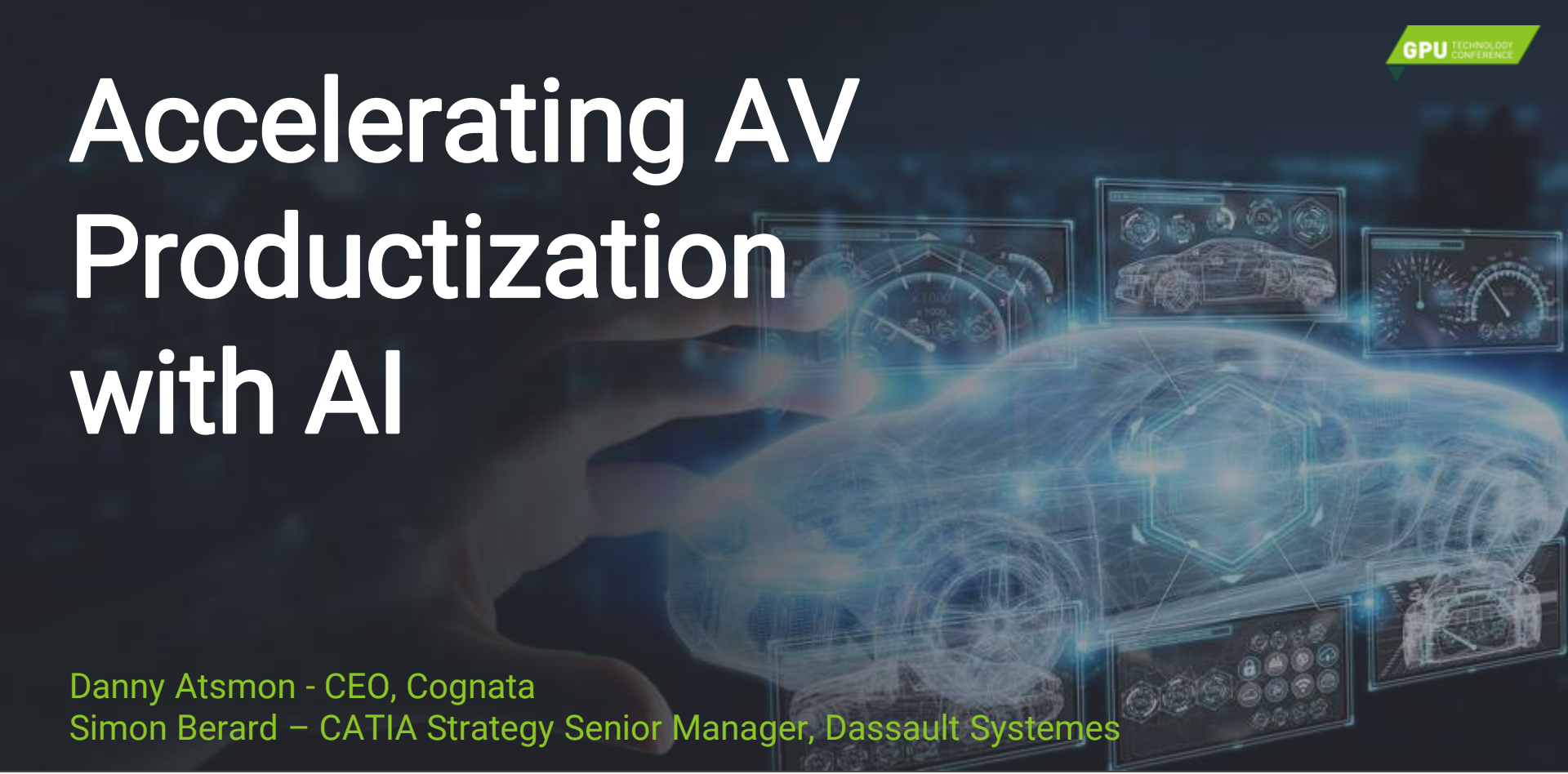
Accelerating AV Productization with AI



Danny Atsmon - CEO, Cognata
Simon Berard – CATIA Strategy Senior Manager, Dassault Systemes

