United Technologies

Model Based Design Approach for Complex System Design

27-Apr-2017

Prakash Bodla

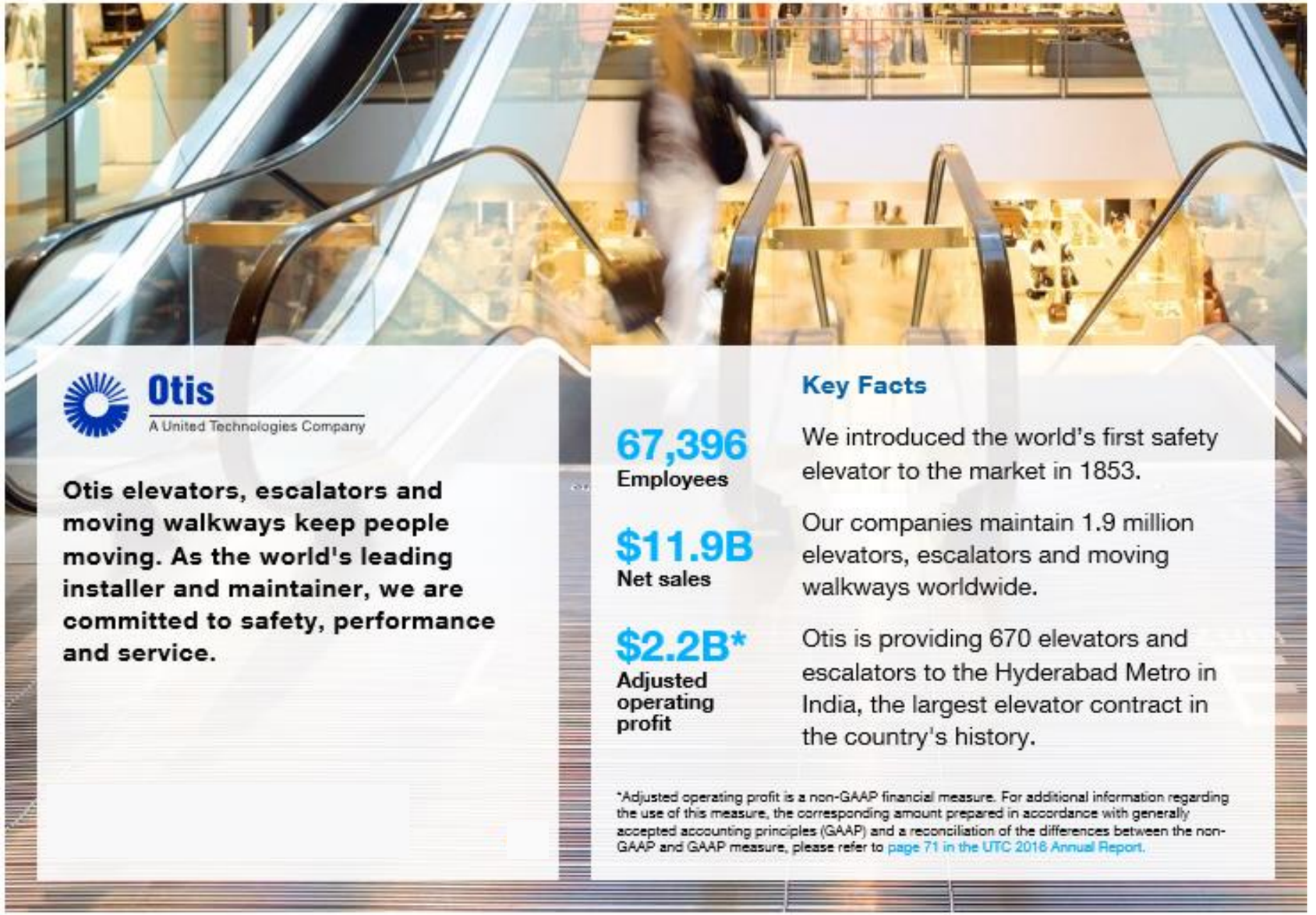
UNITED TECHNOLOGIES CORPORATION

Reference - http://www.utc.com/Who-We-Are/Pages/At-A-Glance.aspx

UTC CLIMATE CONTROLS & SECURITY

