

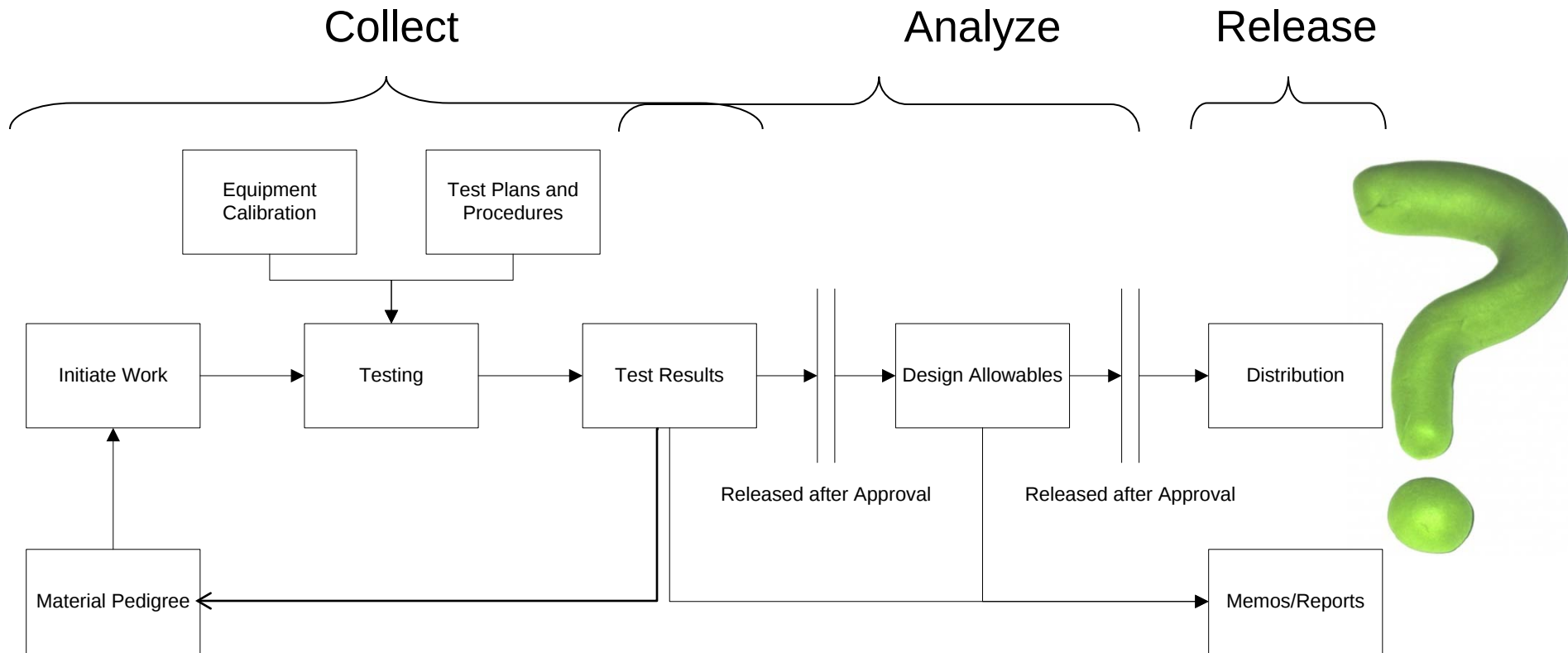


Bridging the Implementation Gap through Chemical and Materials Information Management

Wayne Ziegler, Army Research Lab
Ben Henrie, NASA MSFC
David Cebon, Granta Design

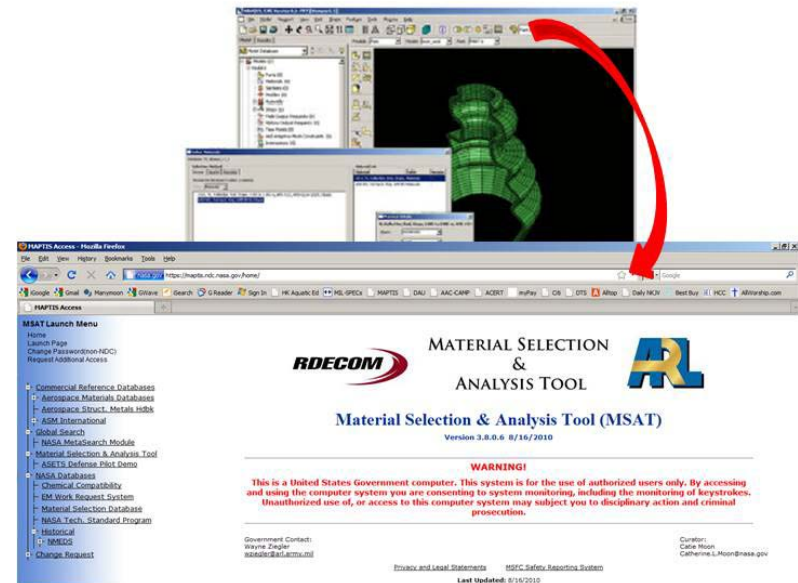
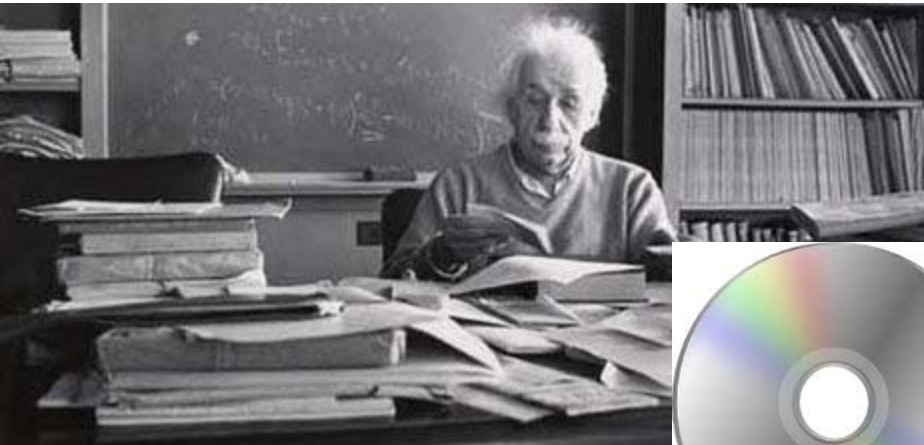
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Traditional Life of Materials & Process Information



