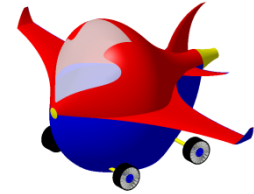


# NA Regional Summit 2008



2020 Vision of Engineering Analysis and Simulation  
October 29 - 31, 2008 | Hampton, Virginia

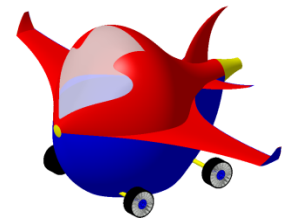


## The Role of Digital Simulation in Developing a PLASVEE<sup>®</sup> for 2020

Rod Dreisbach / Lee Krueger / John Vandeventer  
The Boeing Company



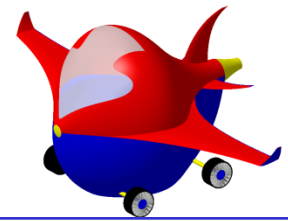
# The Role of Digital Simulation in Developing a PLASVEE<sup>®</sup> for 2020



## Agenda (Boeing intro)

- Session Abstract
- The Role of Digital Simulation in a Competitive Business Environment
- The Five Key Elements of Simulation
- The PLASVEE<sup>®</sup> Development Project
- Request for Proposal: Meeting the 2020 Challenges Associated with Simulation

# The Role of Digital Simulation in Developing a PLASVEE<sup>®</sup> for 2020



## Session Abstract

An industrial-level product development project will be proposed for discussion by multiple CAE application vendors. Each vendor will be provided with an overall description and specifications for a **Personal Land Air Sea Vehicle (PLASVEE)** to be developed in 2020. They will use this information to discuss their view of the business, technology, process, and people issues they foresee in the future product design environment. Each vendor participant should address how they envision the role will be for engineering simulation in developing such a product in the year 2020 that meets the specified business and technical performance targets. The ensuing discussion should address the physical challenges presented by such a product that include (but not necessarily be limited to) kinematics, FEA, multibody dynamics, CFD, optimization, the environment, etc. The participants will present their views followed by a question-and-answer segment with the conference attendees.

## **Activity:** Proposals for a PLASVEE Vehicle by CAE Vendors in the Year 2020

Four years after Boeing's 100th anniversary, we continue to follow William Boeing's philosophy:



**"We are embarked as pioneers upon a new science and industry in which our problems are so new and unusual that it behooves no one to dismiss any novel idea with the statement that 'it can't be done!'"**

# Major Domains Associated with a Competitive Business Advantage

## People

- ✓ Tacit knowledge
- ✓ Collaboration
- ✓ Cultures
- ✓ Global
- ✓ etc.

## Processes

- ✓ Sharing knowledge
- ✓ Reusing knowledge
- ✓ Best practices
- ✓ etc.

## Business

- ✓ Customer knowledge
- ✓ Market intelligence
- ✓ etc.

## Technology

- ✓ Math & Physics
- ✓ Engineering
- ✓ Computing hardware & software
- ✓ Data management
- ✓ etc.

**Digital Simulation Plays a Key Role in Each Domain**



# Characteristics of Innovation

## --- the Interaction of the Four Domains

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### ➤ Innovation

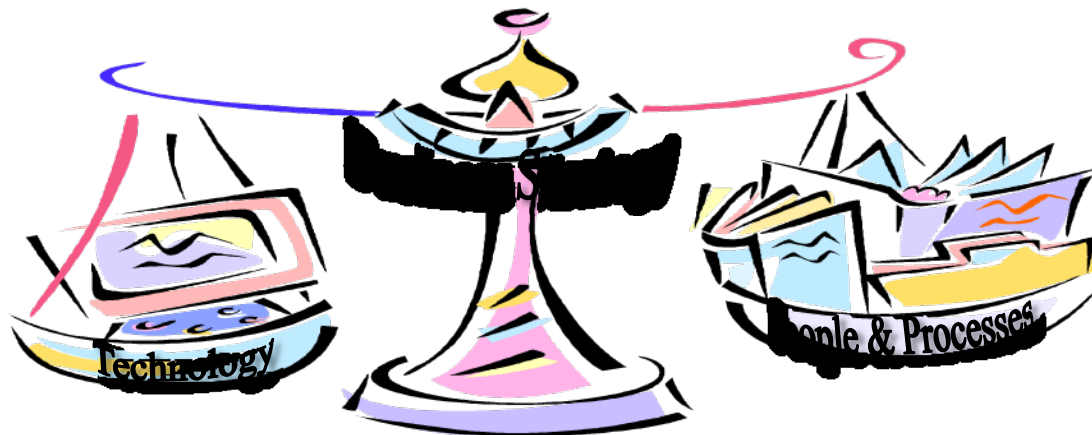
- ✓ Feeds off of the knowledge of a company
- ✓ Is based on sharing knowledge across different domain groups and organizational boundaries
- ✓ Is generally associated with the development of new products and services
- ✓ Is generally the result of a series of incremental improvements
- ✓ Results from well-managed, disciplined business processes---it is not accidental!

