Bridging the Implementation Gap through Chemical and Materials Information Management

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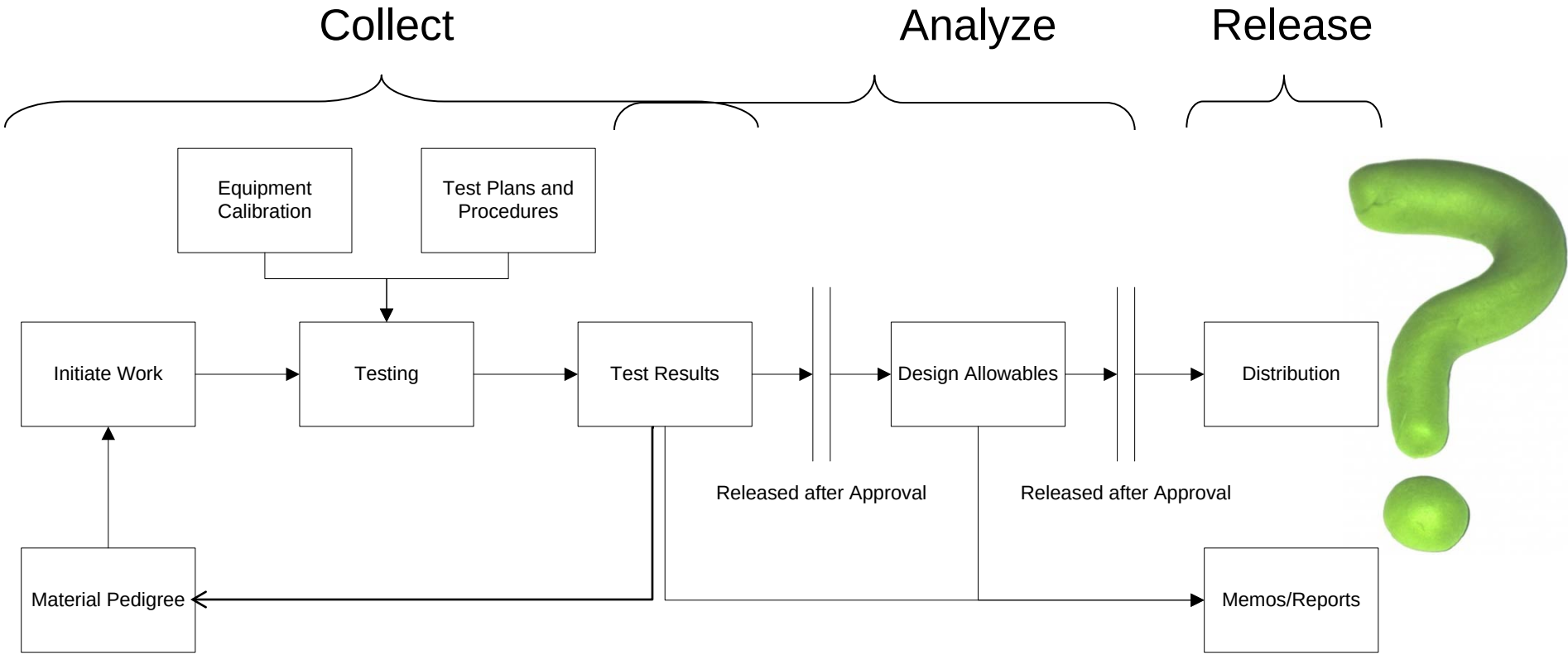
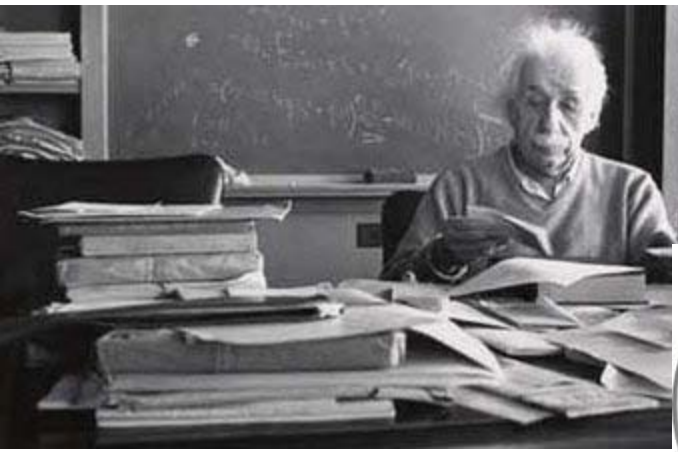
Traditional Life of Materials & Process Information



