Advancing the Simulation Revolution
Analysis, Simulation and Systems Engineering Software Strategies
The ASSESS Initiative

The **ASSESS Initiative** was formed to bring together key players to guide and influence strategies for software tools for model-based analysis, simulation, and systems engineering.
The ASSESS Initiative

Key drivers behind the ASSESS Initiative
1. Growing demand on “How to be more competitive”
2. Exponentially growing complexity of products & processes
3. Available computing power is rapidly removing the computing bottlenecks
4. New world of 3D printed objects and light weighting
5. Entirely new applications are creating a rapidly growing demand for simulation to enable breakthroughs
6. Simulation is used almost exclusively by a limited number of expert analysts
7. Simulation efforts have three key but disjointed vectors – Commercial / Government / Research
The ASSESS Initiative

The ASSESS Vision

“To significantly expand the use and benefit of software tools for model-based analysis, simulation, and systems engineering in the engineering applications domain.”
The ASSESS Initiative

The ASSESS Initiative

• ASSESS activities started with a Summit in 2015 followed by annual Congresses starting in 2016
• ASSESS Initiative LLC was formed as a legal entity in mid 2016
• The ASSESS Initiative Membership Program went live in early 2018
The ASSESS Initiative

- ASSESS interacts and collaborates with multiple activities and organizations including: Cambashi, COFES Institute, intrinSIM, NAFEMS, INCOSE, Revolution in Simulation, and a growing list of others.
Understanding the Simulation Revolution
Business Drivers for Engineering Simulation

The Changing Role of Simulation is really about becoming a major key to strategic goals for improving competitiveness:

- Increase Innovation
- Increase Quality
- Reduce Risk
- Reduce Time
- Reduce Cost
Business Drivers for Engineering Simulation

- Growth of the Engineering Simulation market is tempered due to lack of expertise available
- Engineering Simulation is still done primarily by specialized Analysts
Business Drivers for Engineering Simulation

• Business Drivers are going to force a “revolution” to overcome the expertise based limitation

• Engineering Simulation will be forced to find a way
Business Drivers for Engineering Simulation

- The demand is not going away
- A **Simulation Revolution** will occur:
  - “Model-Based”
  - “Fit for purpose”
  - “Integrated”
  - “Smart”
  - “Transparent” / “Invisible”
  - “Generative”
  - “…”
Bob Tickel’s ASSESS 2017 Congress Keynote illustrates estimated usage of Engineering Simulation at Cummins similar to ASSESS demand curve.

“Democratization” - New Tools, Methods and Skills (MDO, MBSE, etc.)

Automation, Knowledge Management & Reduced Rework
Market data from the Cambashi CAE Observatory
Market Data – from Cambashi CAE Observatory

- 2D & 3D simulation market continues to grow and is expected to exceed $10 Bn annually by 2023
- But growth is still being limited by expertise
- Data courtesy of Cambashi CAE Observatory
Market Data – from Cambashi CAE Observatory

Cambashi CAE Total Revenue
Year on Year growth

Cambashi CAE Total Revenue
Average Year on Year Growth
ASSESS Themes
ASSESS Themes

The ASSESS initiative has been organized around a key set of themes associated with expanding the usage and benefit of Engineering Simulation.

- **Alignment** of Government / Research/ Commercial Activities
- Engineering Simulation **Business** Challenges
- Engineering Simulation **Credibility**
- Democratization of Engineering Simulation (**DoES**)  
- **Generative** Design
- **Integration** of Systems and Detailed Sub-System Simulations
- Engineering Simulation Digital **Twin(s)**
ASSESS Themes

• **Alignment** of Government / Research/ Commercial Activities
  
  • The focus of this ASSESS Initiative theme is to highlight and provide options to address the issue that the efforts related to advancing Engineering Simulation have three key but disjointed vectors (commercial, government, research).
ASSESS Themes

- **Alignment** of Government / Research/ Commercial Activities
- **ASSESS** Positioning Paper
  - Released May 2018
  - Strategic Insight Paper
  - Currently being planned

**Contents**

- ALIGN THEME FOCUS
- DEFINITION OF THE DIFFERENT SECTORS
- DEFINITION OF ALIGNMENT
- UNDERSTANDING MISALIGNMENT
- COMMERCIAL-GOVERNMENT MISALIGNMENT
- Activity Timeframes
- Accounting and Auditing Practices
- Software Reuse Incentives
- Intellectual Property Rights
- Access Control
- COMMERCIAL-RESEARCH MISALIGNMENT
- Intellectual Property Rights
- Business Goals
- GOVERNMENT-RESEARCH MISALIGNMENT
- Perceived Competition
- Access Control
- ALIGNMENT MODELS
- THE PROMISE OF ENGINEERING SIMULATION

**ALIGN THEME FOCUS**

The ASSESS initiative has defined multiple focus Themes to enable a significant increase in the use and benefit of Engineering Simulation. The specific theme for this paper is Engineering Simulation Alignment (Or Lack Thereof) across developers and practitioners in the Commercial, Government, and Research sectors.