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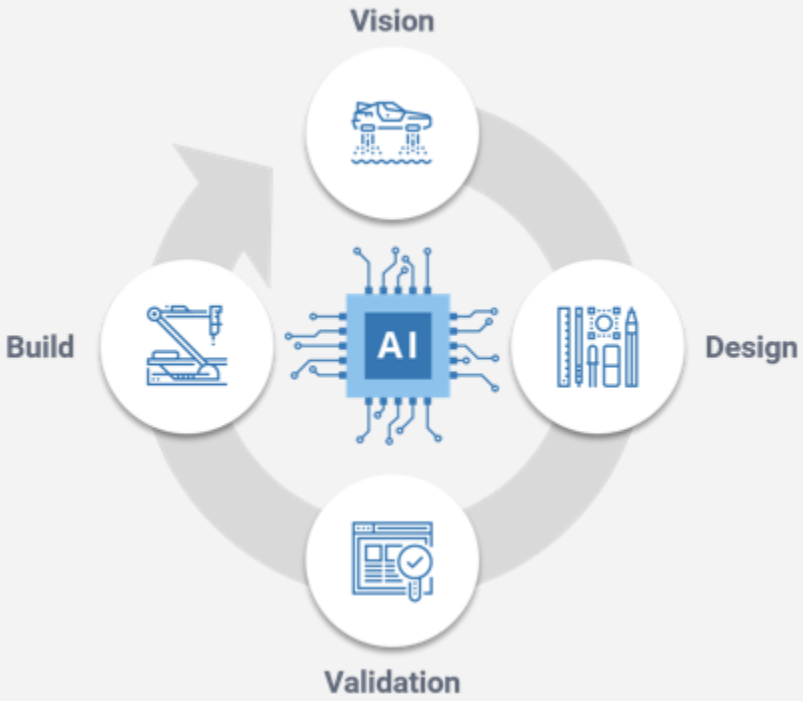
Agenda

- Vision
- Challenges
  - AI Solutions in Design
  - AI Solutions in Validation
- Solution Convergence

AI-driven Design and Validation Solutions



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Vision

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Design Challenges

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Challenge: Mission Driven Engineering

Mission left to the User

Traditional Vehicles

People

Delivery

Taxi Driver

3x more System Requirements

Mission engineered within the System

Autonomous Systems

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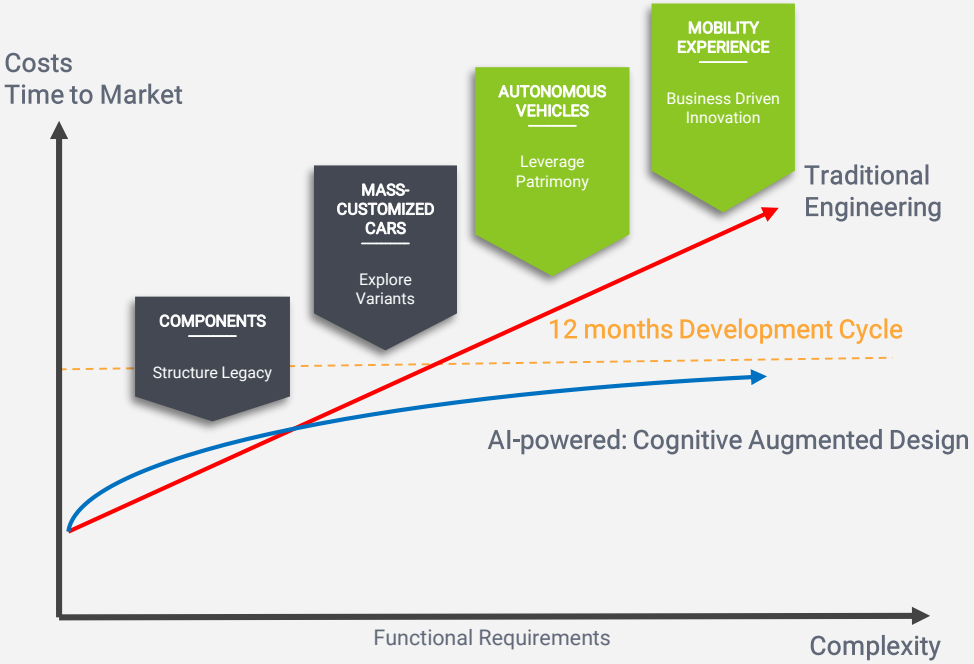
Costs vs Complexity – AI is making it possible