Includes both material property and process data

Materials & Process Information Management



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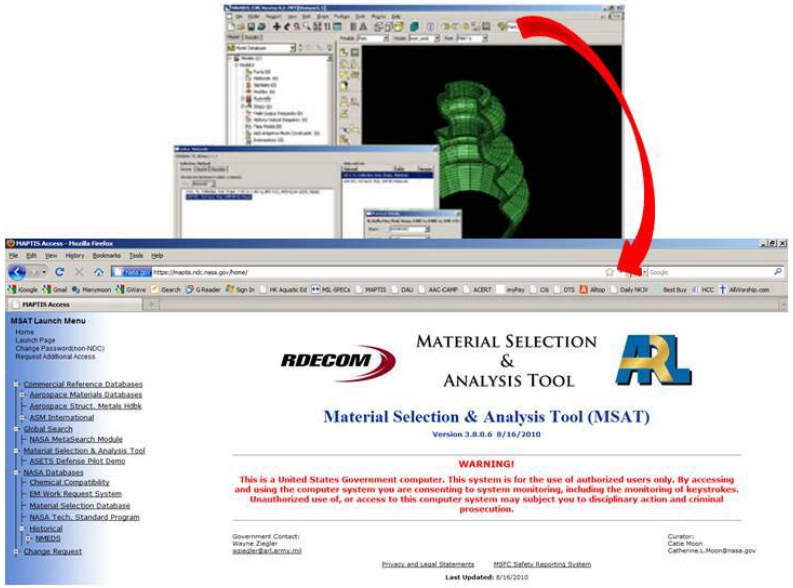
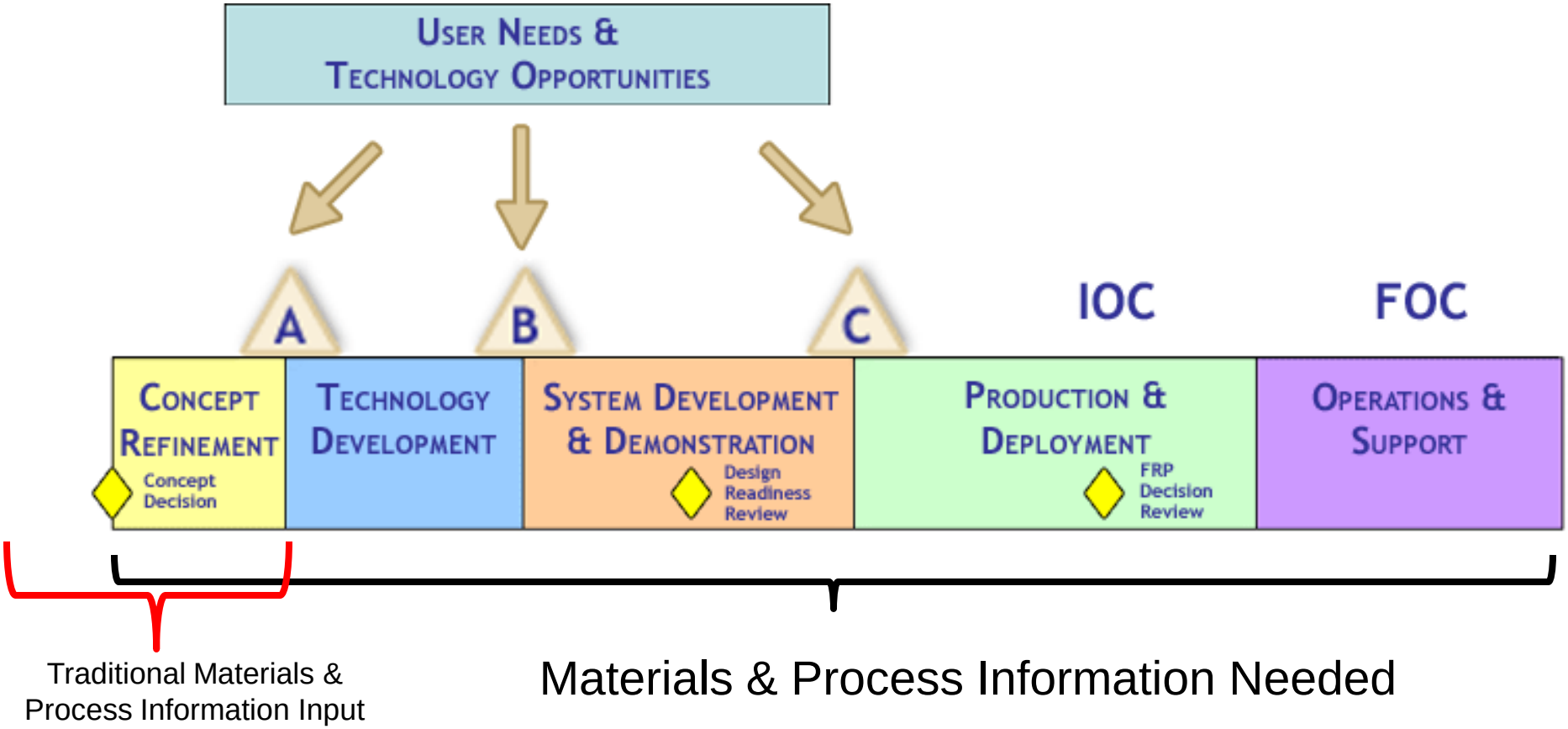
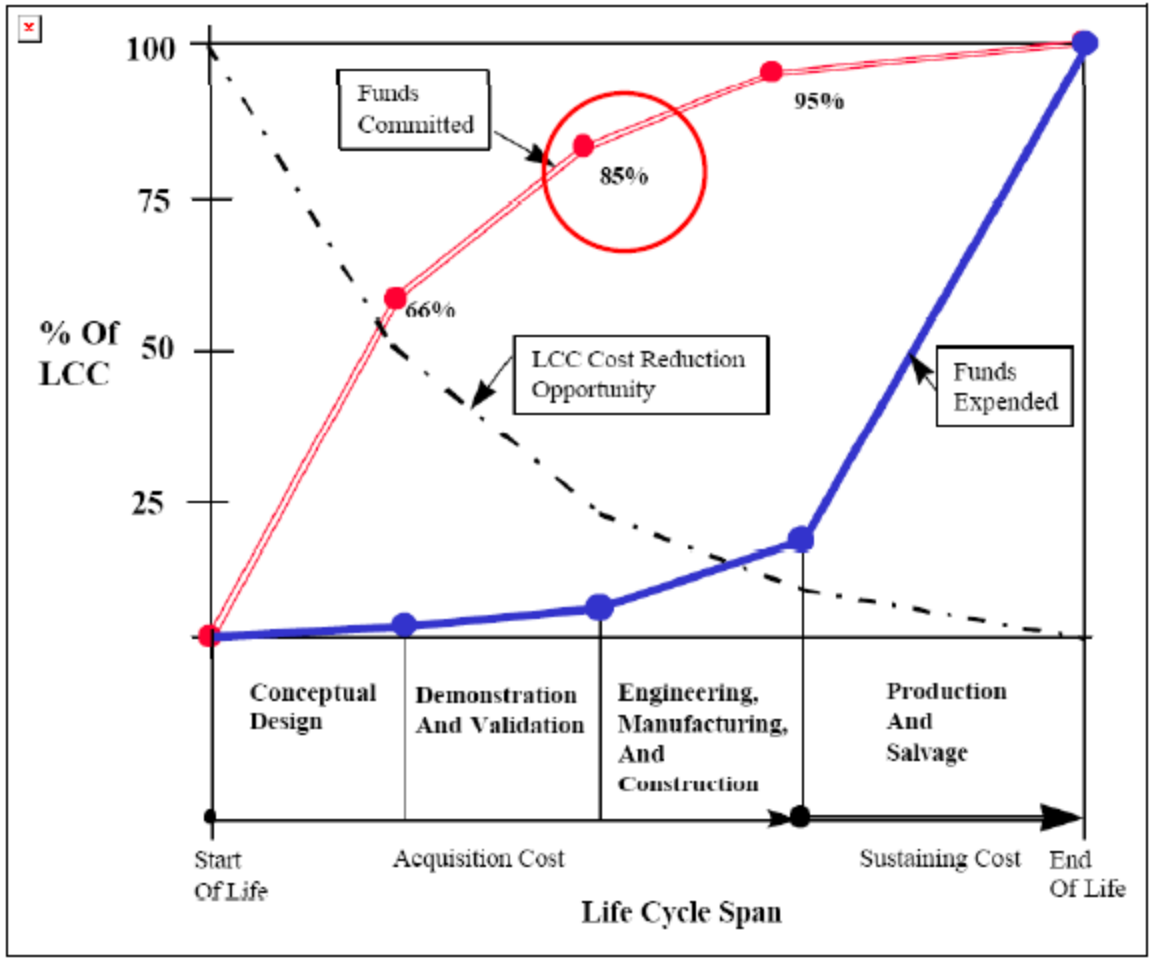