Includes both material property and process data

Materials & Process Information Management



Materials & Process Information in the Acquisition Life Cycle

USER NEEDS &
TECHNOLOGY OPPORTUNITIES



A

B

C

IOC

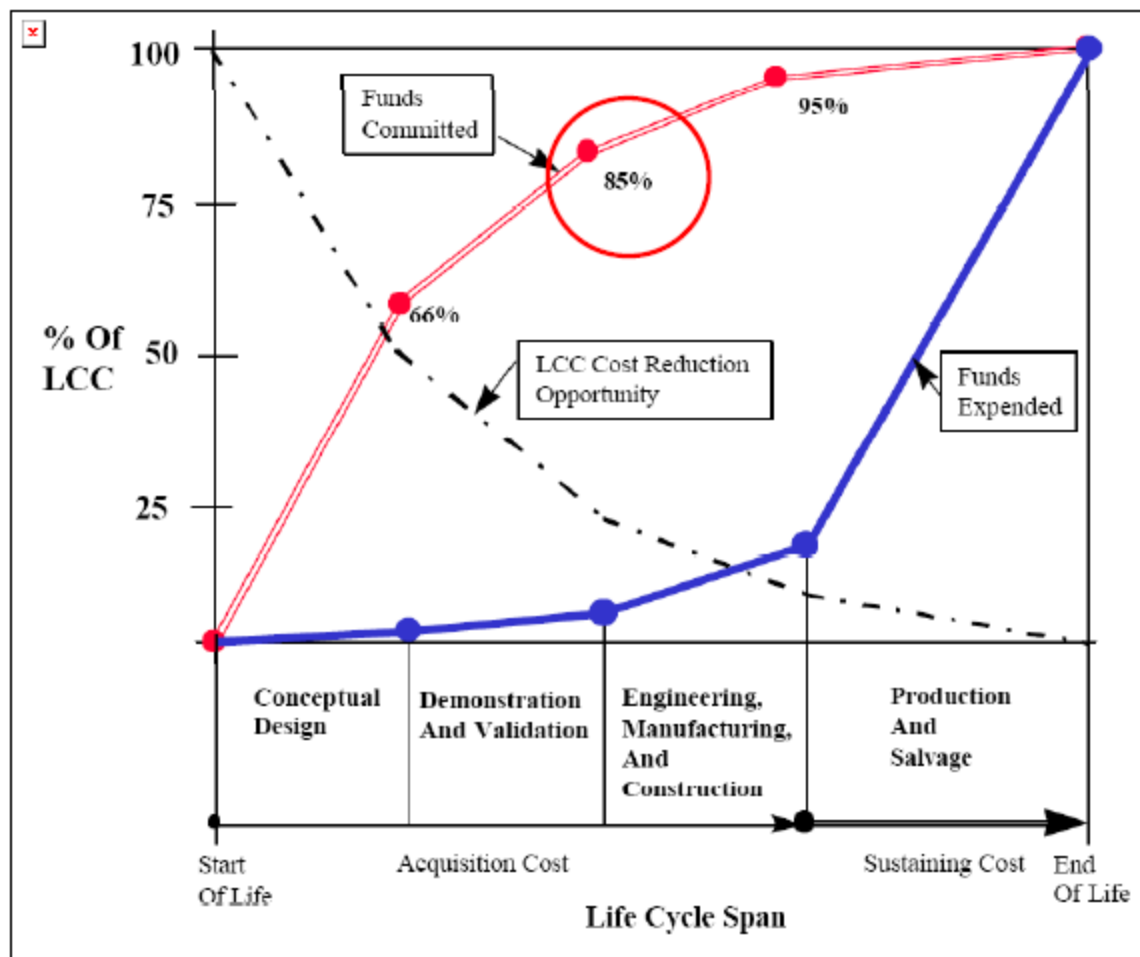
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Traditional Materials &
Process Information Input