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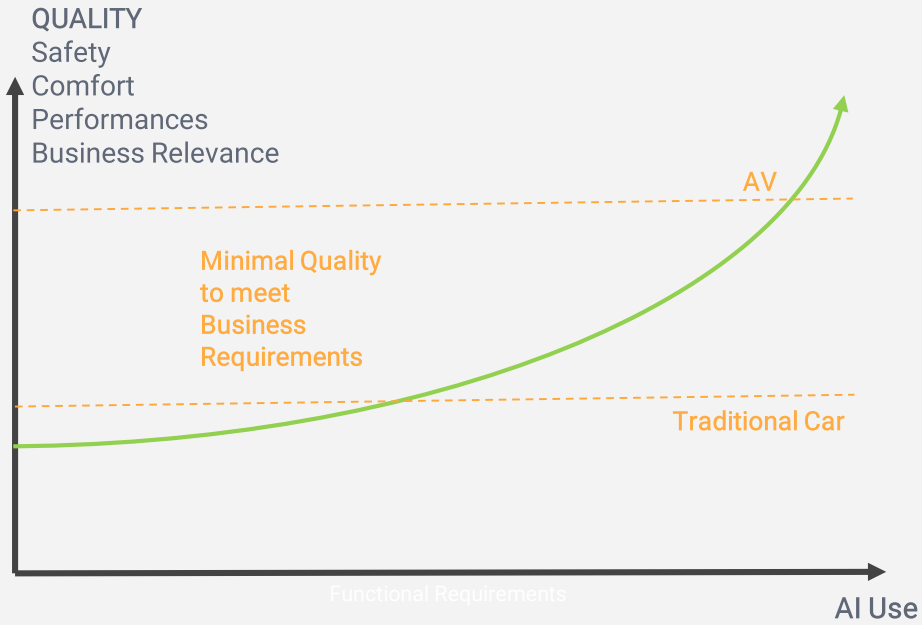
AI is bringing Quality



More than 100.000 Design Variants to explore to find the Optimal Tradeoff

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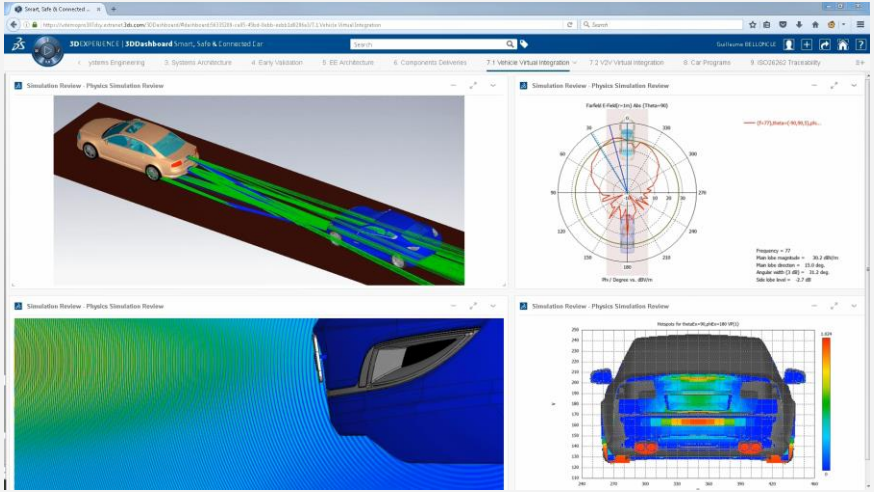
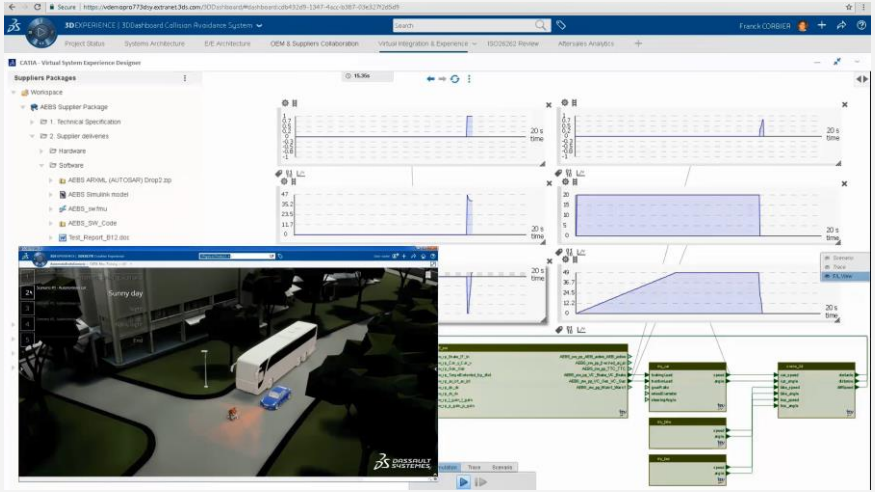
Challenge 2: Physically Exact

