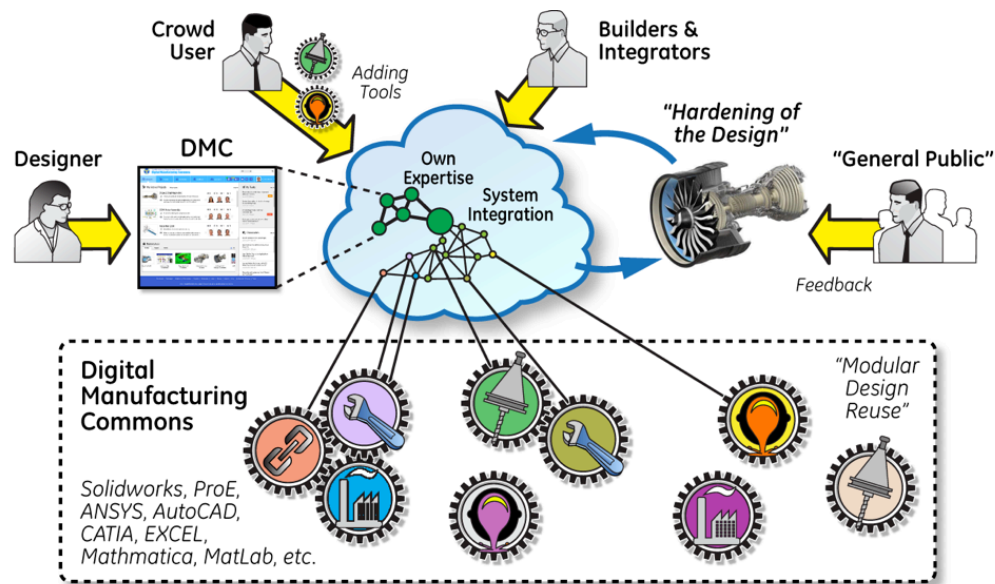# Digital Manufacturing Commons

# Global Economy

**Materials** ... rising costs & supply constraints

**Production** ... overcapacity in most industries

**Labor** ... increasing costs in the developing world

**Product development** ... shorter cycle times, more price points

Must Innovate Differently

# GE's Globalized Engineering Workforce

**DMDII**

Engineers: 1000s
Tools: 100s
Data: Petabytes
Expertise: Distributed



**Global Research HQ**
Niskayuna, NY