Materials & Process Information Needed

Impact of materials and process information on product lifecycle

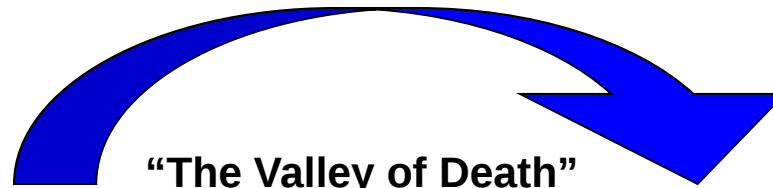


Project Funding Trends by Commitment and Expenditure of Lifecycle Cost (LCC)

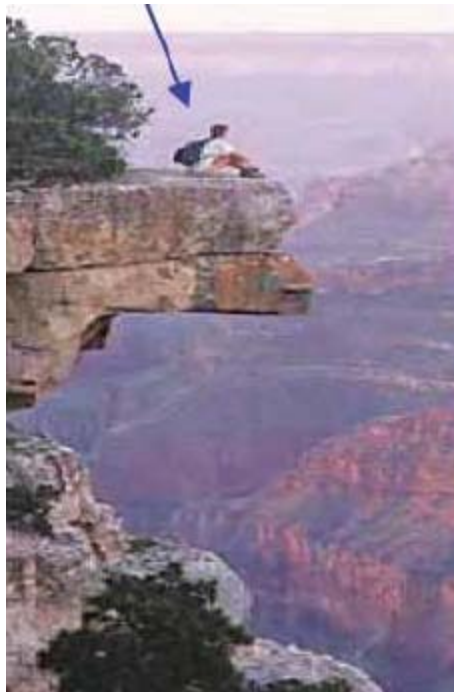
85% of life cycle costs and environmental impact is built-into products during design

From: H. P. Barringer & D. P. Weber (1996) "Lifecycle Cost Tutorial"

Materials & Process Information Role in R & D



“The Valley of Death”



Technology Development

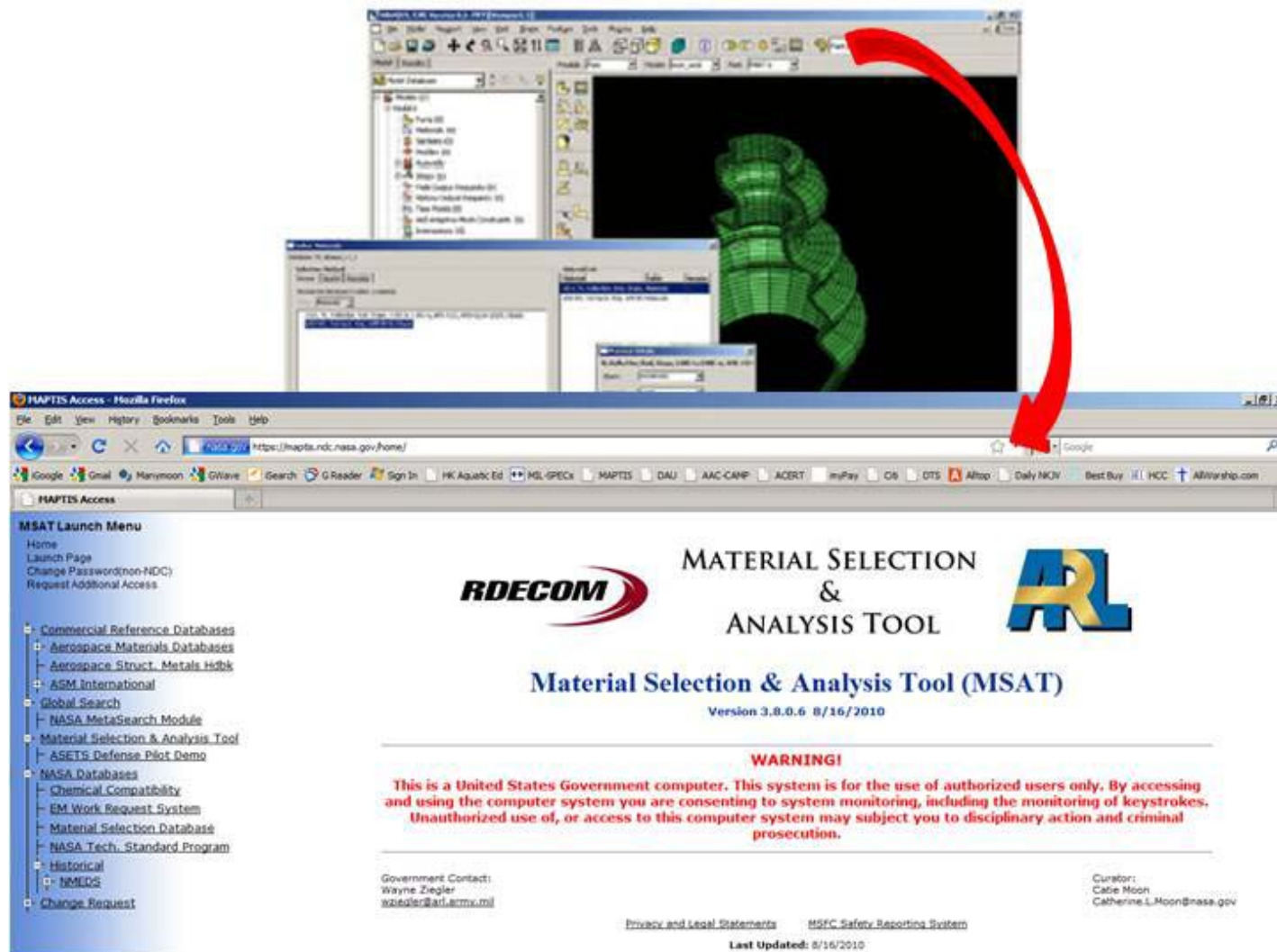
- Cycle times 7-30 Years
- Developed independent of application
- Empirical developments
- Modeling
- Multi-scale issues