Multidiscipline, Multiphysics, Multiscale



Sensors optimization



Consistent System Experience Validation

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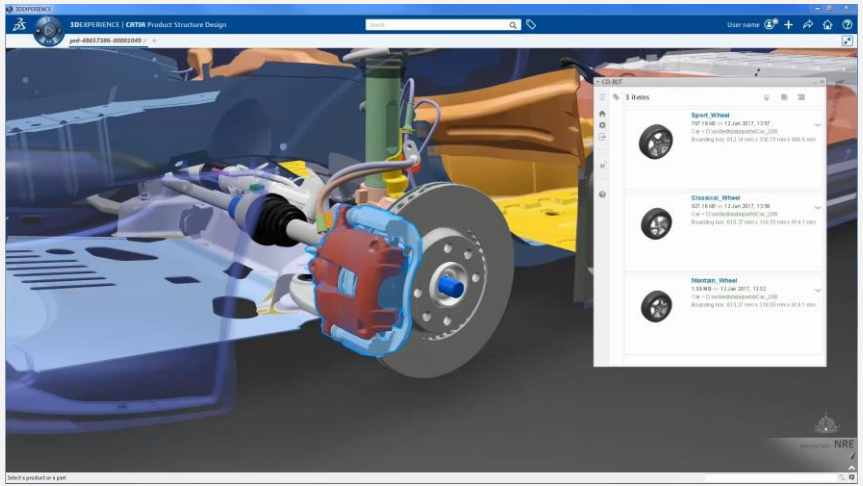
AI Solutions for Design

Learning from Patrimony

Function Driven
Generative Design

3DEXPERIENCE

Context Sensitive
Automated Assembly



Model Based System
Engineering

Parameters space
Exploration

Performance
Tradeoff

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Validation Challenges

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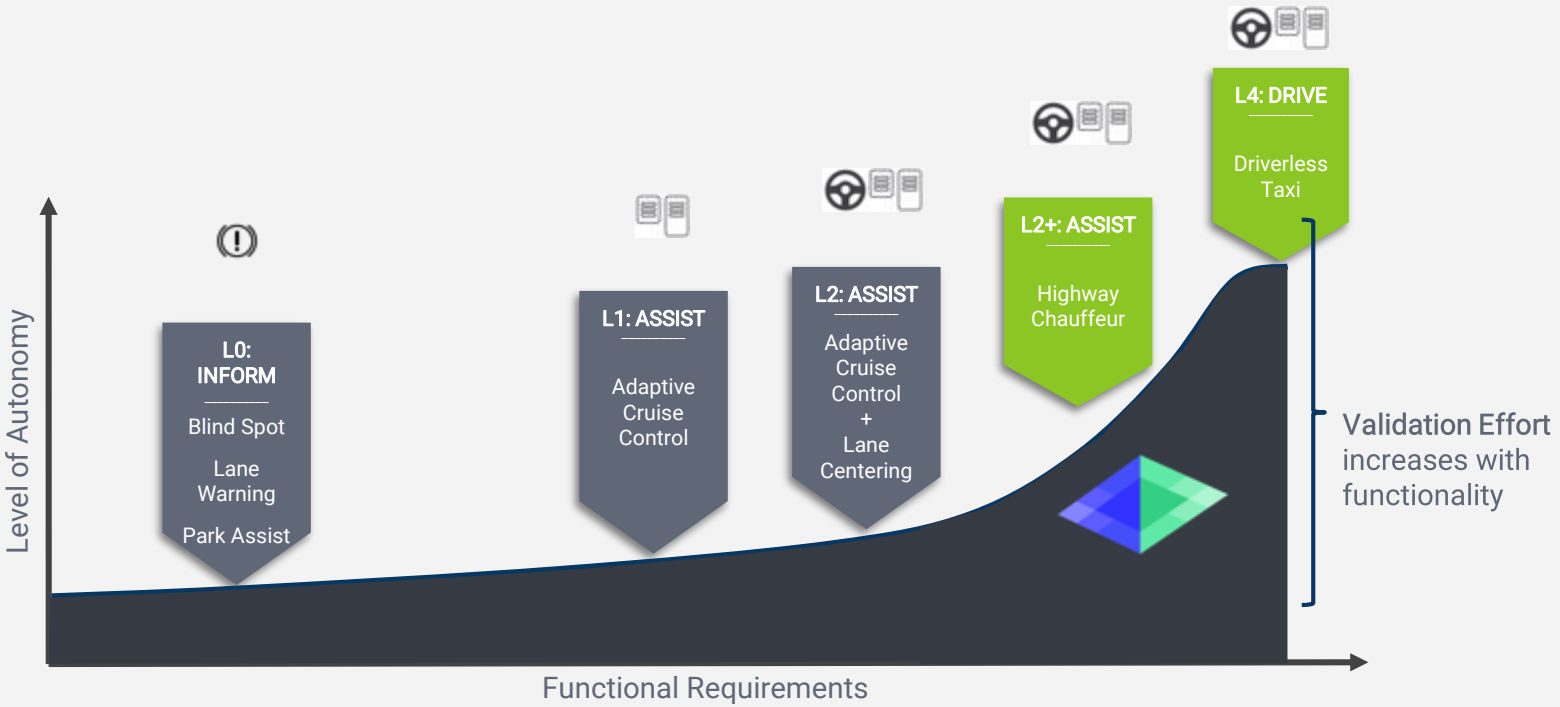
AV Tech Has Had Some Unplanned Setbacks