*“Invention is 1% inspiration versus 99% perspiration”*

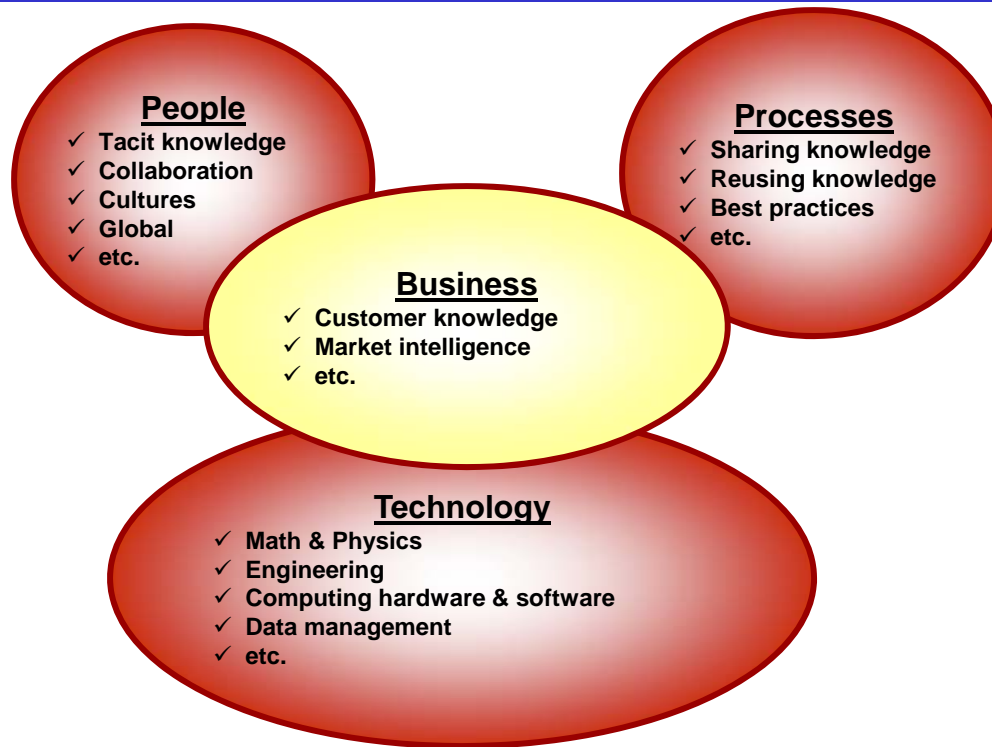
*--- Thomas Edison*

# Innovation & Competitive Advantage

- **People, Processes and Technology** define the foundation for creativity and innovation
  - ✓ **Technology** makes it feasible
  - ✓ **People** and their **Processes** make it successful!
- Balancing and aligning these domains with the **Business Strategy** leads to a **Competitive Business Advantage**