**AMSTC**
Ann Arbor, MI

**GE Aviation**
Lynn, MA

**Software Center**
San Ramon, CA

**GE Energy**
Schenectady, NY

**GE Energy**
Greenville, SC

**GE Aviation**
Evendale, OH

**Brazil Technology Center**
Rio de Janeiro, Brazil

**Global Research - Europe**
Munich, Germany

**China Technology Center**
Shanghai, China

**Engineering Design Center**
Warsaw, Poland

**John F. Welch Technology Center**
Bangalore, India

## Innovation Platform to Streamline Productivity of $Billion+ Engineering Community

a **UI LABS** Collaboration
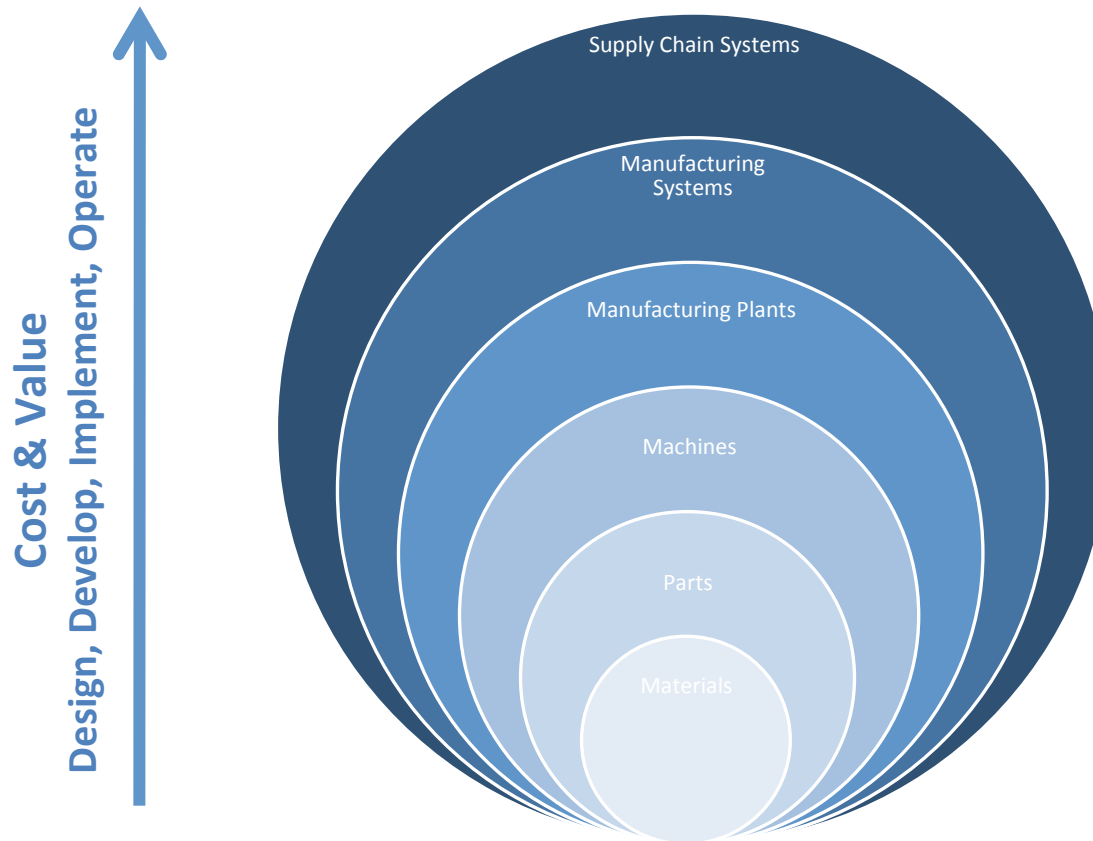
3

# Metcalfe's Law in *Action*
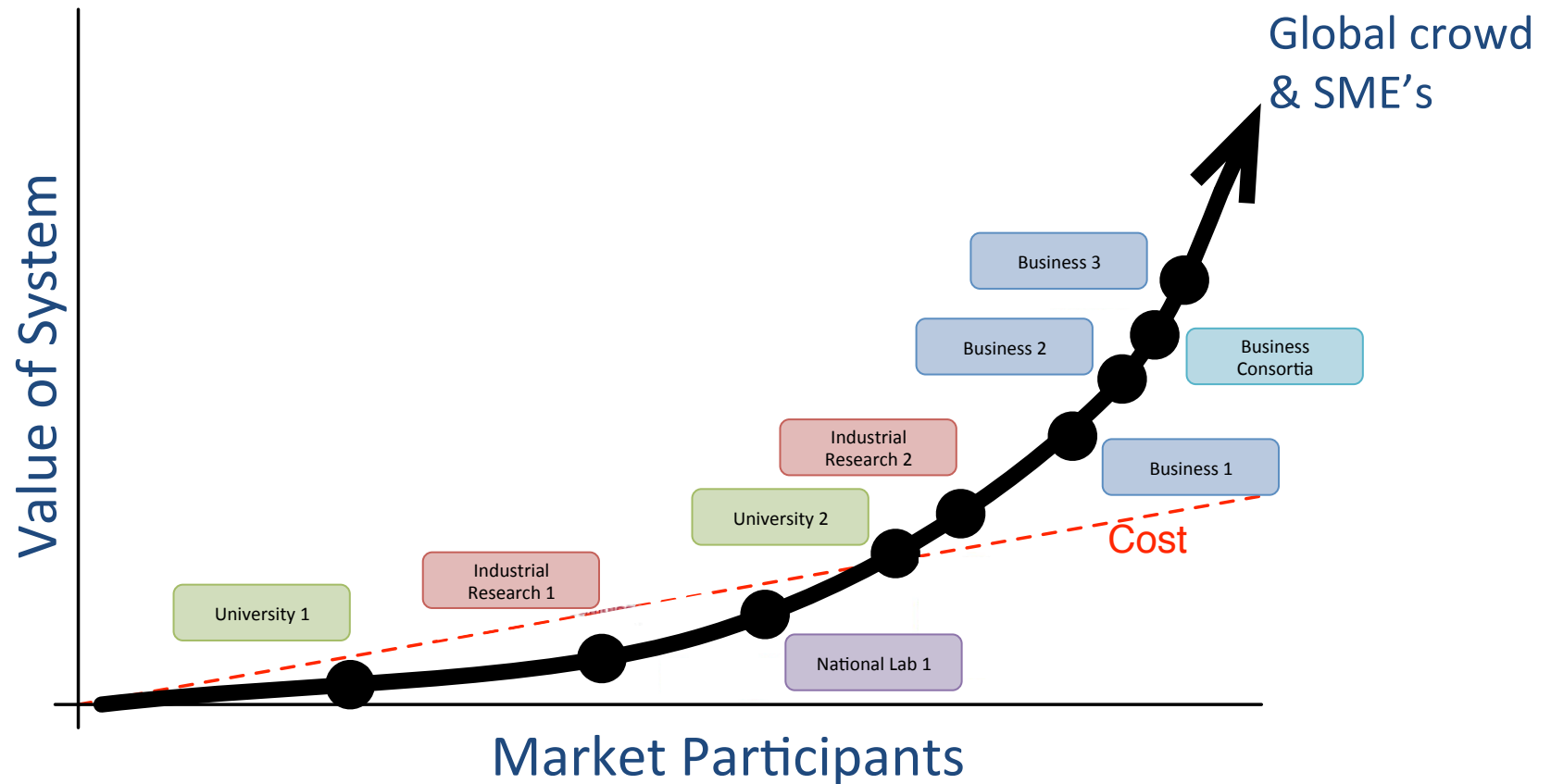


**Build an Exponential Value Network Enabled by Connecting National Labs, Academia, Industry, Crowds**

# Collaboration in Web 2.0



**Evolutionary Adaptation toward Co-creation, Democratization, and Commoditization Culture**
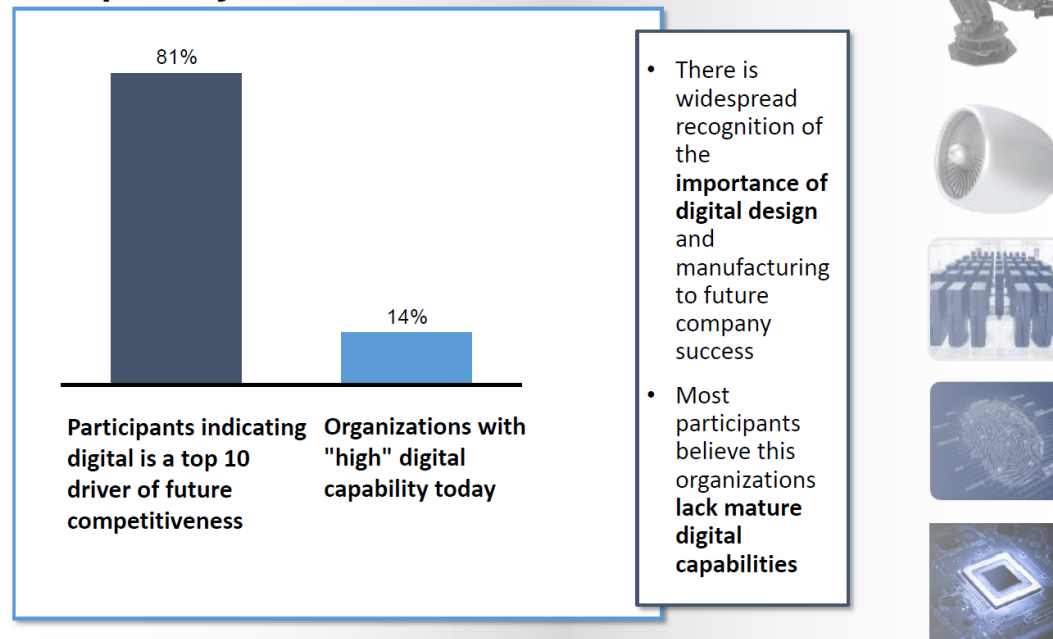
# What Do Complex Systems Cost? How Do We Design Them?