Challenge #1: Scale



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Challenge #1: Scale - Need Vs. Actual

The Need: 11B*

Actually driven: 16M (0.15%)

*Rand corporation

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Challenge #2: Realism

REAL LIFE

Realism
100%

Scalable

VS.

SIMULATION

Realism
??%

Scalable

We need a realistic simulation for a meaningful coverage

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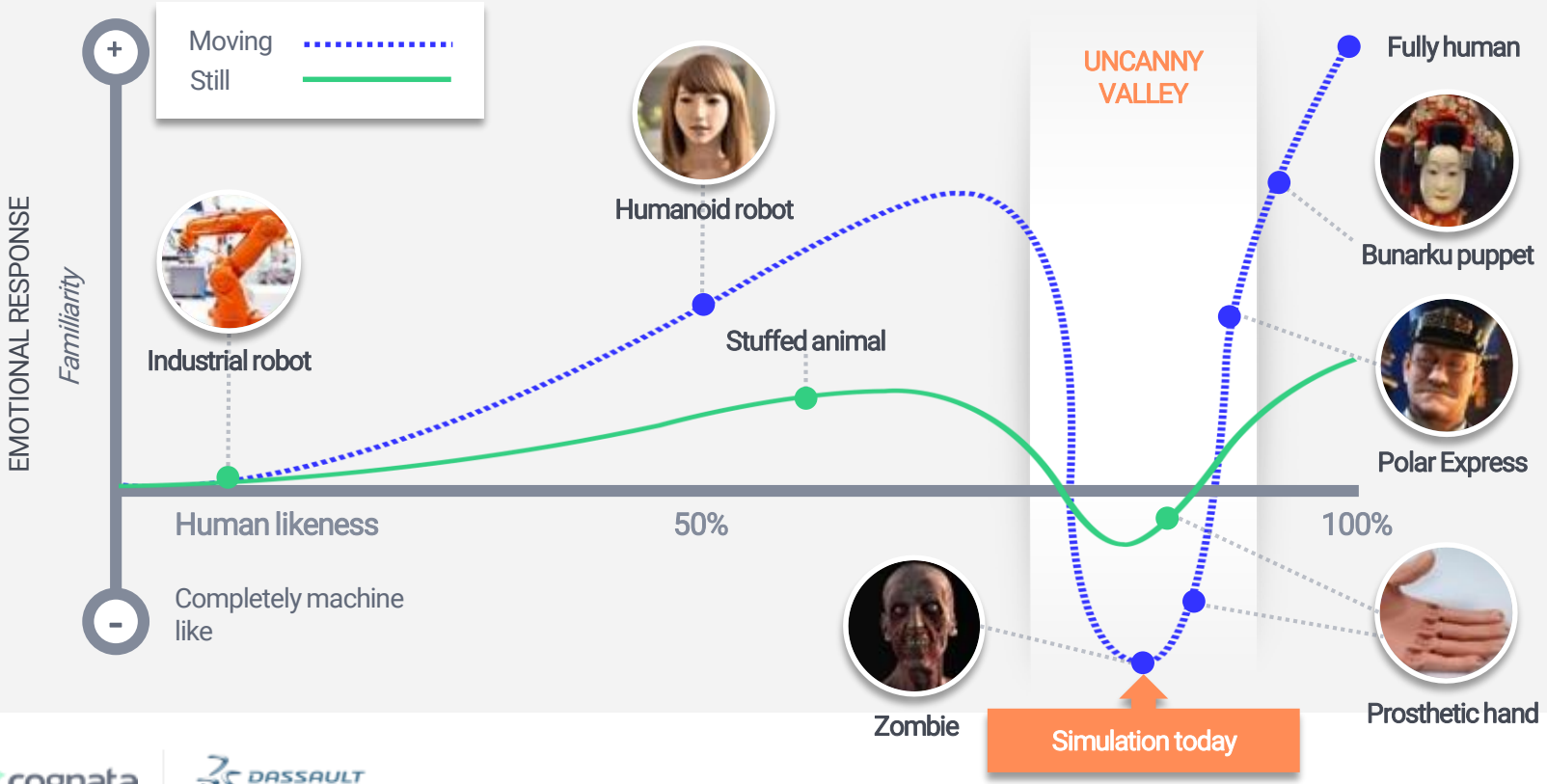
Realism - Uncanny Valley (Masahiro Mori, 1978)



