



# Vertical AUTOSAR System Development at John Deere

**Jim Sachs**

System Engineering Manager  
Enterprise Electronics Group



**JOHN DEERE**



**Jim Sachs**  
**System Engineering Manager**  
**Enterprise Electronics Group**  
**11 years at John Deere**

**25 Years of Experience**

- System Engineering
- Program Management
- Agriculture & Automotive

**Education** - University of Notre Dame

- BA Economics
- BS Electrical Engineering
- MS Electrical Engineering

**Infrastructure Delivery**

- Model Based System Engineering
- Model Based S/W Design
- Network Architecture and Management
- Diagnostic Architecture and Management
- Reprogramming Infrastructure
- MIL/SIL/HIL Testing Infrastructure

# Electrical Complexity



- ~2300 electrical signals
- ~800 pins of I/O
- 20 controllers
- ~400 Features
- Vehicle + Factory
- Electric Hydraulic Control

# Challenges

## Customer

- New Features
  - Most have an electrical component
  - Data and Connectivity
  - Greater Automation

## Technology

- Complexity Increasing Exponentially
- Networks Growing

## Business

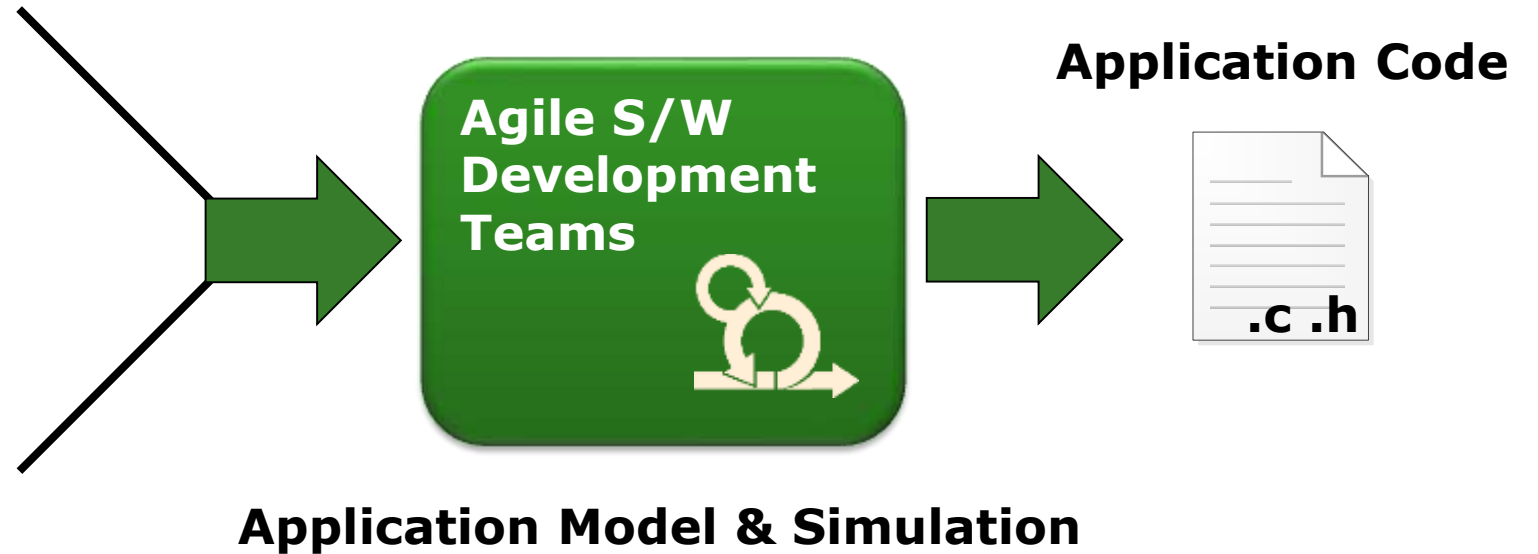
- Get to Market Faster
- Shorter Design Cycles
- Expectation of High Quality



# How to Optimize Software Development

“Software is now the long lead and the majority of the development cost. Not Hardware!”

How to provide better requirements, context, and direction?