Cost & Value
Design, Develop, Implement, Operate

- Supply Chain Systems
- Manufacturing Systems
- Manufacturing Plants
- Machines
- Parts
- Materials

## Large-Scale Opportunity for Developing Advanced Tools for Complex Supply Chain Systems

# DMDII Survey – Sample

**DMDII**

Despite the recognition of importance for digital design and manufacturing, most participants believe their organizations lack capability

81%

14%

**Participants indicating digital is a top 10 driver of future competitiveness**

**Organizations with "high" digital capability today**

- There is widespread recognition of the **importance of digital design** and manufacturing to future company success

- Most participants believe this organizations **lack mature digital capabilities**

## Digitization Key, But Capability Lacking Far Behind

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# Collaborative Platform for Systems Design



Design

Control Point

Knowledge, Simulation and Know-How
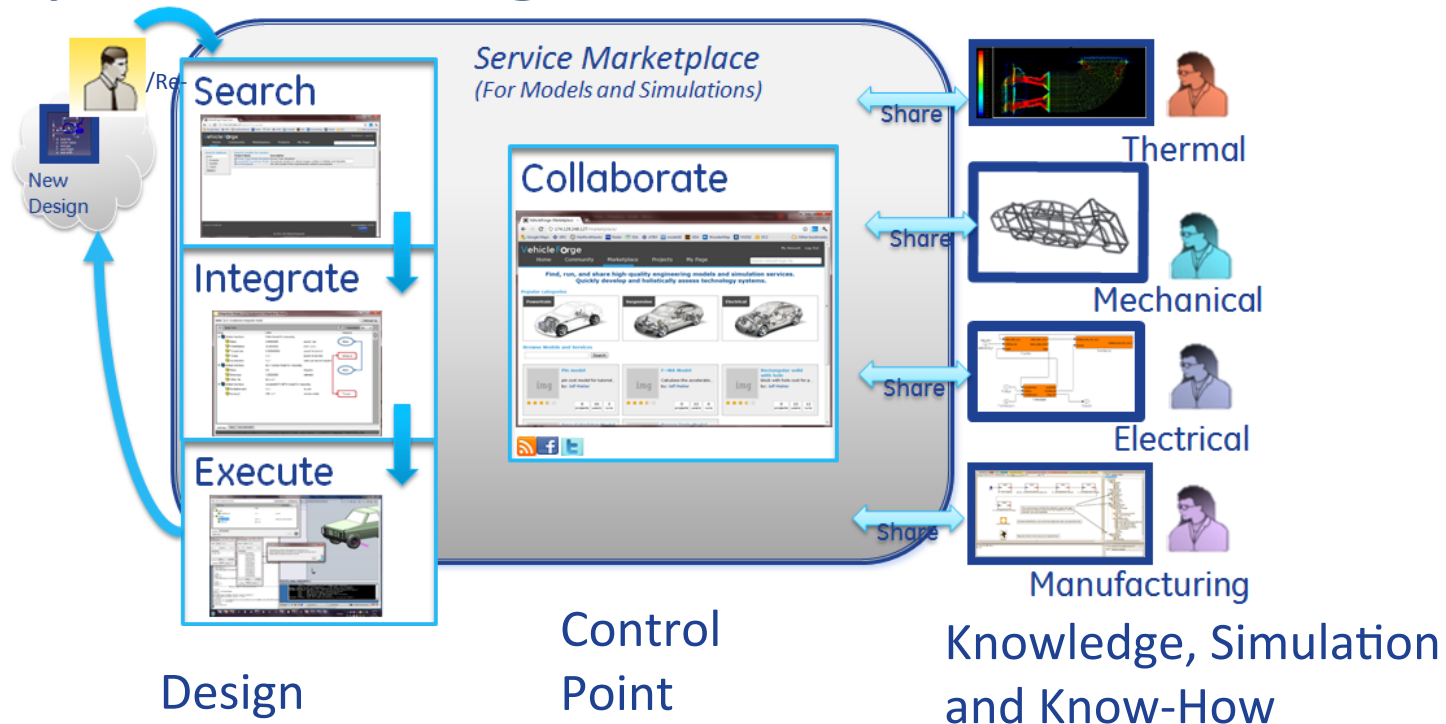
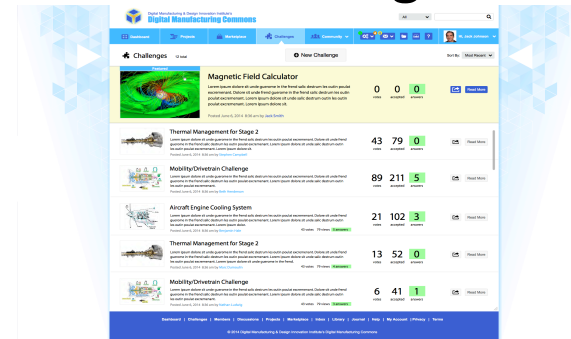## Democratized Platform Delivered Via a Networked System of Systems