# Roles & Elements of Digital Simulation



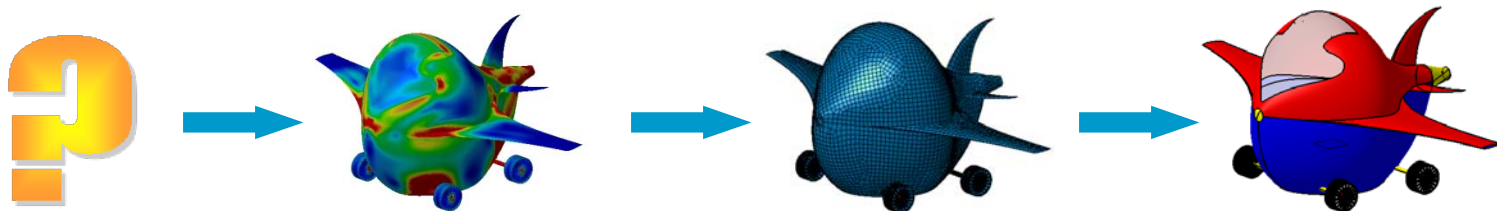
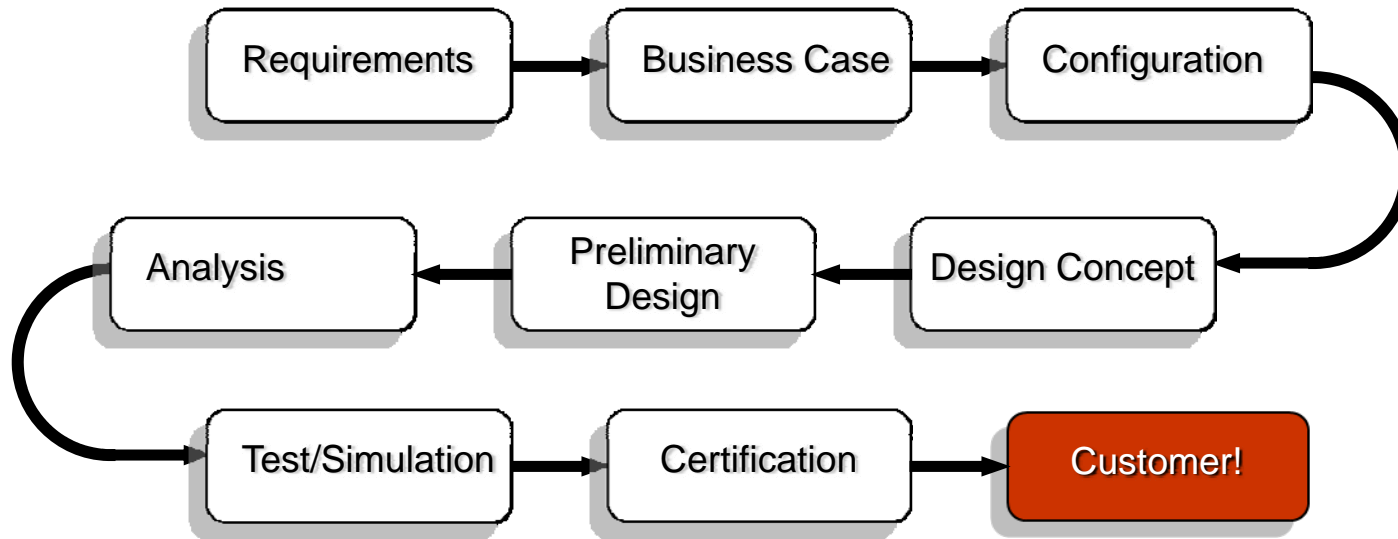
**Digital Simulation Plays a Key Role in Each Domain**

**Where the Elements of Simulation include:**

- ✓ Modeling
- ✓ Analysis & Optimization
- ✓ Product Lifecycle Knowledge Management
- ✓ Man-Machine Interaction
- ✓ Computing Architecture

