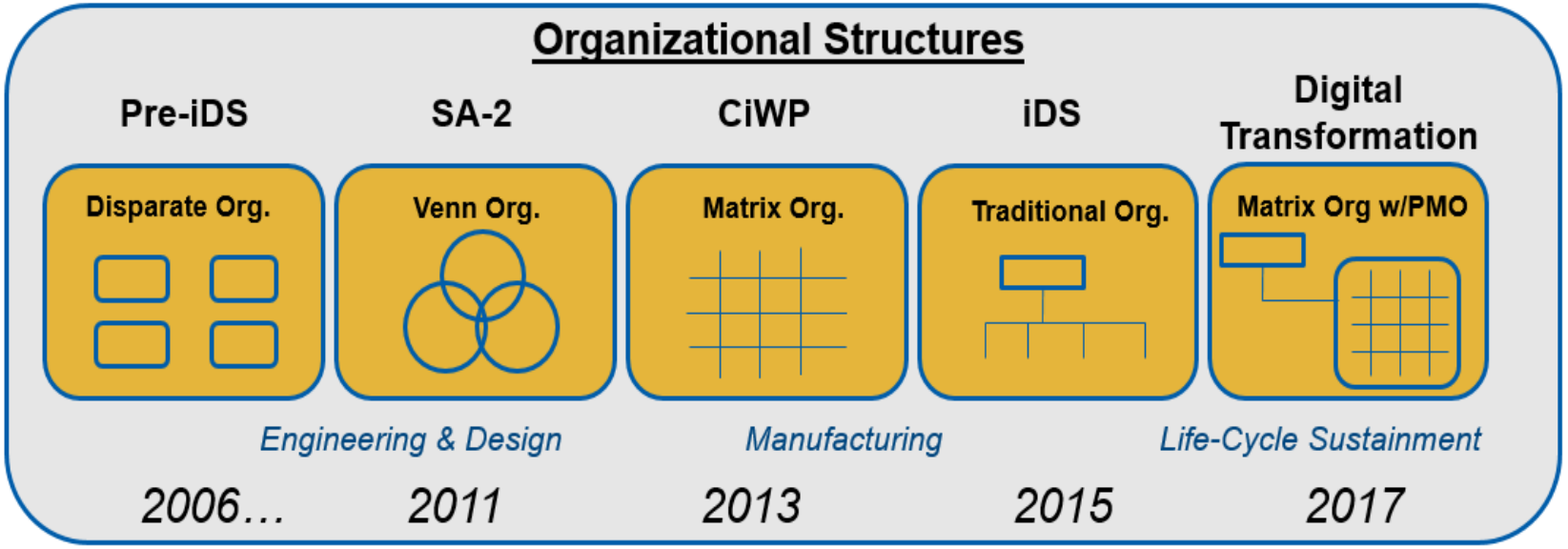
SA – Self Assessment **CiWP – Common Integrated Work Package** **iDS – Integrated Digital Shipbuilding**

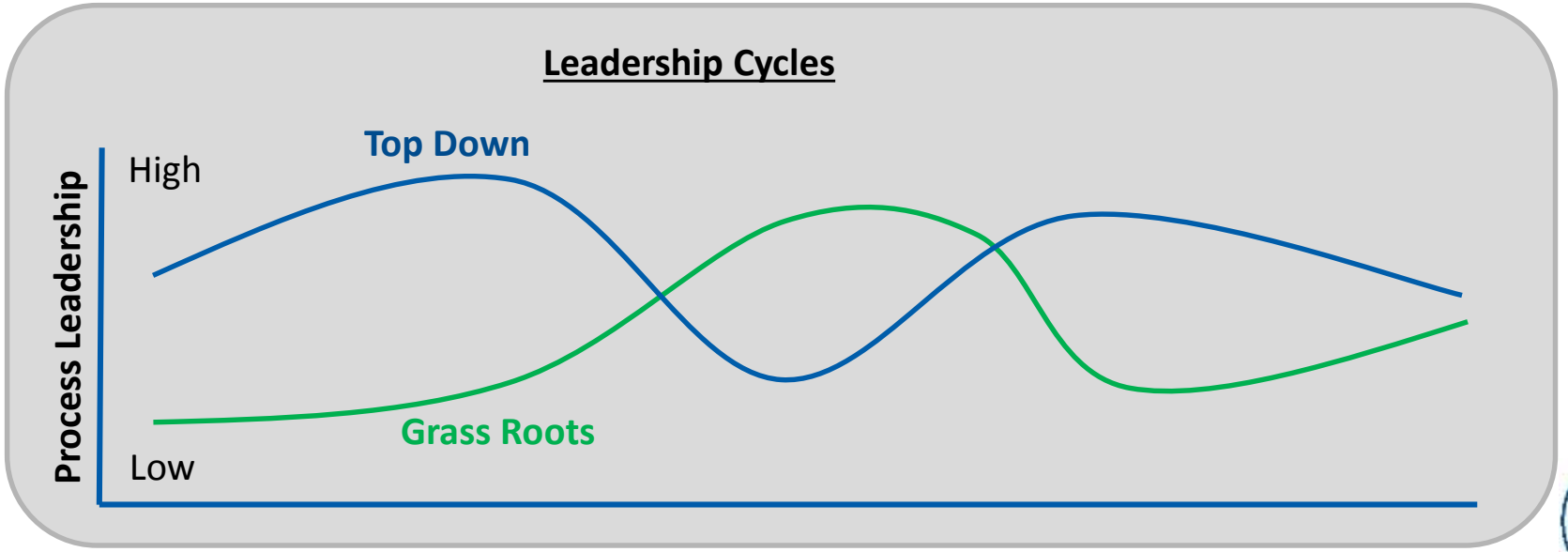
Our Changing Organizational Structure – MBE Growth