Engineering Design

- Cycle times 3-5 Years
- Requires confidence in materials system
- Risk Averse
- Modeling enables rapid developments in design

**Use of New Materials & Processes only Occurs
With Mitigation of Risk**

Materials & Process Information Role in Design



The screenshot shows a computer desktop with a 3D model of a mechanical part (a green wireframe mesh) in the background. In the foreground, a web browser window displays the MSAT (Material Selection & Analysis Tool) interface. The browser address bar shows the URL <https://haptis.ndc.nasa.gov/home/>. The MSAT interface includes a sidebar with a "MSAT Launch Menu" and a main content area with the following text:

RDECOM **MATERIAL SELECTION & ANALYSIS TOOL** **ARL**

Material Selection & Analysis Tool (MSAT)
Version 3.8.0.6 8/16/2010

WARNING!
This is a United States Government computer. This system is for the use of authorized users only. By accessing and using the computer system you are consenting to system monitoring, including the monitoring of keystrokes. Unauthorized use of, or access to this computer system may subject you to disciplinary action and criminal prosecution.

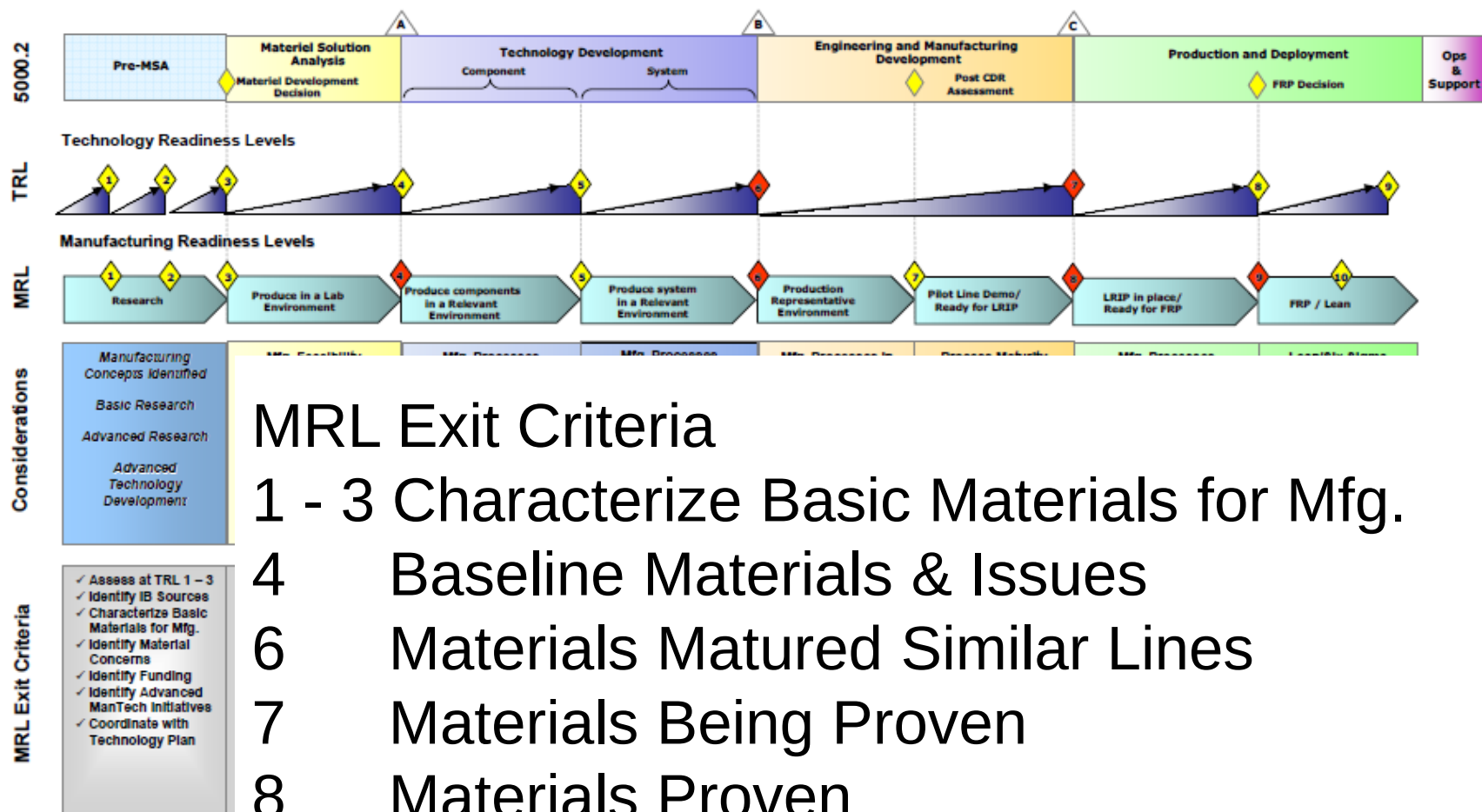
Government Contact:
Wayne Ziegler
wziegler@arl.army.mil