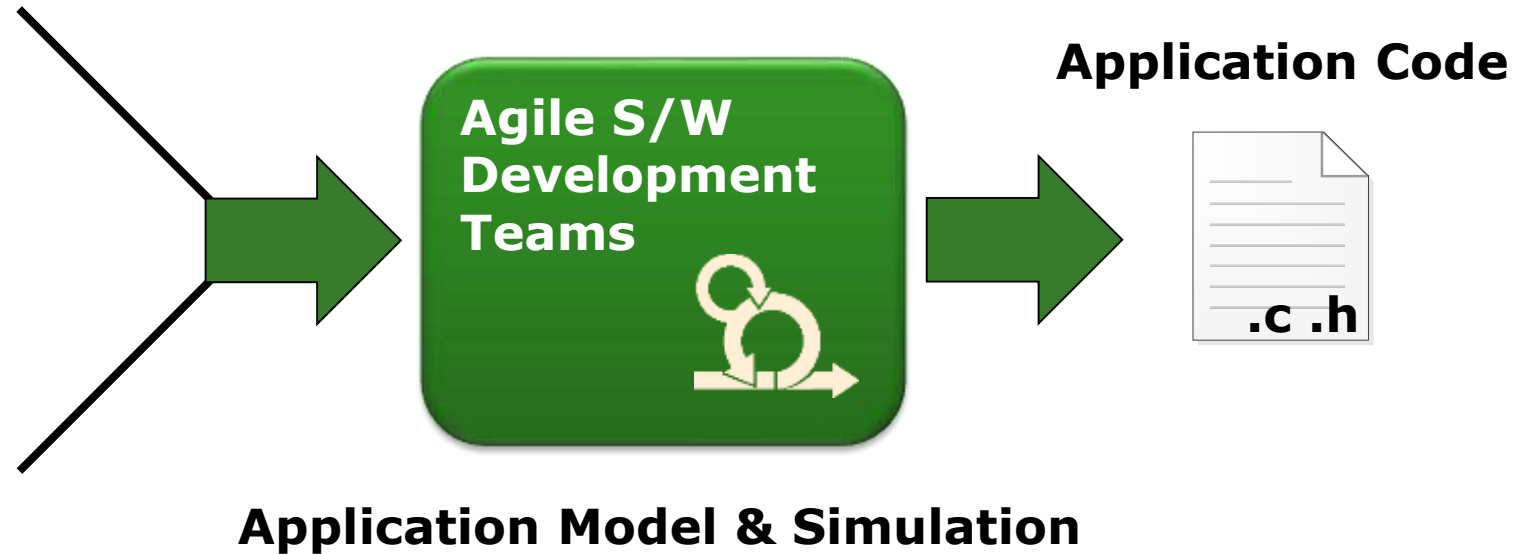


# How to Optimize Software Development

“Software is now the long lead and the majority of the development cost. Not Hardware!”

## S/W Architecture

- Feature/Function Based
- Provides Context
- Focused on Interfaces





# Drive Efficiency in System / Software Development

## Reuse

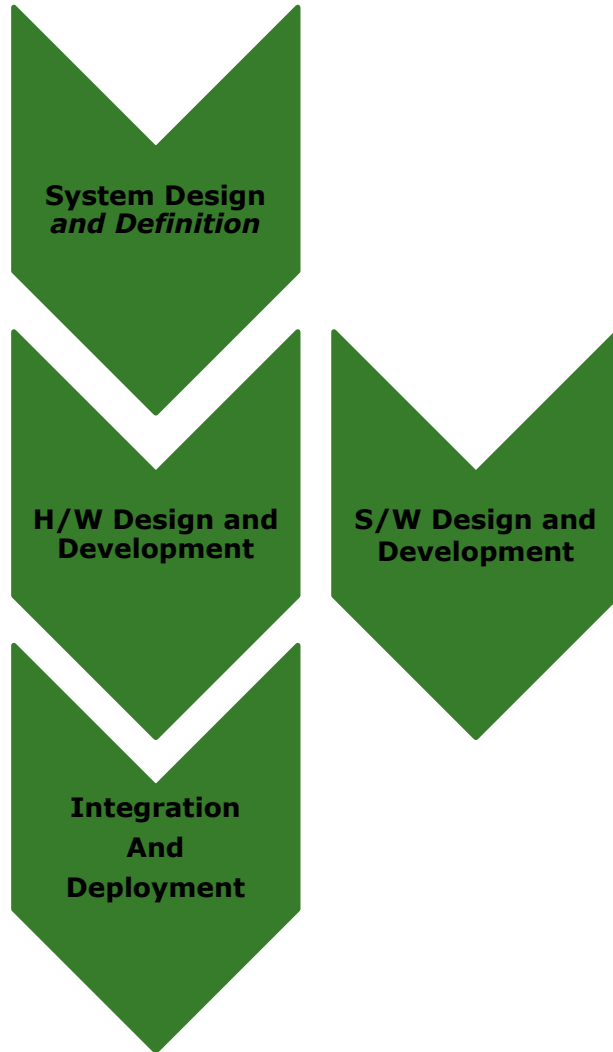
- Design it Once
- Define it Once
- Applicable at different levels