Materials & Process Information in the Acquisition Life Cycle



Impact of materials and process information on product lifecycle

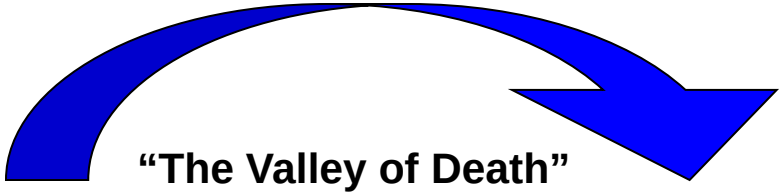


From: H. P. Barringer & D. P. Weber (1996) "Lifecycle Cost Tutorial"

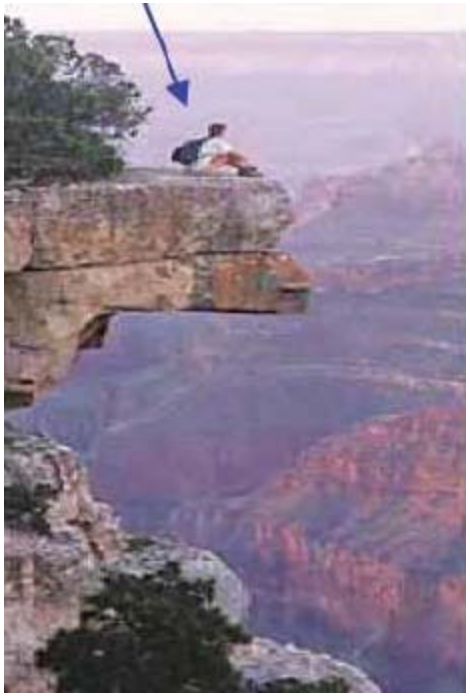
Project Funding Trends by Commitment and Expenditure of Lifecycle Cost (LCC))

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

Materials & Process Information
Role in R & D



“The Valley of Death”