# The Role of Digital Simulation in Developing a PLASVEE<sup>®</sup> for 2020

## Product Development Process





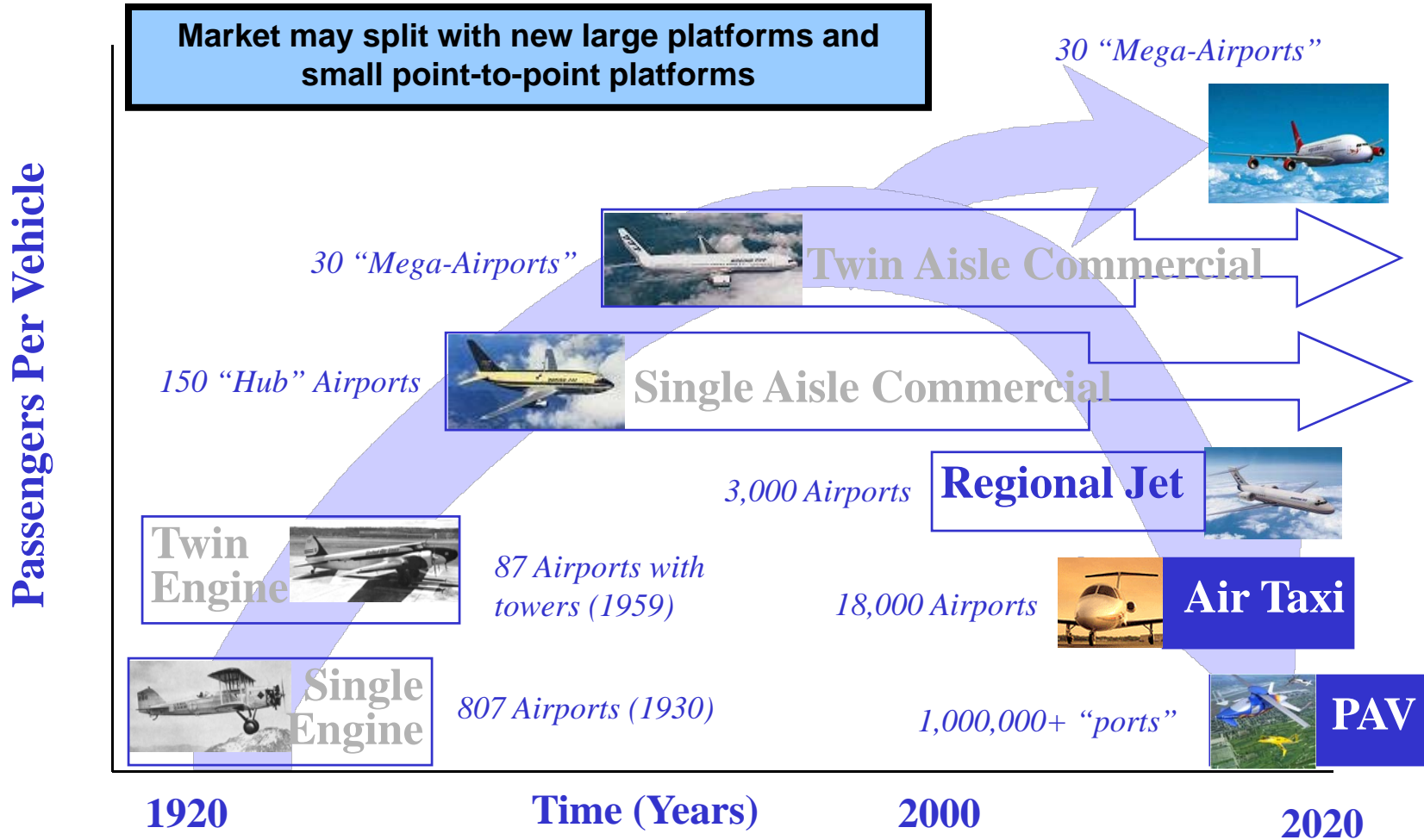


# The Role of Digital Simulation in Developing a PLASVEE<sup>®</sup> for 2020

## The Problem to be Addressed

- Freeways don't solve city and inner-city traffic problems
- Most freeways have inadequate capacity for present traffic demands, particularly at commute time
- Expanding or building more freeways provides only temporary relief. Traffic volume quickly rises to meet available freeway capacity
- Freeway expansion and new freeway construction are approaching limits imposed by real estate availability, price, environmental concerns, disruption of infra-structures and political constraints
- In many locations, current mass transit systems have a minimal impact on traffic problems
- People prefer personal vehicles
- People want schedule flexibility and the convenience of personal vehicles
- People want the comfort and security of door-to-door transportation, privately or with company of their own choosing
- People know that public transportation systems are usually slower than personal vehicles due to frequent stops and transfers

# The Role of Digital Simulation in Developing a PLASVEE<sup>®</sup> for 2020 --- U.S. Air Travel & Airports



# The Role of Digital Simulation in Developing a PLASVEE<sup>®</sup> for 2020 --- Historical PAV Concepts

Flying Cars ?

Roadable Aircraft ?

Submersible Aircraft ?

## Land Air Sea Vehicle... Fantasy?!?

- First Flight of First Flying Car - March 1937; Waterman Aerobile
- Fulton Airphibian – 1946
- Aerocar – First Flight, 1949; Civil Certification, 1956
  - ✓ ...
  - ✓ ...
- About a dozen current developments

"Now I would say that people want to ride in airplanes more and more each day -- and I shall go so far as to say they will someday regard airplane travel to be as commonplace and incidental as train travel... We are trustees of a veritable revolution that is taking place once more in the **economic**, **social**, and **political** fabric with the advent of this new speed medium."