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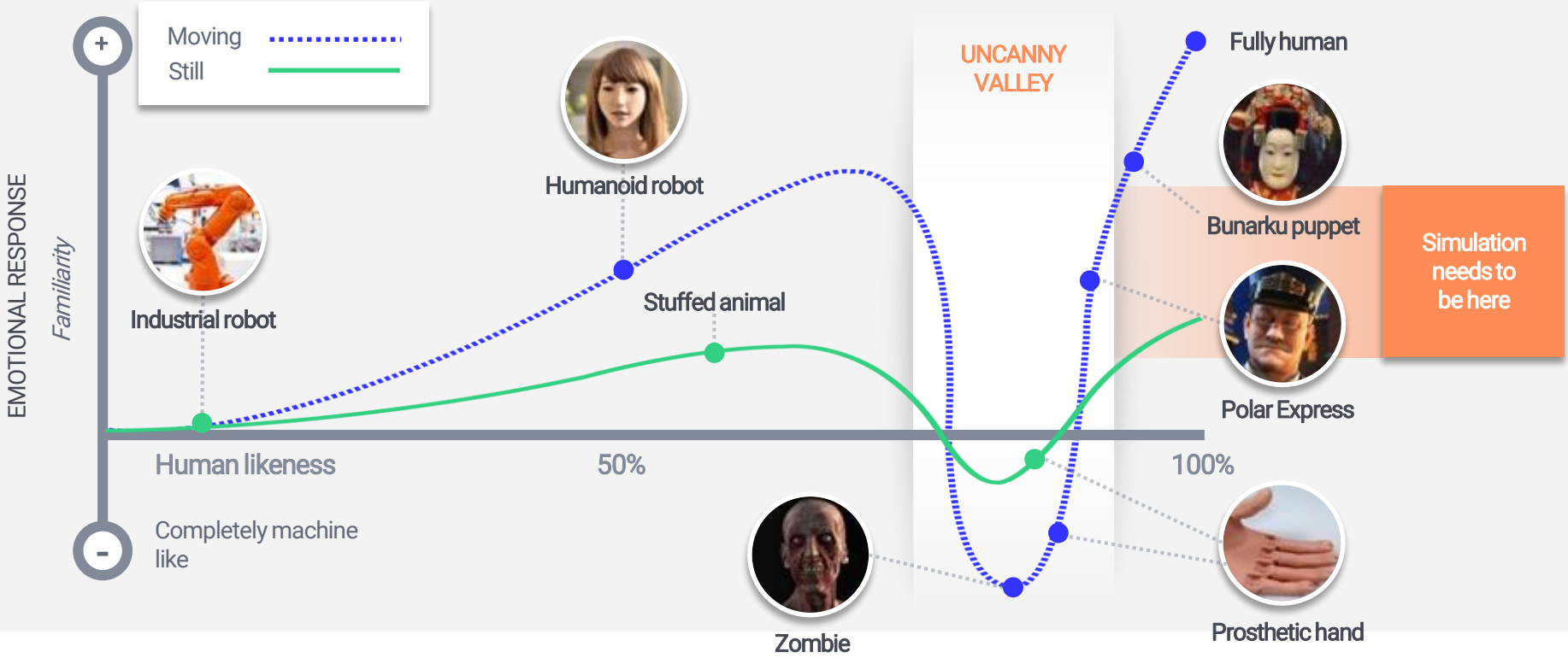
Realism - Uncanny Valley



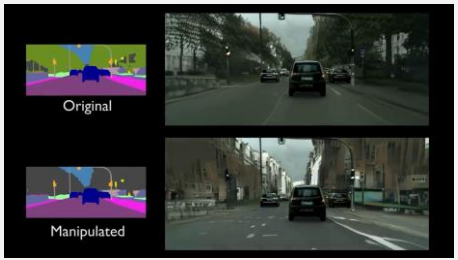
The animation solution

“An animator cannot capture all of reality . Instead he picks 3 or 4 distinct elements and exaggerate them.“

- Walt Disney

AI based methods for Realism

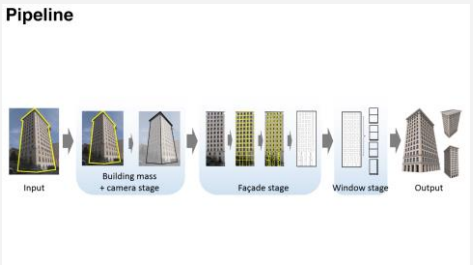
Nvidia & MIT - Video (Labels) to Video Synthesis – Wang et. al. 2018