Curation:
Catie Moon
Catherine.L.Moon@nasa.gov

Privacy and Legal Statements MSFC Safety Reporting System
Last Updated: 8/16/2010

Materials & Process Information Role in Acquisition Decision-making

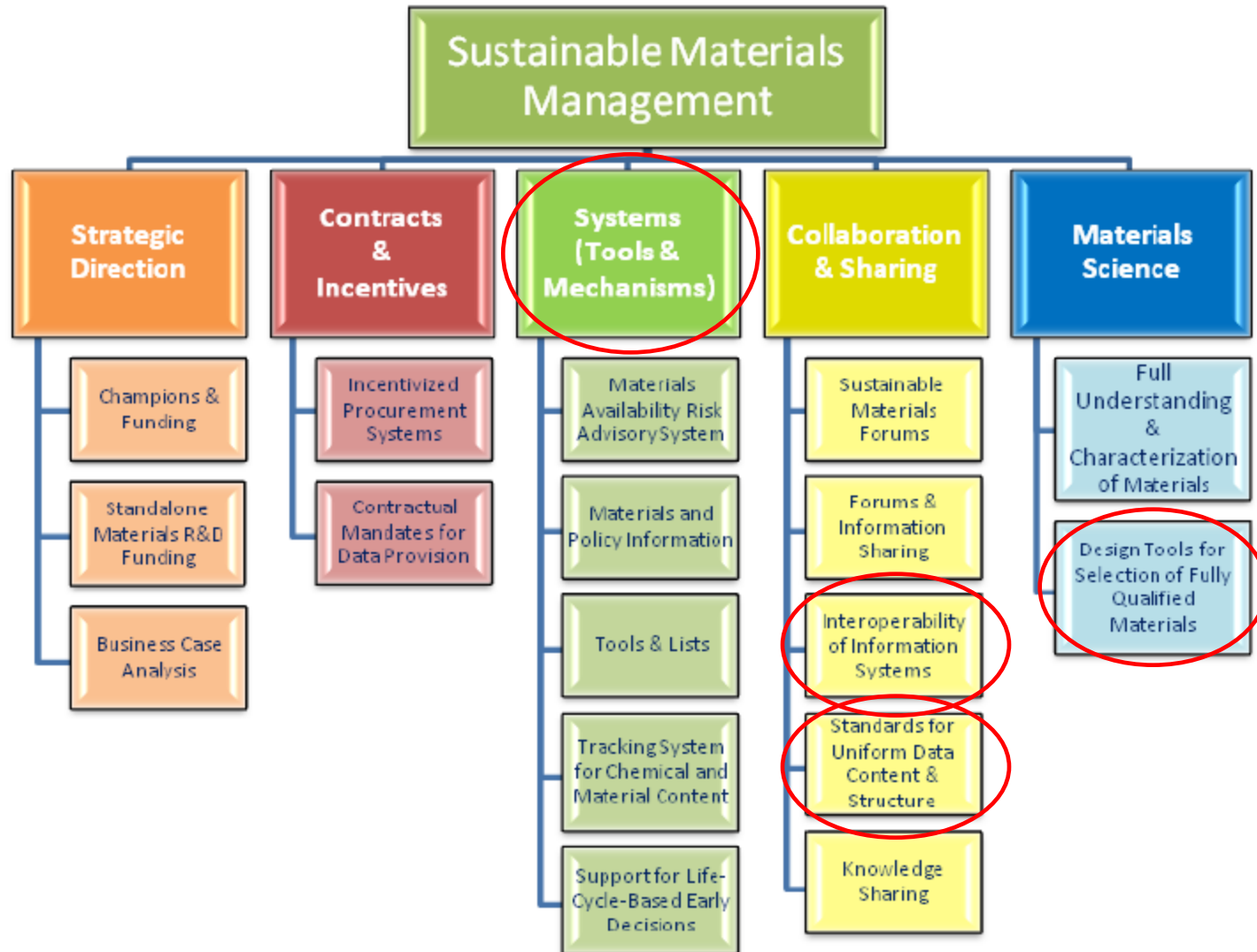
Manufacturing Readiness Levels



MRL Exit Criteria

- 1 - 3 Characterize Basic Materials for Mfg.
- 4 Baseline Materials & Issues
- 6 Materials Matured Similar Lines
- 7 Materials Being Proven
- 8 Materials Proven
- 9 Materials In Control