The objective of the ASSESS initiative Align theme is to provide guidance and foster improved alignment of commercial, government and research Engineering Simulation efforts.
ASSESS Themes

• Engineering Simulation Business Challenges
  • The focus of this ASSESS Initiative theme is to investigate issues and to develop approaches to enable a transformation of business models to enable a significant increase in usage and benefit of Engineering Simulation software tools.
ASSESS Themes

- **Engineering Simulation Business Challenges**
  - Value Proposition survey completed
    - Will be made available to ASSESS Initiative members
  - ASSESS Positioning Paper
    - Planned for Mid 2019
  - Strategic Insight Paper
    - Currently being planned
ASSESS Themes

• Engineering Simulation **Credibility**
  • The vision of this ASSESS Initiative Theme is for engineering organizations to have a high level of trust in the use of Engineering Simulation tools, processes and activities when making critical business decisions.
ASSESS Themes

- Engineering Simulation Credibility Activities
  - ASSESS Positioning Paper
    - Targeted for Fall 2019
  - Strategic Insight Paper
    - Released Oct 2018
  - Understanding an Engineering Simulation Risk Model
    - Available to ASSESS Initiative Members
ASSESS Themes

• **Democratization of Engineering Simulation (DoES)**
  • The focus of this ASSESS Initiative theme is to advocate for and enable a significant expansion of the use of Engineering Simulation by all users in a reliable way, for whom access to the power of Engineering Simulation would be beneficial.
ASSESS Themes

- **Democratization of Engineering Simulation (DoES)**
  - ASSESS Positioning Paper
  - Released July 2018
  - Strategic Insight Paper
  - Currently being planned

The objective of the ASSESS Initiative Align theme is to provide guidance and foster improved alignment of commercial, government and research Engineering Simulation efforts.
ASSESS Themes

• **Generative Design**
  
  • The focus of this ASSESS Initiative theme is to advocate for and enable a significant expansion of the breadth of capabilities of Generative Design and the use of Generative Design as an enabler of changing the design paradigm process through Engineering Simulation.
ASSESS Themes

- **Generative Design**
  - ASSESS Positioning Paper
    - Planned for early 2019
  - Strategic Insight Paper
    - Currently being planned

*Generative Design is the use of algorithmic methods to quickly and automatically, or iteratively, transform requirements, constraints, uncertainties, and design space to create/drive viable designs or outcomes.*
ASSESS Themes

• **Integration** of Systems and Detailed Sub-System Simulations

  • The focus of this ASSESS Initiative theme is to investigate gaps and to develop approaches for effective integration of systems and detailed sub-systems simulations.
ASSESS Themes

• **Integration** of Systems and Detailed Sub-System Simulations
  - ASSESS Positioning Paper
  - Released January 2019

• **Strategic Insight Paper**
  - Currently being planned

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INTEGRATION THEME FOCUS
The ASSESS Initiative has defined multiple focus Themes to enable a significant increase in the use and benefit of Engineering Simulation. The specific theme for this paper is Integration of System and Detailed Sub-System Simulations with the objective of developing and communicating strategies for effective integration thereof. This objective includes broadening the understanding of integration benefits, gaps, and potential approaches.
ASSESS Themes

• Engineering Simulation Digital Twin(s)
  • The focus of this ASSESS Initiative theme is to advocate for and enable a significant expansion of the use of Engineering Simulation Digital Twin(s).
ASSESS Themes

- Engineering Simulation Digital Twin(s)
  - ASSESS Positioning Paper
    - Planned for fall 2019
  - Strategic Insight Paper
    - Currently being planned

Engineering Simulation Digital Twin is a physics-based computer representation of a physical asset or collection of physical assets (physical twin) that exploits information flow to/from the associated physical asset. Each physical twin may have multiple Engineering Simulation Digital Twins used for various purposes.
ASSESS Congresses
ASSESS Congresses

- **ASSESS Summit**
  (January 2015, Sante Fe, NM)
  - 40 Industry leading Ambassadors
  - 1 Keynote presentation (Richard Riff – retired from Ford)
  - 5 Working Groups
  - 8 key issues were highlighted

- **ASSESS 2016 Congress**
  (January 2016, Potomac, MD)
  - 85 Industry leading participants
  - 4 Keynote presentations
  - 26 Technology Briefings
  - 7 Working Sessions each with a particular ASSESS related theme
ASSESS Congresses

- **ASSESS 2017 Congress**  
  (November 1-3 2017, Potomac, MD)  
  - 82 industry leading participants  
  - 2 Keynote presentations  
  - 8 Technology Briefings  
  - 16 Working Sessions focused on ASSESS related themes

- **ASSESS 2018 Congress**  
  (October 28-30 2018, Chateau Elan, Braselton, GA)  
  - 87 industry leading participants  
  - 2 Keynote presentations  
  - 10 Notes From the Front Presentations  
  - 14 Working Sessions focused specific ASSESS related Theme questions, with 2 questions/sessions for each theme
ASSESS 2019 Congress
(October 27-29 2018, Chateau Elan, Braselton, GA)
Theme: Advancing the Simulation Revolution
• Targeting 105 industry leading participants
• 2 Keynote presentations
  • Walter Witkowski of Sandia National Labs
  • Ralf Hartmann of Airbus
• 10 Notes From the Front Presentations
• 14 Working Sessions focused specific ASSESS related Theme questions, with 2 questions/sessions for each theme
Viva la Simulation Revolution