Reference - http://www.utc.com/Who-We-Are/Pages/At-A-Glance.aspx#uccs

UTC OTIS



Reference - http://www.utc.com/Who-We-Are/Pages/At-A-Glance.aspx#otis

UTC CLIMATE CONTROLS & SECURITY BRANDS

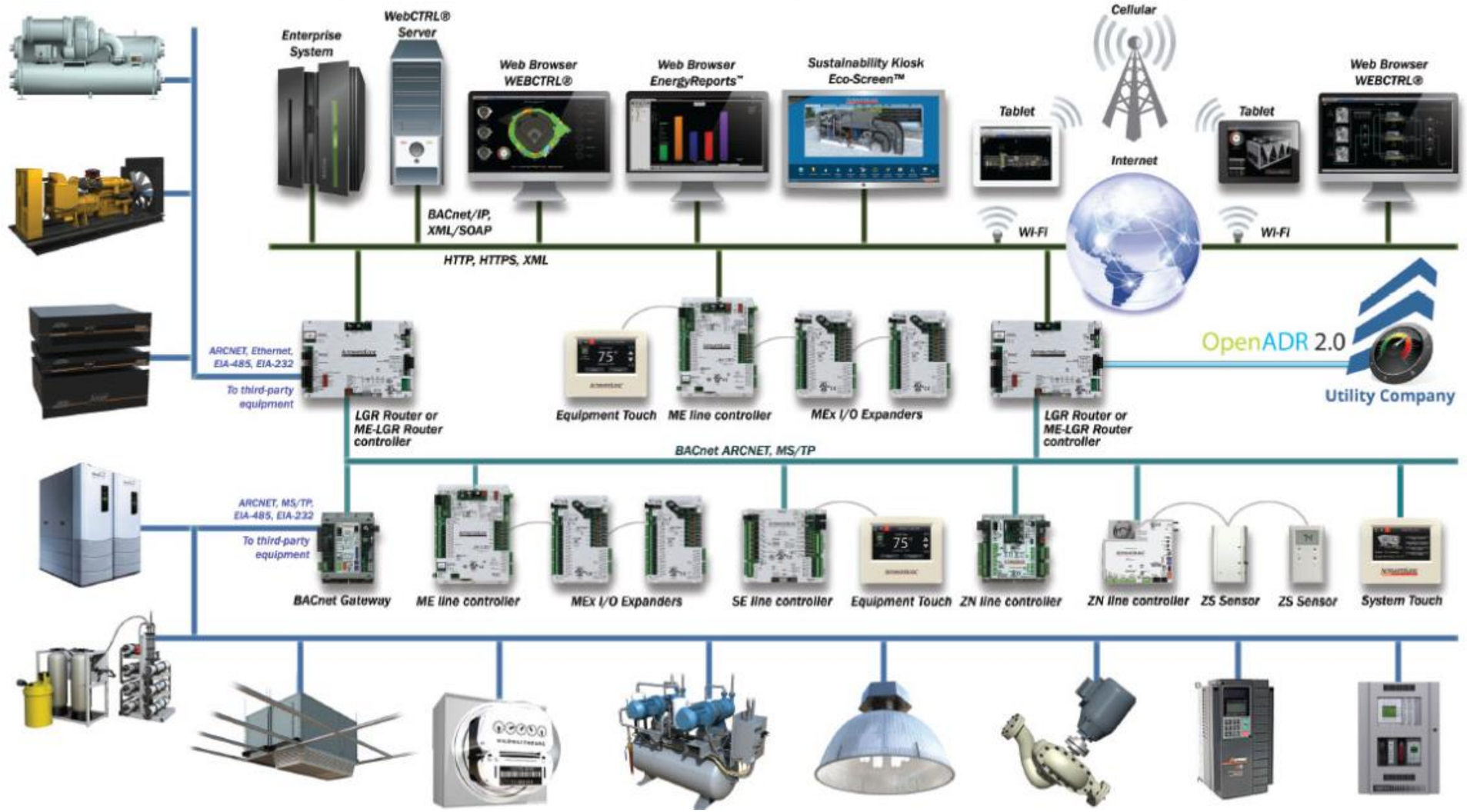
Reference - http://www.utc.com/Who-We-Are/Pages/Products-And-Brands.aspx?business=CCS