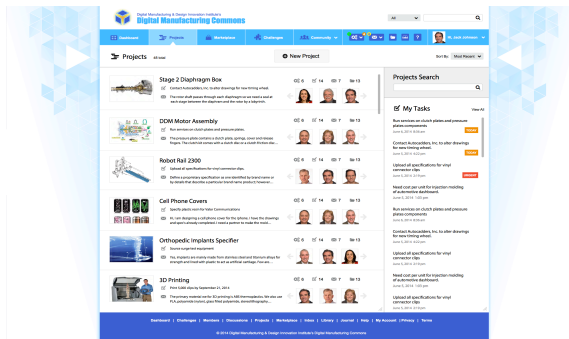# Digital Manufacturing Commons

**DMDII**

### Dashboard
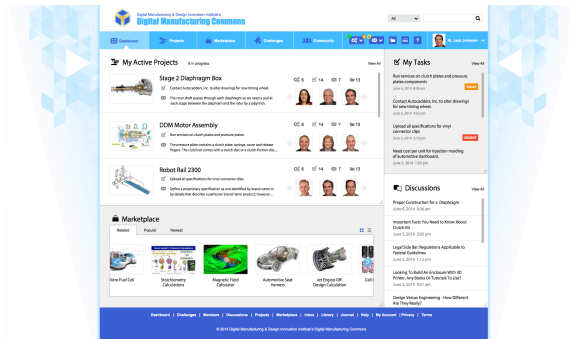


### Service Page



### Marketplace



### Community
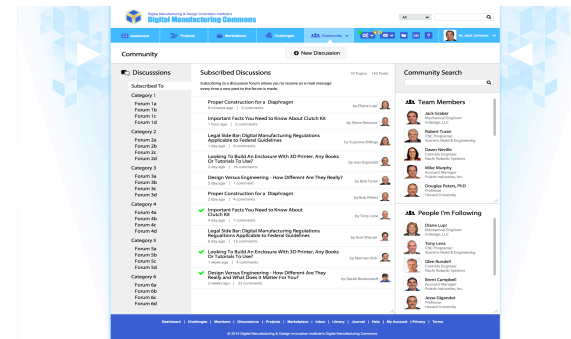


## Infinity Scalable on an ITAR Compliant Elastic Cloud

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# Service Interaction Via the Cloud