END TO END

Realistic, not consistent

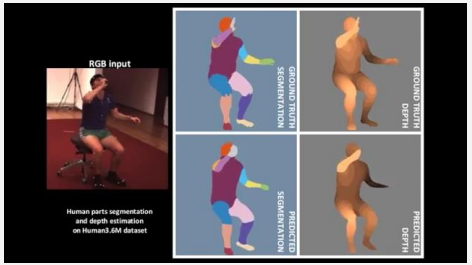
Procedural Modeling of a Building from a Single Image – Nishida et al, 2018



LAYERED APPROACH

Consistent, Not scalable (Manual)

Learning from Synthetic Humans – Varol et. al 2017



LAYERED APPROACH

Consistent, Not scalable (Variations)

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Challenge #2: Realism conclusions

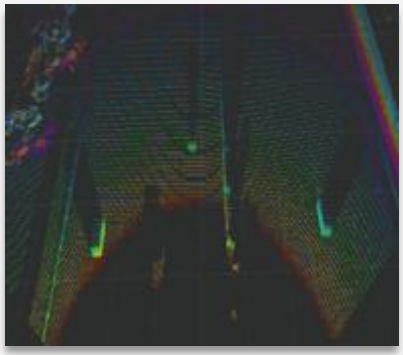
REAL LIFE VS. SIMULATION

- DNN transfer functions ~= Realism
- Isolated layers brings better results than End to End
- *Data sources should be wide (crowd sourced)*

Cognata - 4 Technology layers

STATIC

DYNAMIC



SENSING

CLOUD & ANALYTICS

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A Combined Solution

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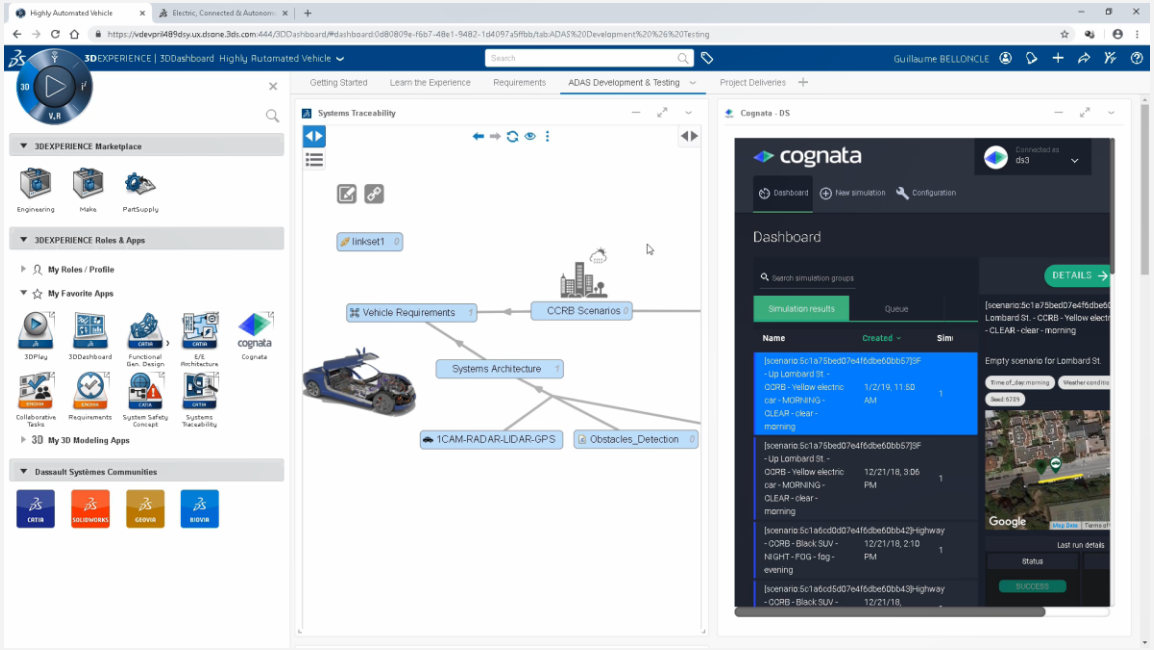
Design and Validation Converge



Better Together

- Tests and designs together
- Validation base directly from requirements
- Smart coverage

Takeaways

- Autonomous vehicles brings
  - New designs and use cases
  - Large scale validation challenge
- AI is a key to get Autonomous vehicles in a safe and cost effective way
- A platform solution to manage, design and validate is the needed solution

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Thank You!