Materials & Process Information Role in Sustainment/O&M



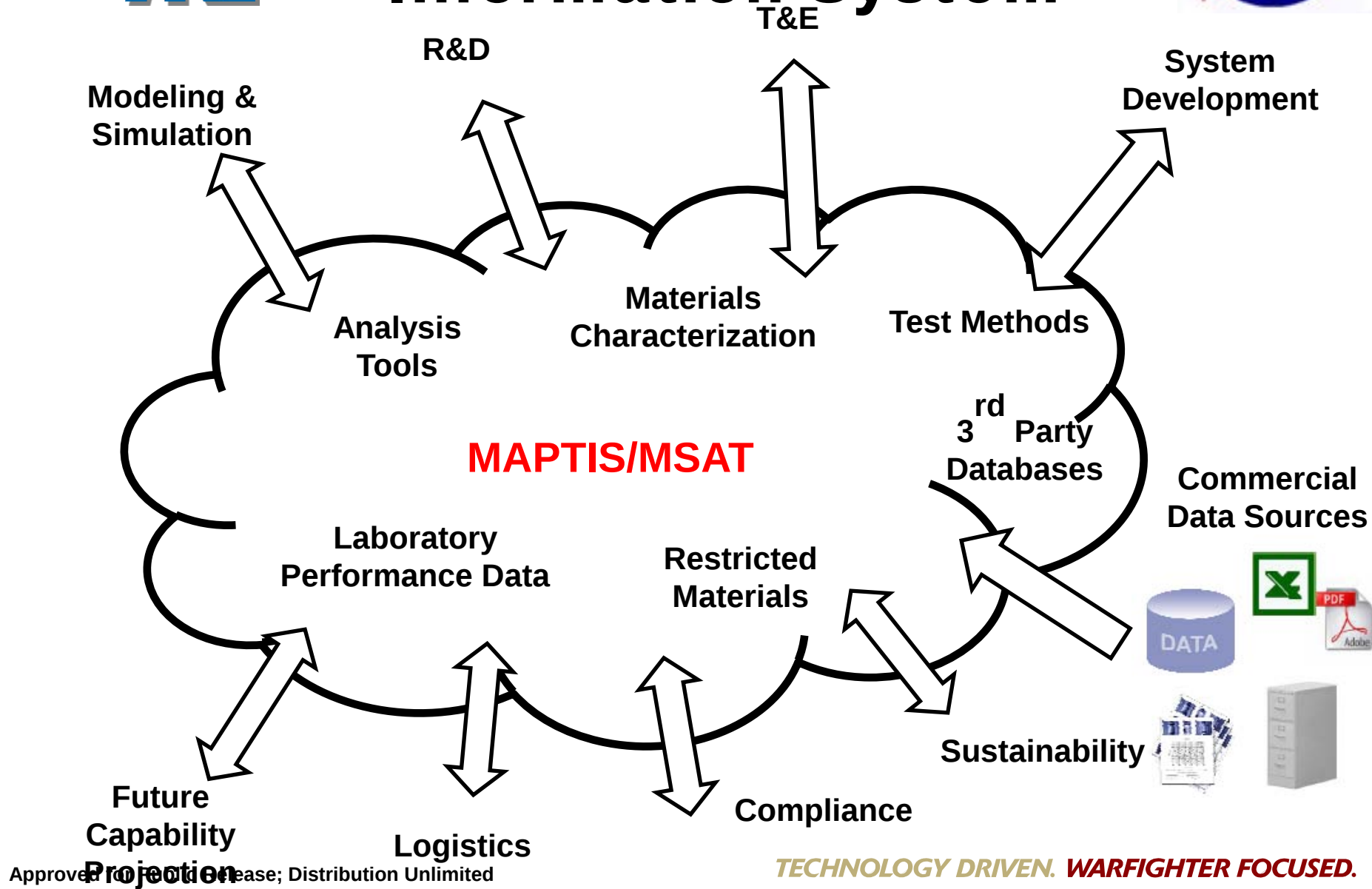


Materials & Process Information Role in O & M



- Supports alternative selection for restricted materials & process
- Tied to TDPs could answer, “Where is it used?”

Solution – Distributed Information System





Material and Processing Technology Information System (MAPTIS)

<http://maptis.nasa.gov>

- MAPTIS - single point source for NASA, for the purpose of acquiring, archiving and disseminating materials information throughout a product life cycle



MAPTIS - History

- While materials selection has always been an integral part of hardware design, the importance of selection of proper materials in space craft design took on greater importance after the Apollo I accident:
 - Finding: “An extensive distribution of combustible materials in the cabin.” – *Report of Apollo 204 Review Board, Page 5-12*
 - Recommendation: “The amount and location of combustible materials in the Command Module must be severely restricted and controlled.” - *Report of Apollo 204 Review Board, Page 6-1*



History



- After the Apollo I accident NASA started to look at material compatibilities by developing handbooks
- Several NASA handbooks were brought together into MAPTIS around 1986
 - First “query-able” version with user terminal access was on a VAX 8650
- Today, MAPTIS-II is a web accessible system
- MAPTIS is a central repository for material data for reliability and reusability



Current User Demographics



- **Current number of register users: 4300+**
- **Average users per month: 500+**
- **NASA Centers (61%)**
 - Marshall, Ames, Glenn, JPL, Johnson, Kennedy, Langley, White Sands Test Facility
- **Contractors/Universities (26%)**
 - Example Contractors: Boeing, Lockheed Martin, Orbital, Ball Aerospace, Hamilton, Honeywell, Goodrich, Raytheon, SAIC
 - Example Universities: Texas A&M, University of Colorado, University of Alabama, UCLA, MIT
- **Foreign Users (13%)**
 - ESA, JAXA (Japan), Canadian Space Agency, Italian Space Agency, Russian Space Agency