Technology Development

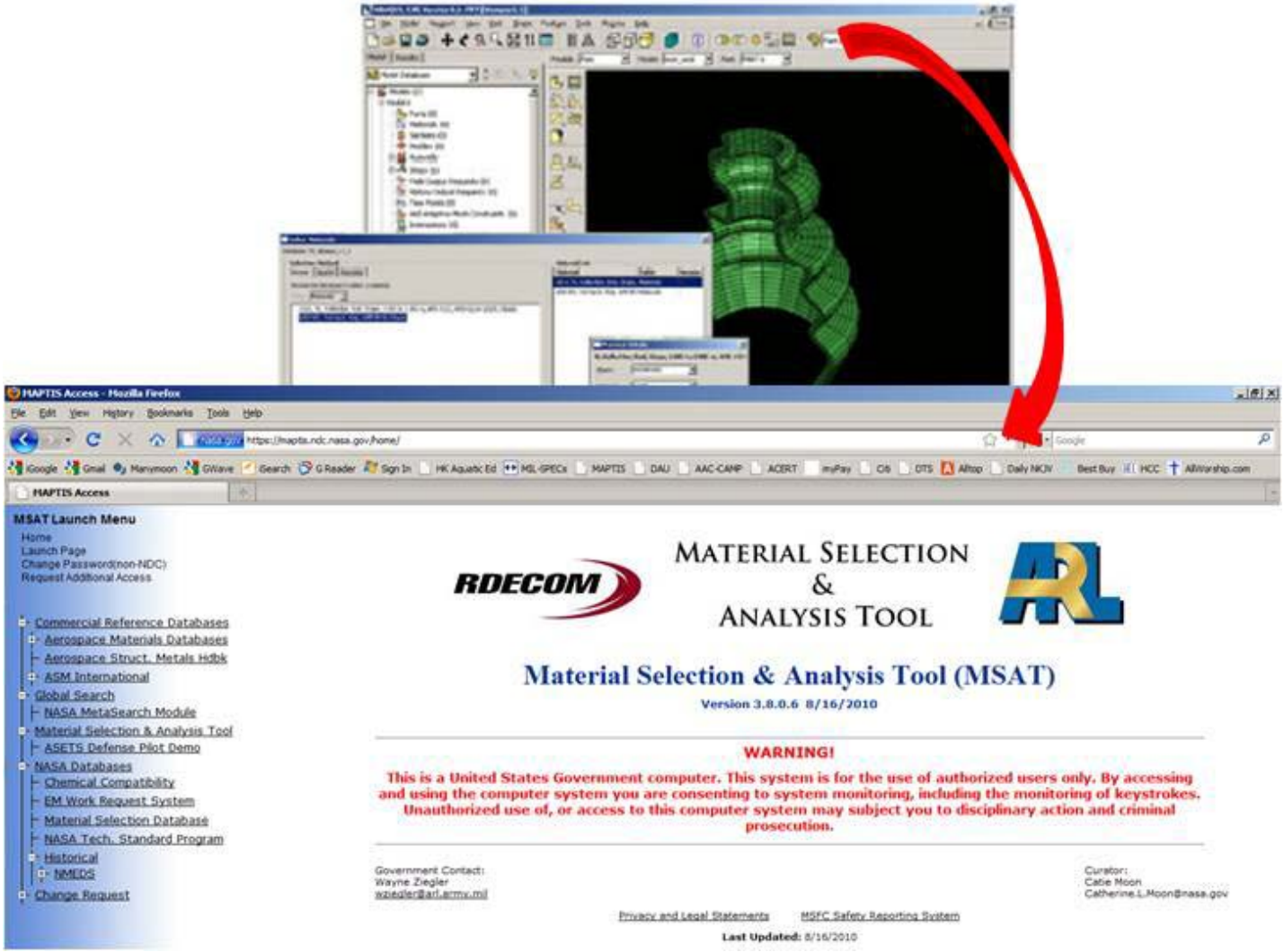
- Cycle times 7-30 Years
- Developed independent of application
- Empirical developments
- Modeling
- Multi-scale issues