HYDERABAD RESEARCH & DESIGN CENTER

United Technologies Announces Opening of New Hyderabad Research & Design Center →

COMPLEX SYSTEM

Sample System Diagram for a Building Automation System

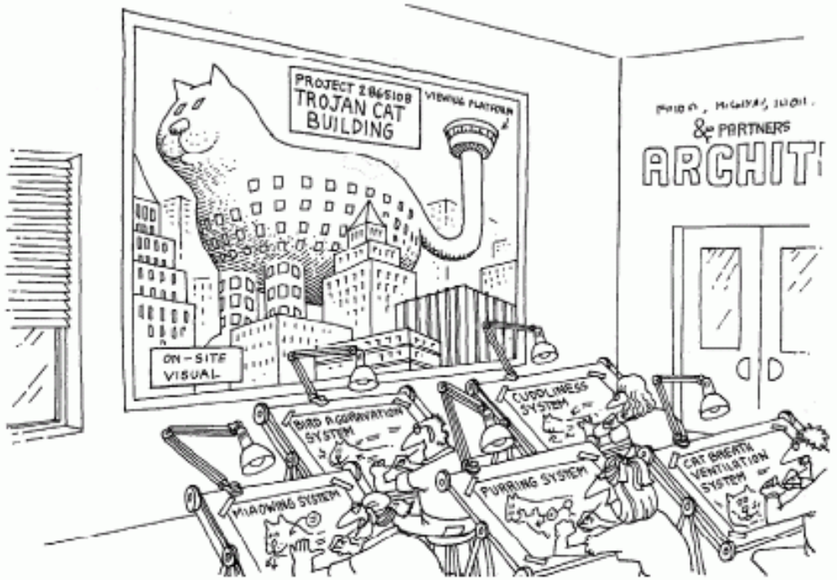


Reference – Automated Logic Corporation Website http://www.automatedlogic.com/pages/products.aspx

COMPLEX SYSTEM DESIGN

Main Challenges

- Complex interfaces
- Prolonged Development time
- Late Identification of Quality issues
- Dynamic Behavior Simulation
- Lower Reliability
- Convoluted Impact of changes during iterations
- Increased data matrices for development, testing
- Changes in regulations, legal restrictions