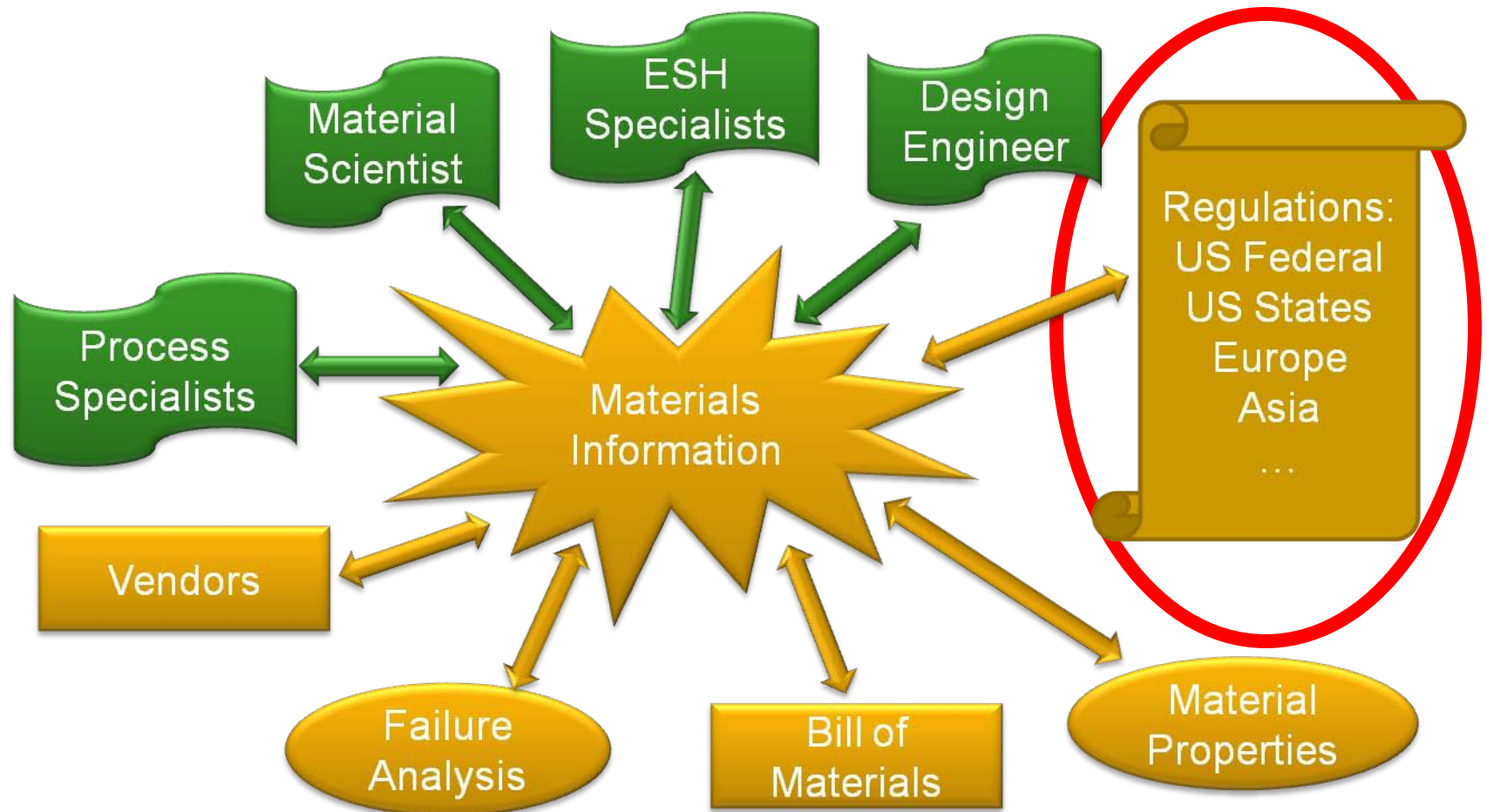


Features



- 30+ Databases
- Web Accessible
- 24 x 7 hour access
- Live support 7am to 5pm CST
- Search capability to query open material sources
- Flexible System configuration to adapt to our customer needs
- The MAPTIS team provides all IT support along with materials expertise