Engineering Design

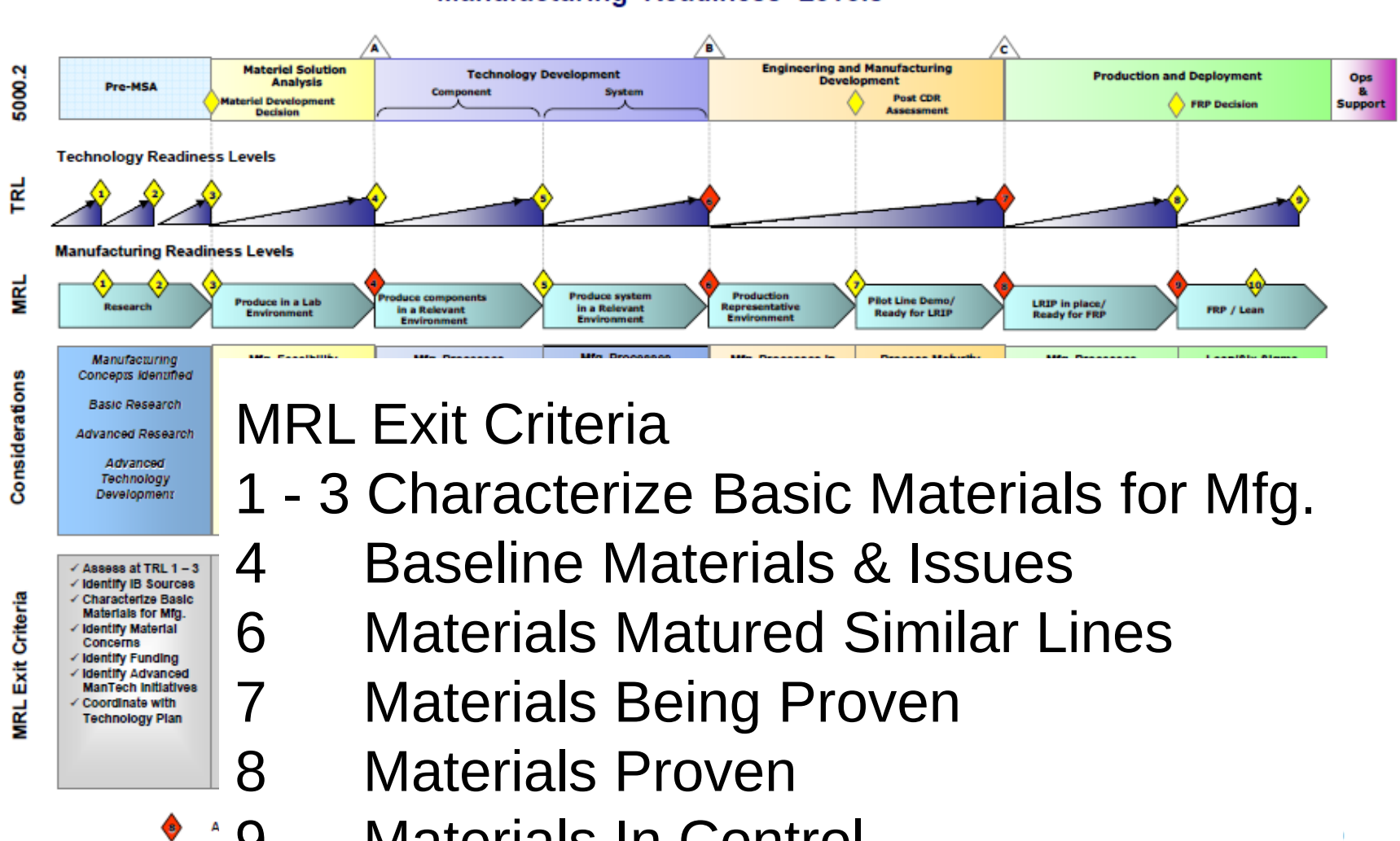
- Cycle times 3-5 Years
- Requires confidence in materials system
- Risk Averse
- Modeling enables rapid developments in design

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

Materials & Process Information
Role in Design



Materials & Process Information Role in Acquisition Decision-making



MRL Exit Criteria

1 - 3 Characterize Basic Materials for Mfg.