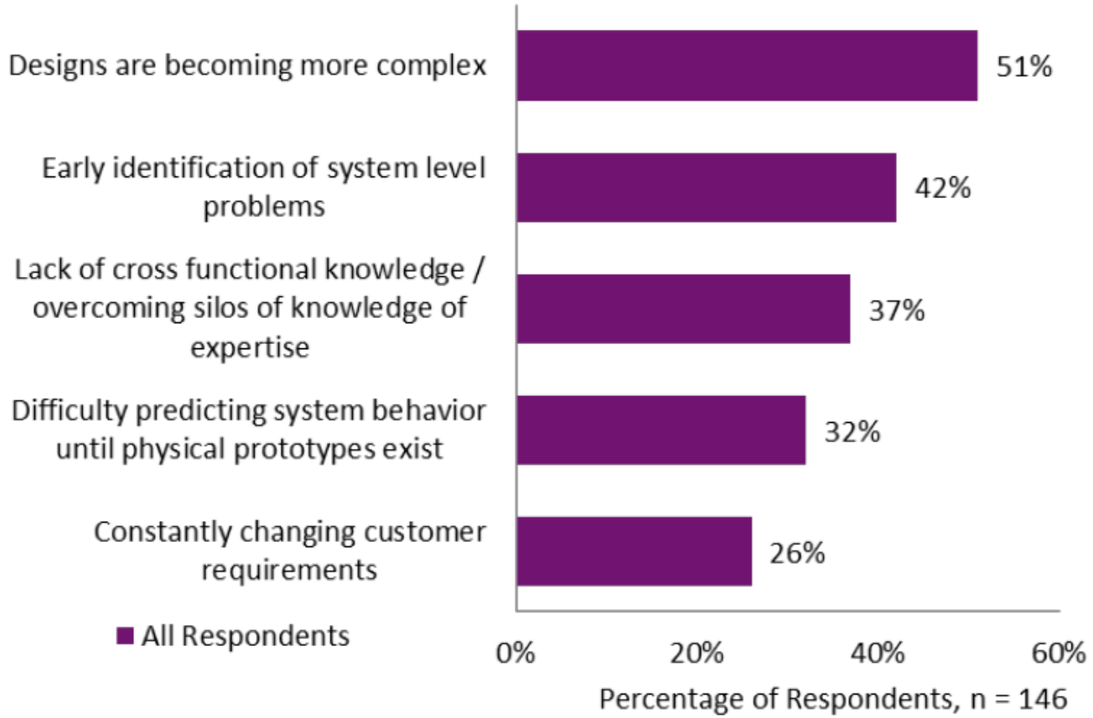


The architecture of a complex system is a function of its components as well as the hierarchic relationships among these components.

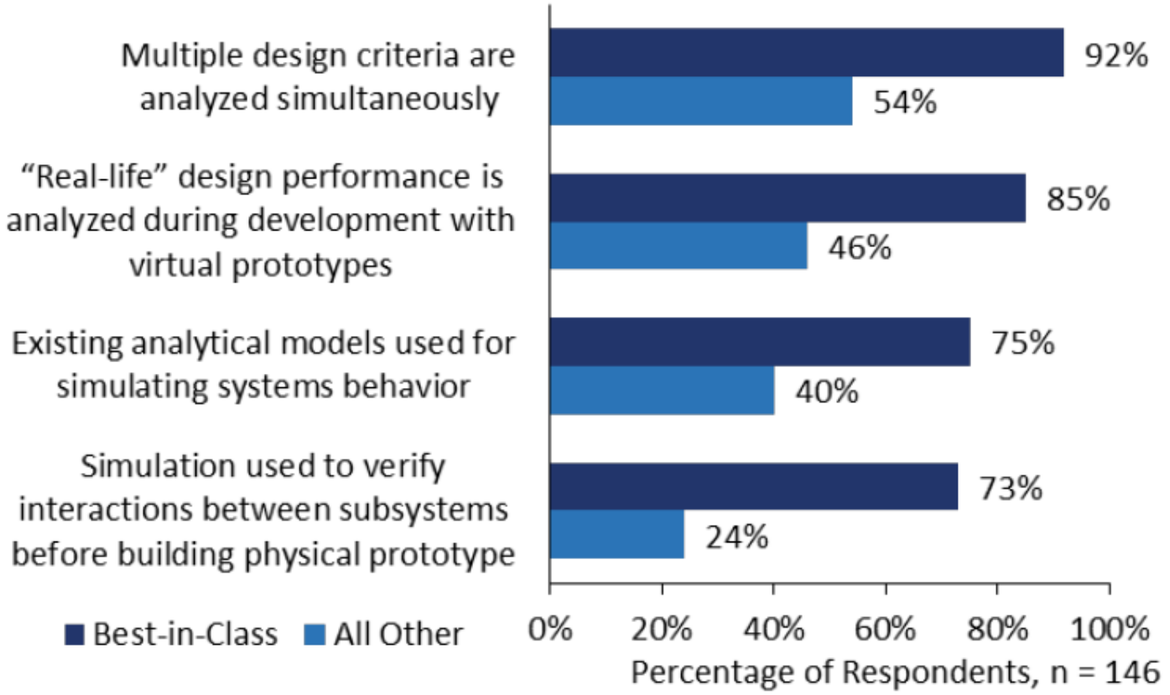
Reference - http://www.webreference.com/programming/java/complexity/3.html

COMPLEX SYSTEM DESIGN

Main Challenges



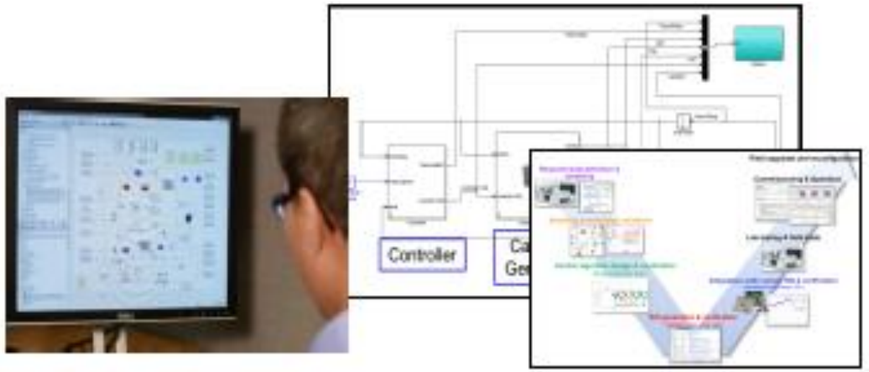
Comparison of Best in Class and Others in using Simulation throughout the Design Phase