Our Changing Organizational Structure – Process Leadership





Summary – Lessons Learned

Leadership Readiness – Top Down Approach

- **Transformation Model** (*Leading Change/Our Iceberg is Melting*)
- **"Flywheel Concept" - focus more on long term, 10-15 years** (*Good to Great*)
- **Know how to manage Disruptive Technology** (*Innovators Dilemma*)
- **Self-awareness: Willingness and readiness to evolve regularly**

Culture Change – Bottom Up Approach

- **Relationship centric** – Start with empathy
- **Process versus Practice**
- ***Influencer* Model**:

	Motivation	Ability
Personal	Make the Undesirable, Desirable	Over Invest in Skill building
Social	Harness Peer Pressure	Find Strength in Numbers
Structural	Design Rewards and Demand Accountability	Change the Environment

Educate, then educate some more!

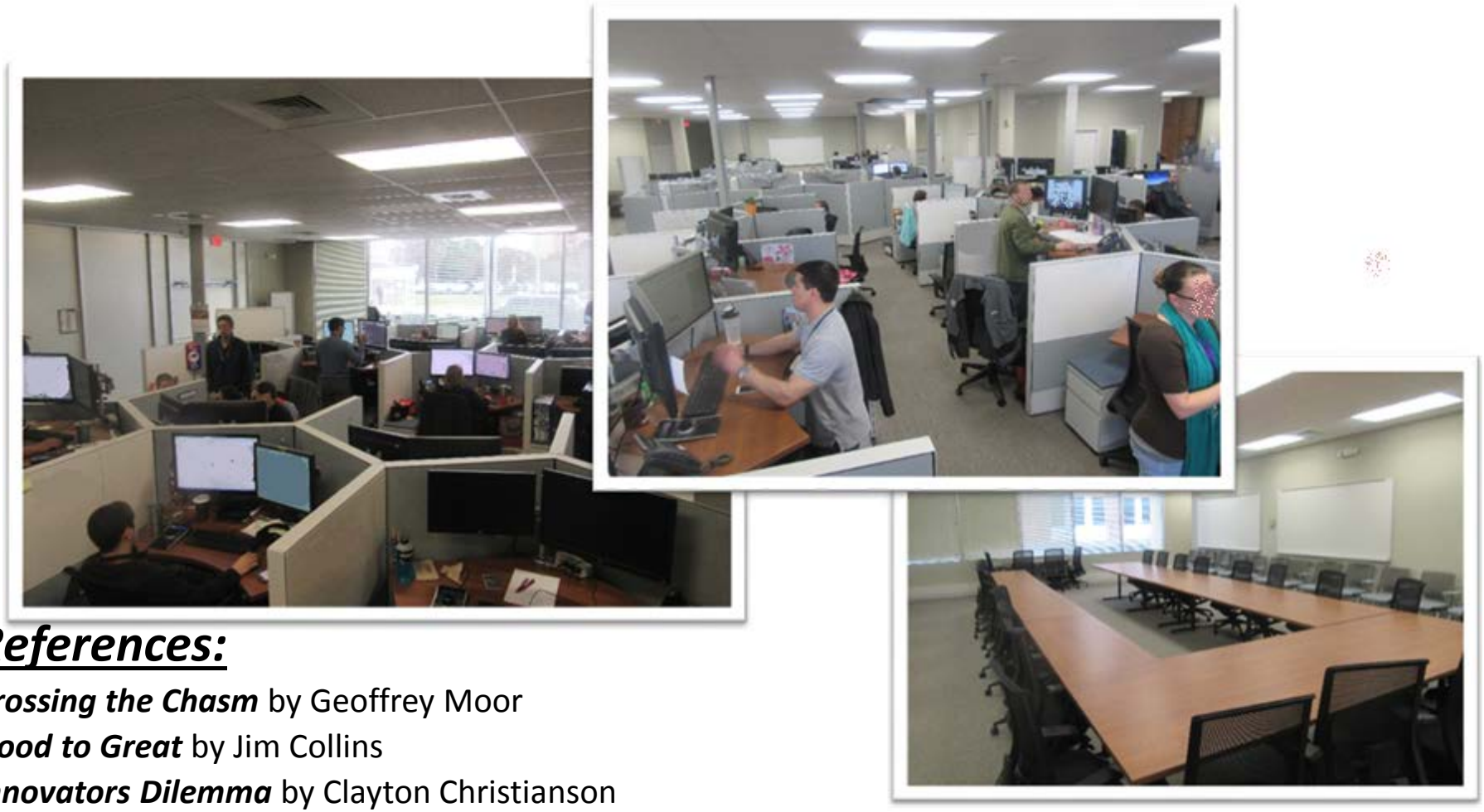
- **Common language, terms and conditions**
- **Retrain** – sometimes you must remove before you can add
- **Upskill** – your workforce isn't becoming obsolete they're evolving

Technology readiness

- **Technology Adoption Curve** *(Crossing the Chasm, Reuse Your CAD)*
- **Prototype, Prototype and Prototype!**
  - **Design Thinking** approach
  - **Scale appropriately** – Be wary of early returns (*Hawthorne Effect*)

To be successful, we had to evolve our workforce and build a new culture.

QUESTIONS?



References:

Crossing the Chasm by Geoffrey Moor

Good to Great by Jim Collins

Innovators Dilemma by Clayton Christianson

Influencer: The New Science of Leading Change by Joseph Grenny, Kerry Patterson, David Maxfield, Ron McMillan, and Al Switzler

Leading Change by John Kotter

Our Iceberg is Melting by John Kotter

Reuse Your CAD: The Model-Based CAD Handbook *by Jennifer Herron*