4 Baseline Materials & Issues

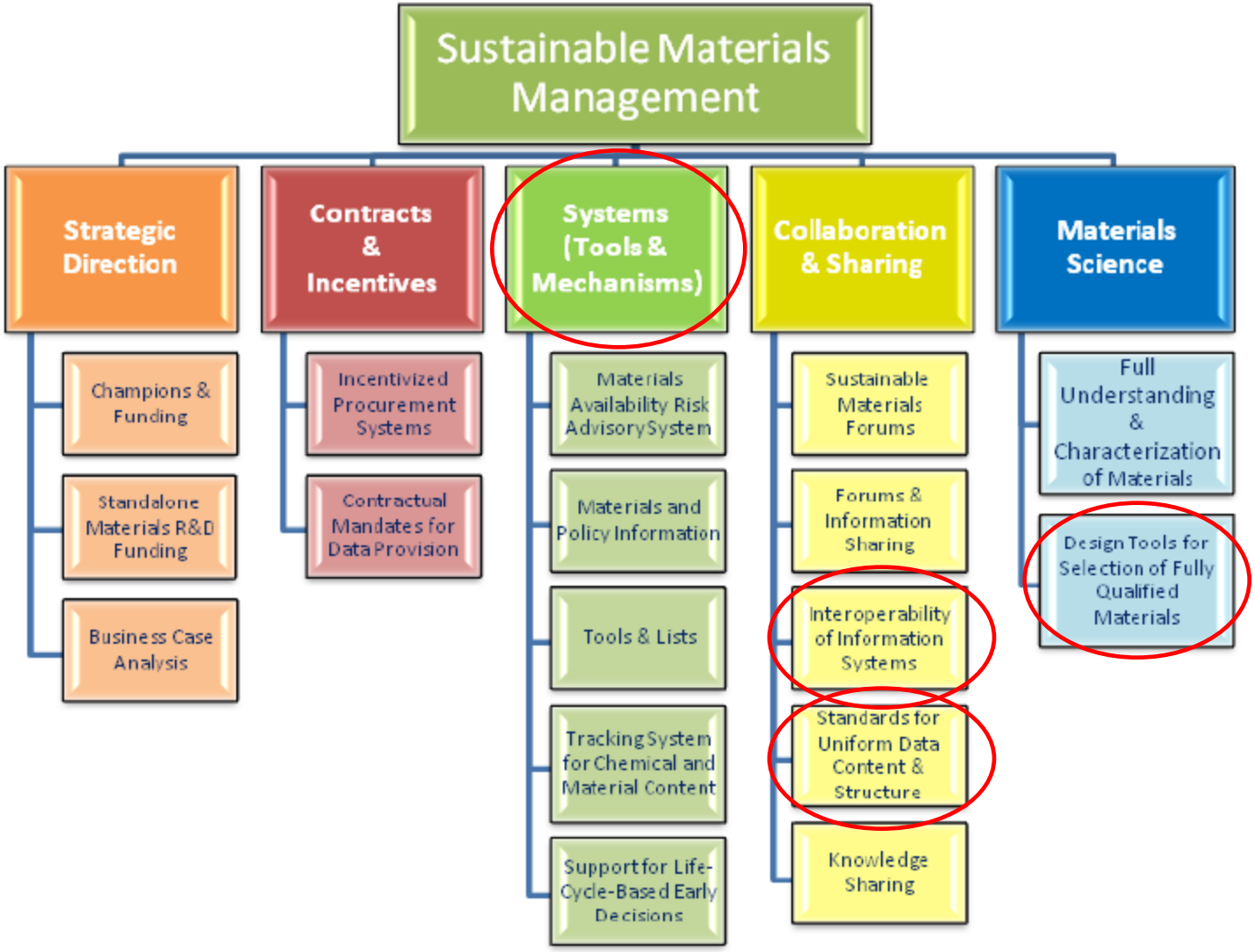
6 Materials Matured Similar Lines

7 Materials Being Proven

8 Materials Proven

9 Materials In Control

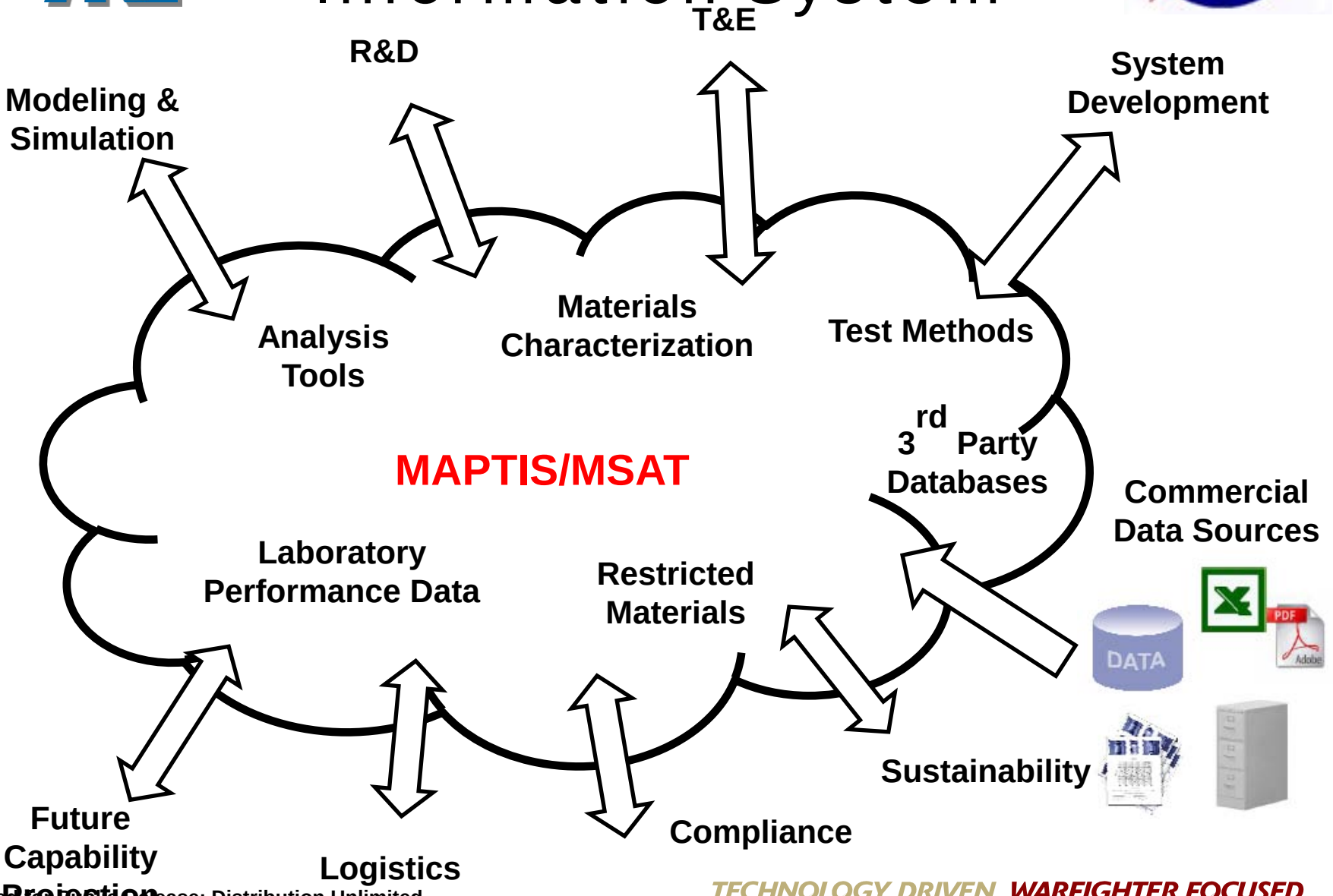
Materials & Process Information
Role in Sustainment/O&M