## System Engineering

- Requirements
- Functional Decomposition
- Logical Architecture
  - Drives S/W and H/W Architectures



# Vertical Value Chain



- Primarily development is in house
- H/W and S/W are separate
- Families of electronic controllers
- Communication is informal and flexible

A vertically integrated tool chain enables :

Error proofing

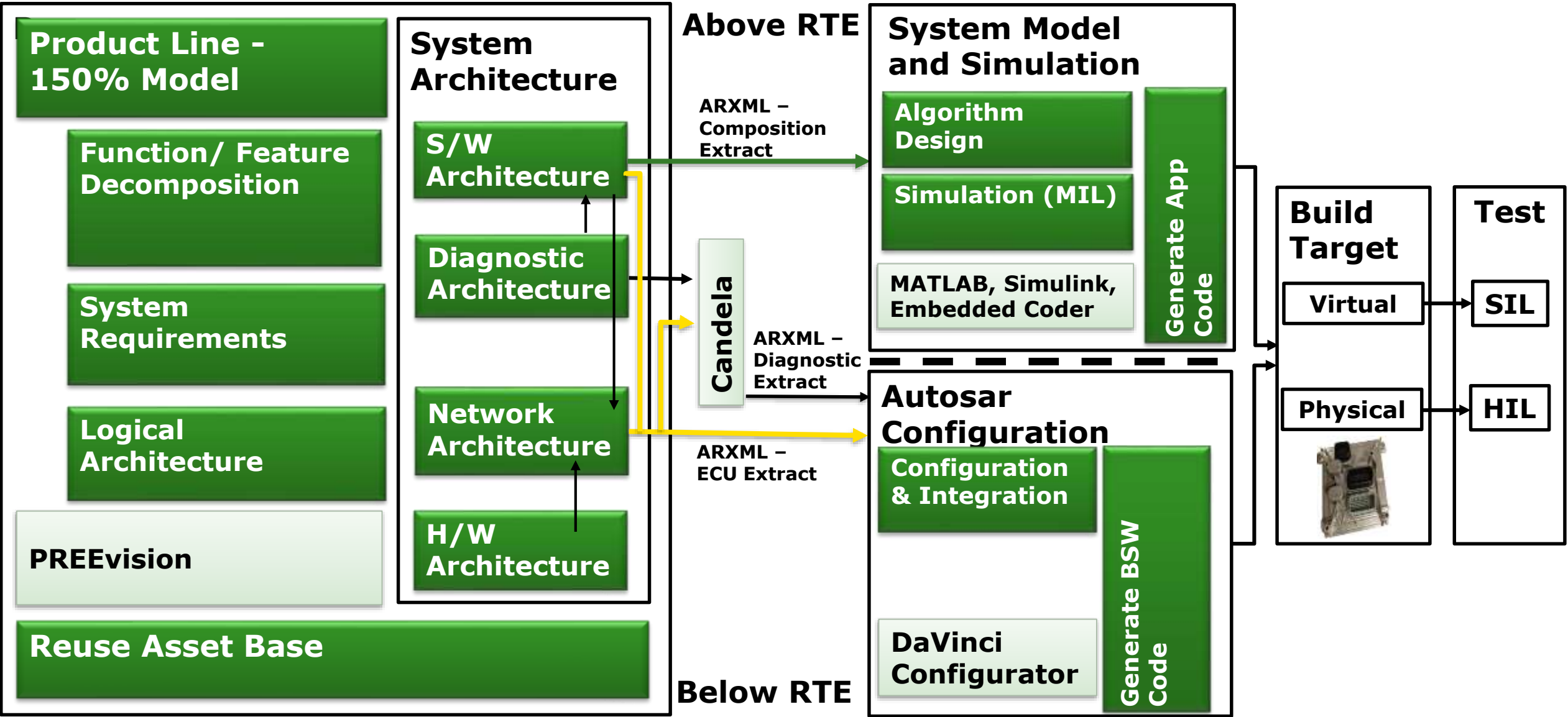
Process acceleration

Integrated data interfaces

Automation



# Workflow and Tool Chain





**JOHN DEERE**