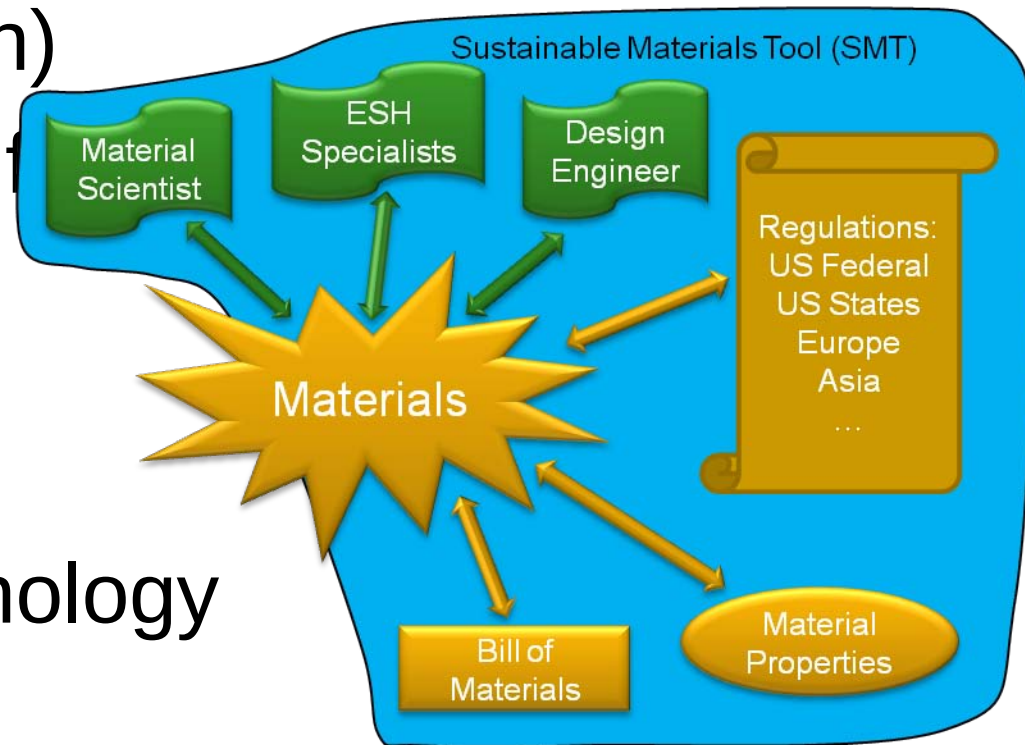
MAPTIS



Sustainable Materials Tool (SMT)



- Expand Regulations (Domestic & Foreign)
- Improve integration with ESH specialists
- Integrate ESH considerations into advance M&P technology development
- Access to ESH information from CAD/PLM packages

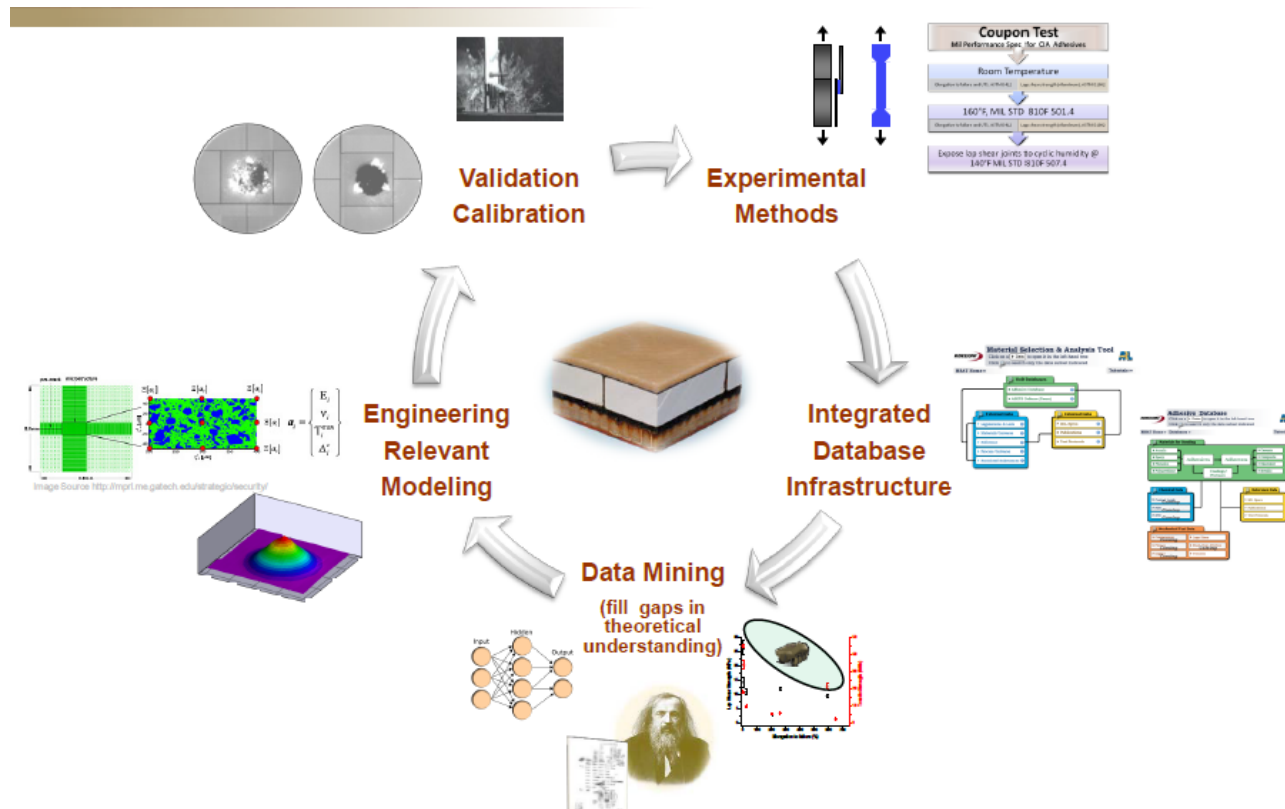


SMT is a 2 year project

Pilot Efforts



- Adhesives
- Composites
- Workflow management
- Informatics





MSAT/MAPTIS Vision



- Single source for Materials & Process Information
- Consistent data management with common data connectivity
- Customized interfaces & tools – intuitive user experience
- Track materials to components
- Target implementation strategies