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

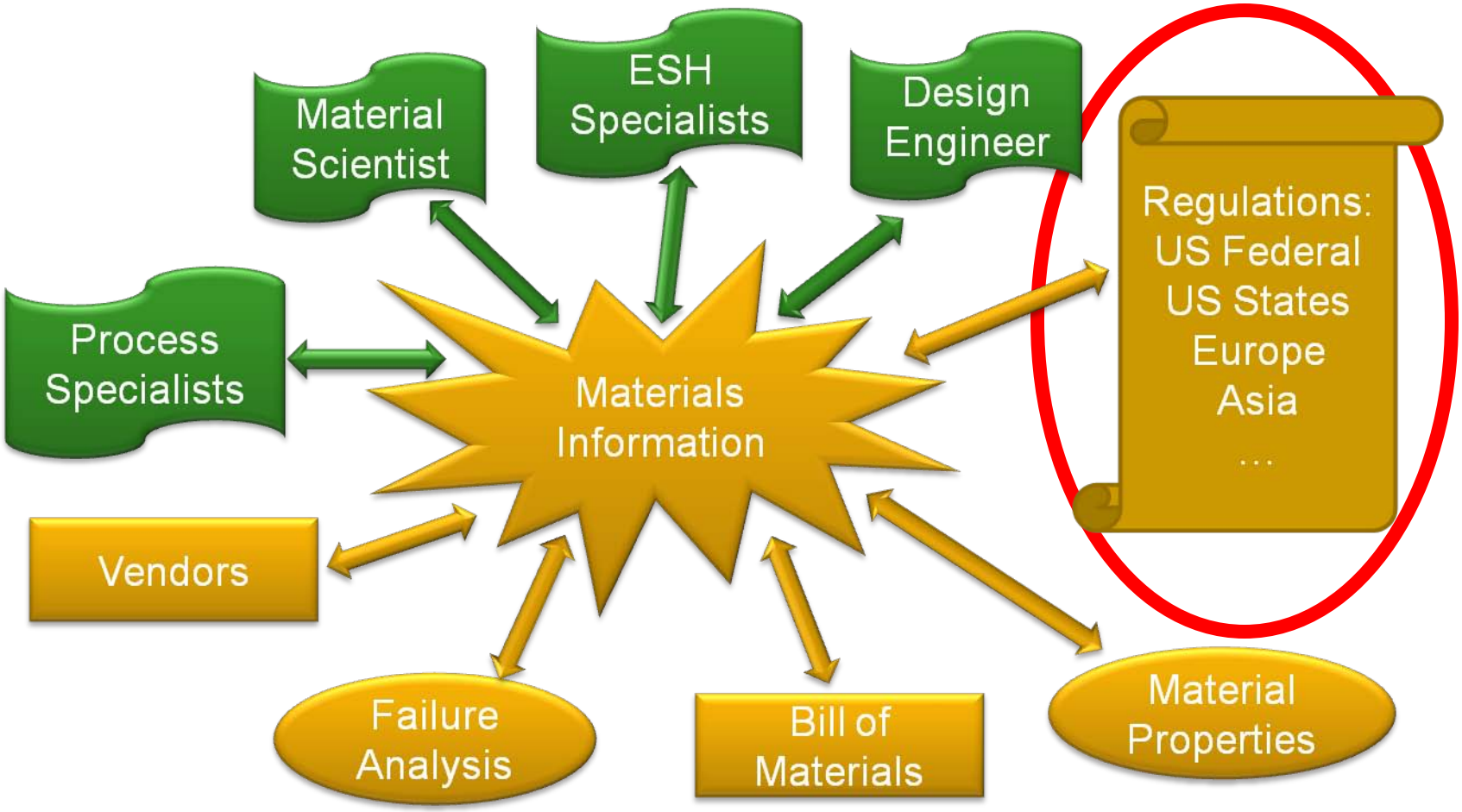
Current User Demographics

- **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

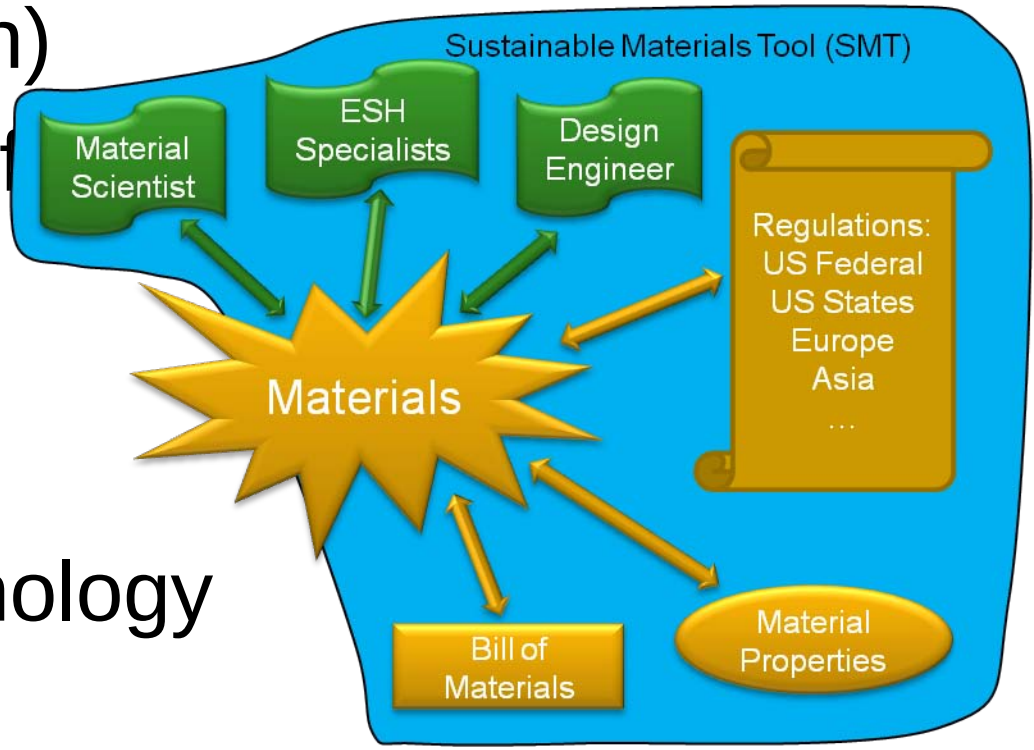
- 30+ Databases
- Web Accessible
- 24 x 7 hour access
- Live support 7am to 5pm CST
- Search capability to query open material sources
- Flexible System configuration to adapt to our customer needs