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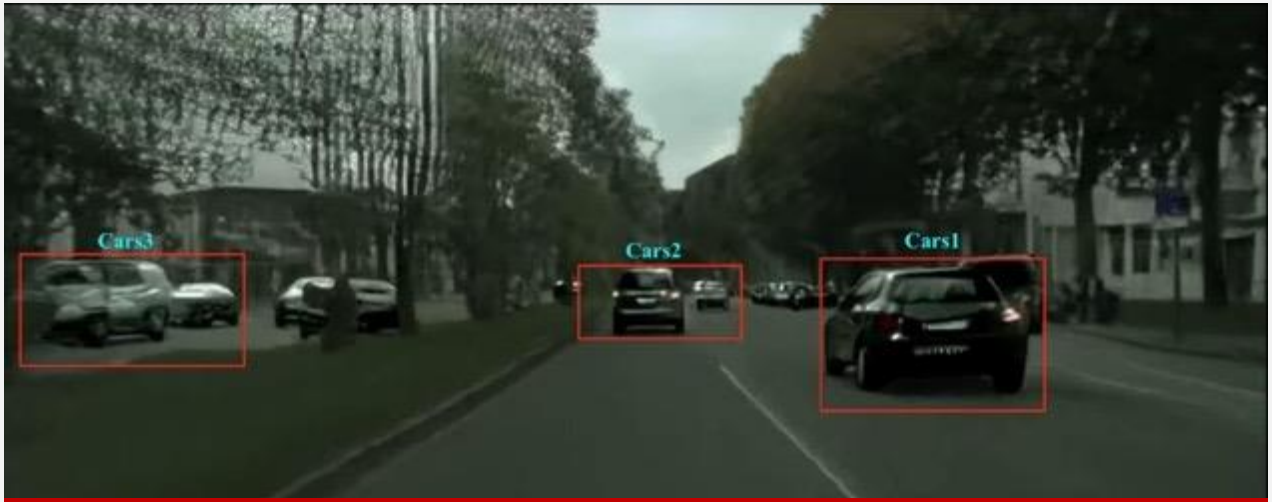
End to end limitations



The Problem: Not consistent, overfeat

Buildings reconstruction conclusions

The Good: Consistent, Procedural

The Bad: Not practical

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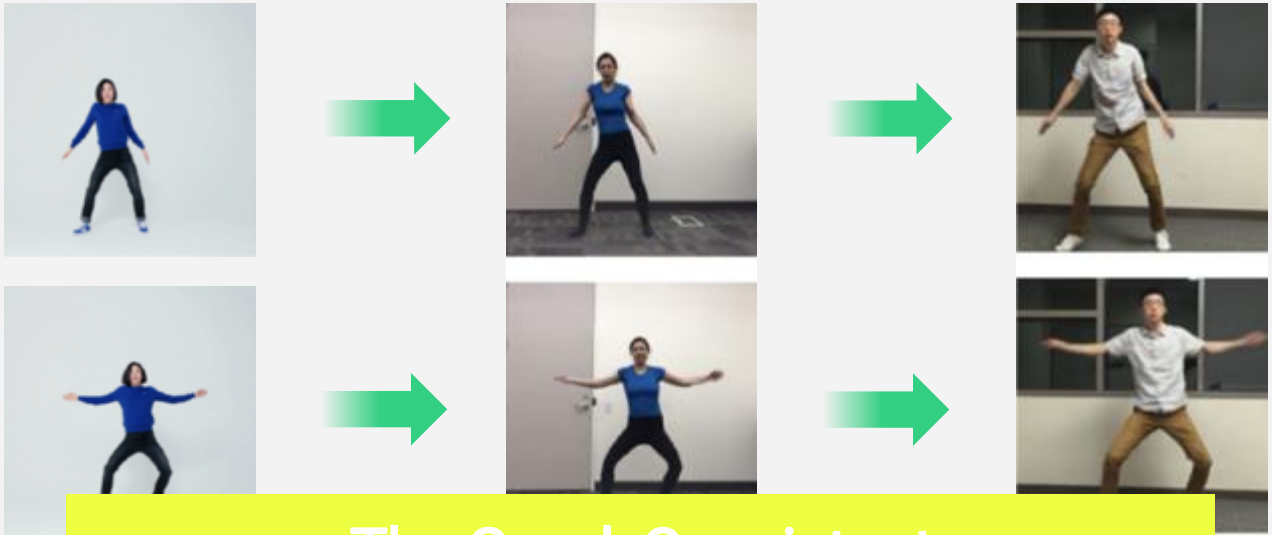
Learning pose - Conclusions

This the most advanced way of learning moving objects.



The Good: Consistent

The Bad: Not scalable