**DMDII**

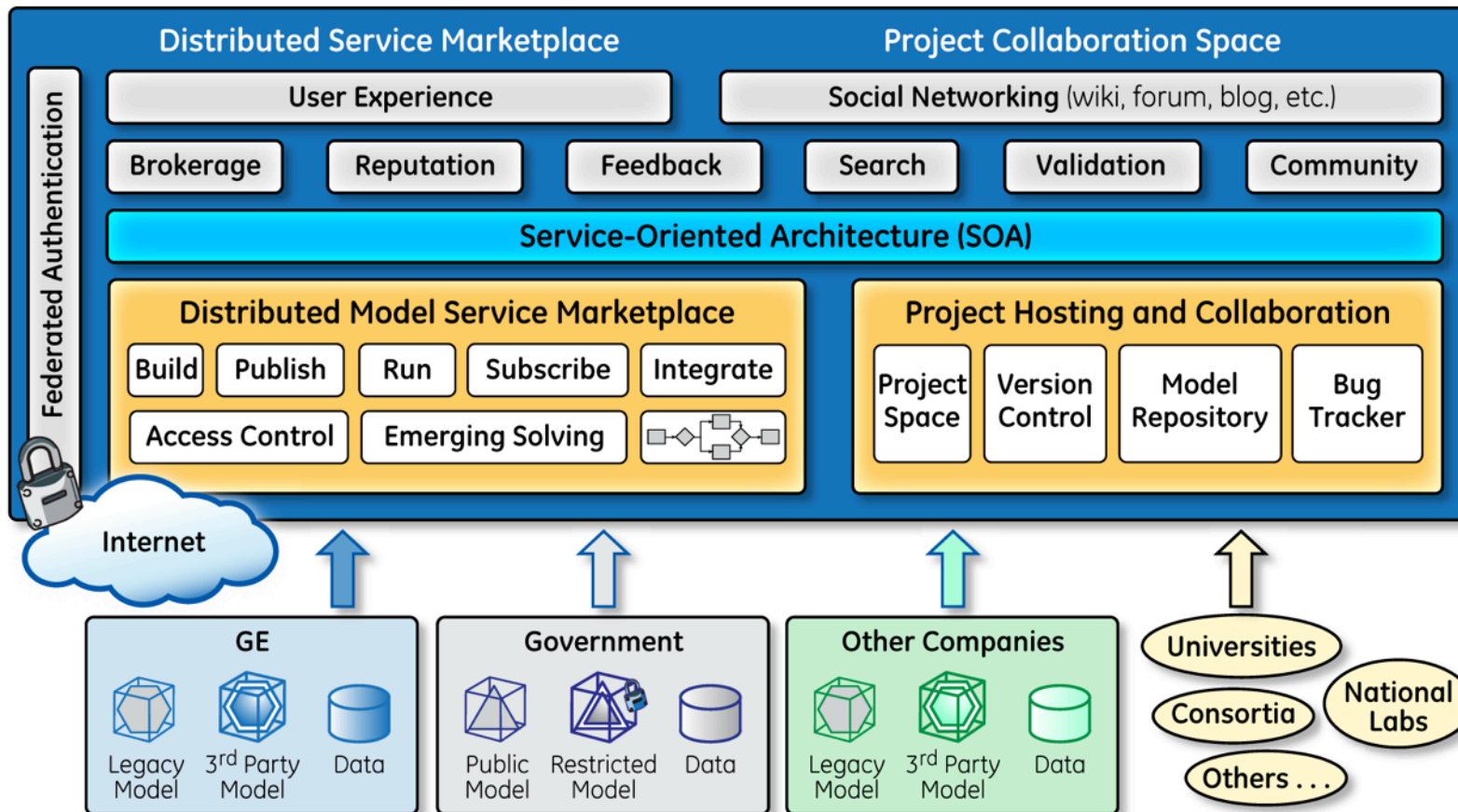Finding & Exchanging Data and Models
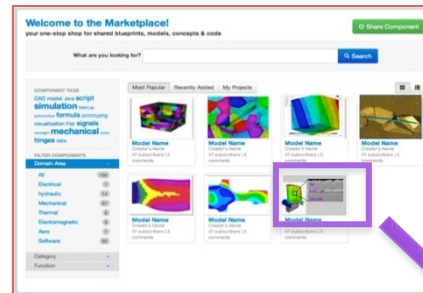
Single Source of Model, Data & Services

- **Transparent**
- **Auditable**
- **Automated**

Exposed Automated Tool to Authorized Users

Expose Tools, Data and Compute in a Searchable Automation Platform "The Commons"

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# DMC Platform Overview



## Modern Software Architecture Designed for Scalability and Flexibility

# Starting-up the DMC

**DMDII**

## Developing the DMC



Cloud Resources

Build and Testing

Project Planning

Code Repository

Documentation

## Designing the DMC

User Focus
Agile Development
Functional Flow
Visual Style Standards
Website Mockups

## Identity in the DMC

InCommon
Federation:
21 DMDII
Academic
Organizations

Plus:
AOL, Facebook,
Google, LinkedIn,
Twitter, Windows
Live, Yahoo!

## Securing the DMC

Holistic risk evaluation being pursued
- Threat modeling
- White box evaluation
- Penetration testing
- Infrastructure security
- Architecture security
- User identity

## Extending the DMC

Evaluating
features with
existing criteria

## Building an Organization to Support the Future of the Digital Manufacturing and Design Innovation Institute

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# Delivering Advanced Tools
# to a Broad Community of Users