- The MAPTIS team provides all IT support along with materials expertise

MAPTIS



Sustainable Materials Tool (SMT)

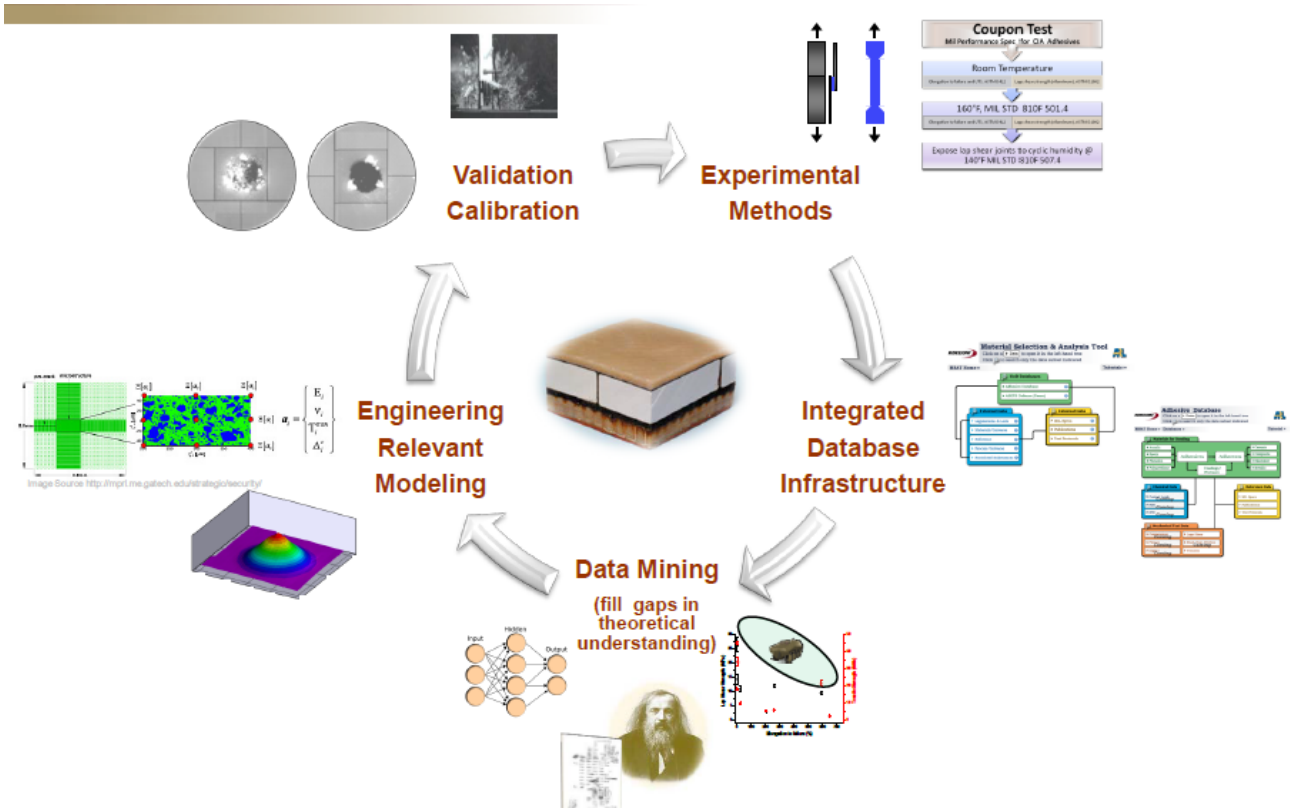
- Expand Regulations (Domestic & Foreign)
- Improve integration f ESH specialists
- Integrate ESH considerations into advance M&P technology development
- Access to ESH information from CAD/PLM packages



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