Reference Source: Aberdeen Group, January 2014

MODEL BASED DESIGN

Benefits



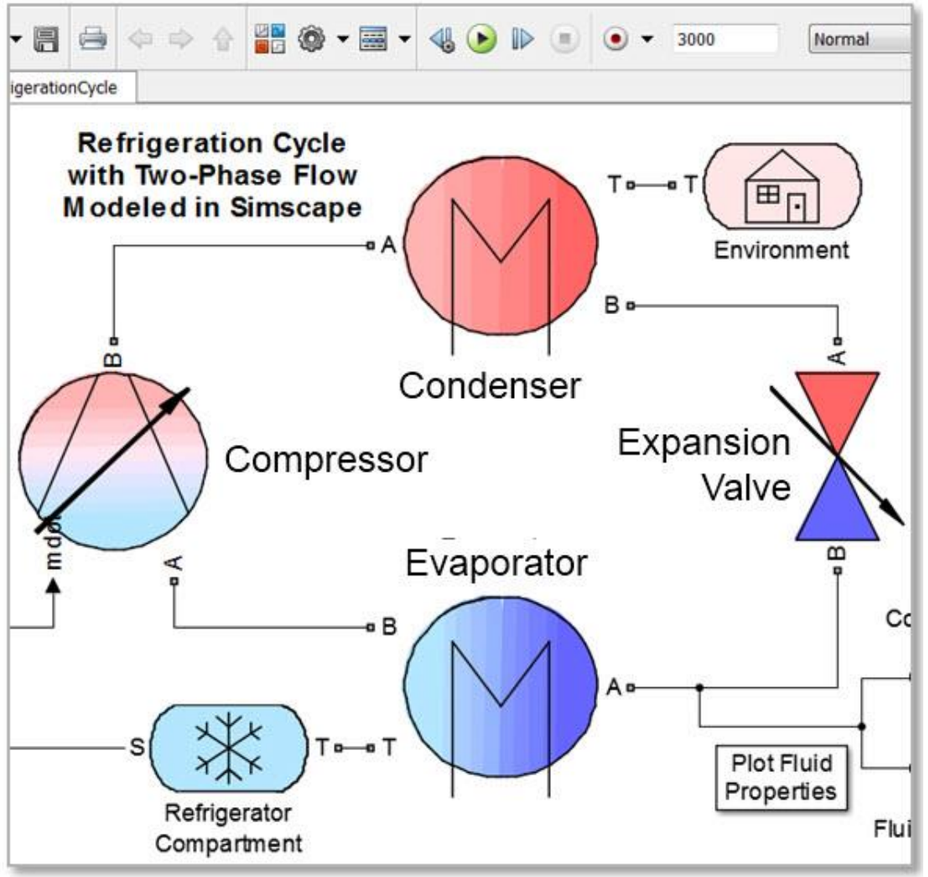
- ✓ Use a common design environment
- ✓ Link designs directly to requirements
- ✓ Integrate testing with design
- ✓ Refine algorithms through multi-domain simulation
- ✓ Automatically generate embedded software code and documentation
- ✓ Develop and reuse test suites
- ✓ Accelerate time to market

Reference - MathWorks Website https://in.mathworks.com/solutions/model-based-design.html

MODEL BASED DESIGN

Benefits

Entire Refrigeration Cycle can be simulated using tools and dynamic behavior can be virtualized to enhance product development



Reference - MathWorks Website https://in.mathworks.com/matlabcentral/fileexchange/46448-refrigeration-cycle-in-simscape?s_tid=srchtitle

Changing customer expectations,

faster time to market and

increased regulations …

Model Based Design is the way forward!

United Technologies

Hyderabad Research & Design Center

Thank you!