-William E. Boeing, 1929

# The Role of Digital Simulation in Developing a PLASVEE<sup>®</sup> for 2020 --- Historical PAV Concepts

## Separable



## Fold-and-Go



## Compact



## VTOL

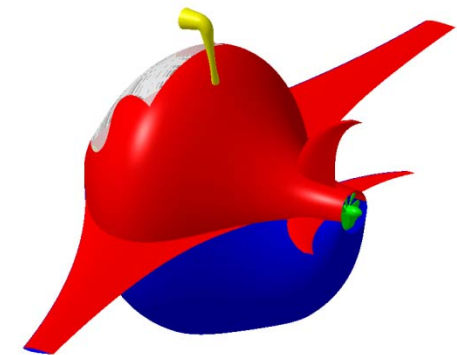
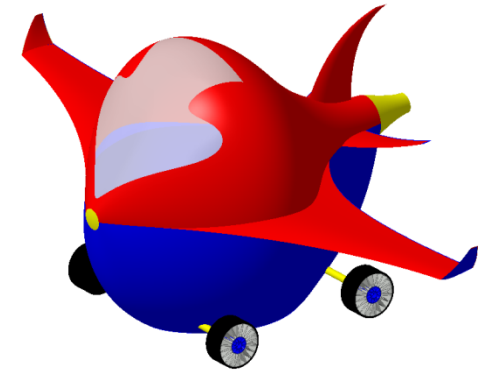


# The Role of Digital Simulation in Developing a PLASVEE<sup>®</sup> for 2020

## Project Proposal

Personal Land, Air & Sea Vehicle → PLASVEE<sup>®</sup>

- **Price** (\$100,000 Retail)
- **Green**
  - ✓ Sustainable materials
  - ✓ Manufacturing
  - ✓ Fuel Economy
- **Operating Parameters**
  - ✓ Water Operation to 50 ft depth
  - ✓ Flight 2000 ft max above terrain
  - ✓ Capable of Highway Speeds to 60 mph
- **Meets Government Safety Standards**
  - ✓ Highway
  - ✓ Aircraft
  - ✓ Submersible Watercraft



Conceptual Cartoon  
(Final Product Configuration TBD)

Not a Boeing Product

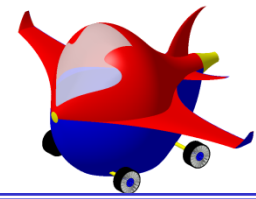


# **Request for Proposal: Meeting the 2020 Challenges Associated with Simulation**

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- **When: Some time in the year 2020**
- **Each Vendor Presentation Should Focus on 5 Topics:**
  - ✓ **Modeling**
  - ✓ **Analysis & Optimization**
  - ✓ **Product Lifecycle Management**
  - ✓ **Man-Machine Interface – Visualization, Shared Intelligence**
  - ✓ **Computing Architecture – Immersive Environment**
- **Scope of Presentation**
  - ✓ **Should Address Aspects of all the Technologies Associated With the PLASVEE<sup>®</sup> Product (Fluids, Structure, Dynamics, Ergonomics, Materials, Computing, etc...)**
  
- **The Subject PLASVEE Project is Fictitious!**

# The Role of Digital Simulation in Developing a PLASVEE<sup>®</sup> for 2020



## Agenda for the Regional Summit

- Introduction of the PLASVEE Project (Boeing ~ 17 min)
- CAE Application Vendor Presentations (Each vendor ~ 17 min)
  - ✓ Altair - *Bob Yancey, Managing Director - Western US*
  - ✓ SIMULIA - *Kyle Indermuehle, Aerospace Lead at SIMULIA*
  - ✓ LMS International - *Keith Moss, CAE Solutions Architect*
  - ✓ ANSYS - *Steve Scampoli, Lead Product Manager*
  - ✓ CD-adapco - *Dennis Nagy, VP Marketing & Business Development*
  - ✓ Siemens - *S. Ravi Shankar, Sr. Manager, Global Marketing*
  - ✓ MSC.Software - *Hal Hikita, Senior Director, Product Development*
  - ✓ ETA – *TJ Flemings, Virtual Sales Engineer*
- Roundtable Discussion (Audience Engagement ~ 30 min)