

There has never been a better time to be an
Automotive Embedded System & Software Engineer.



GM Electronic Controls & Software

- 16 development and application centers across the globe



GM Electronic Controls & Software

- 16 development and application centers across the globe
- Responsible for Powertrain, Chassis, Cluster, HVAC and other in-house system software
- Creates a global Software Product Line for use across the GM vehicle portfolio
- 1000+ creators and users of these software products, globally



Large-scale influences everything

- Hundreds of algorithm models,
- Millions of lines of code,
- Released every 6 weeks,
- Created by hundreds of engineers,
- Consumed by hundreds more,
- Geographically dispersed,
- Product line and feature set evolves annually
- 15 concurrent temporal development streams



“Creating more value for less resource”

Our Key Strategy – Software reuse

More Quality

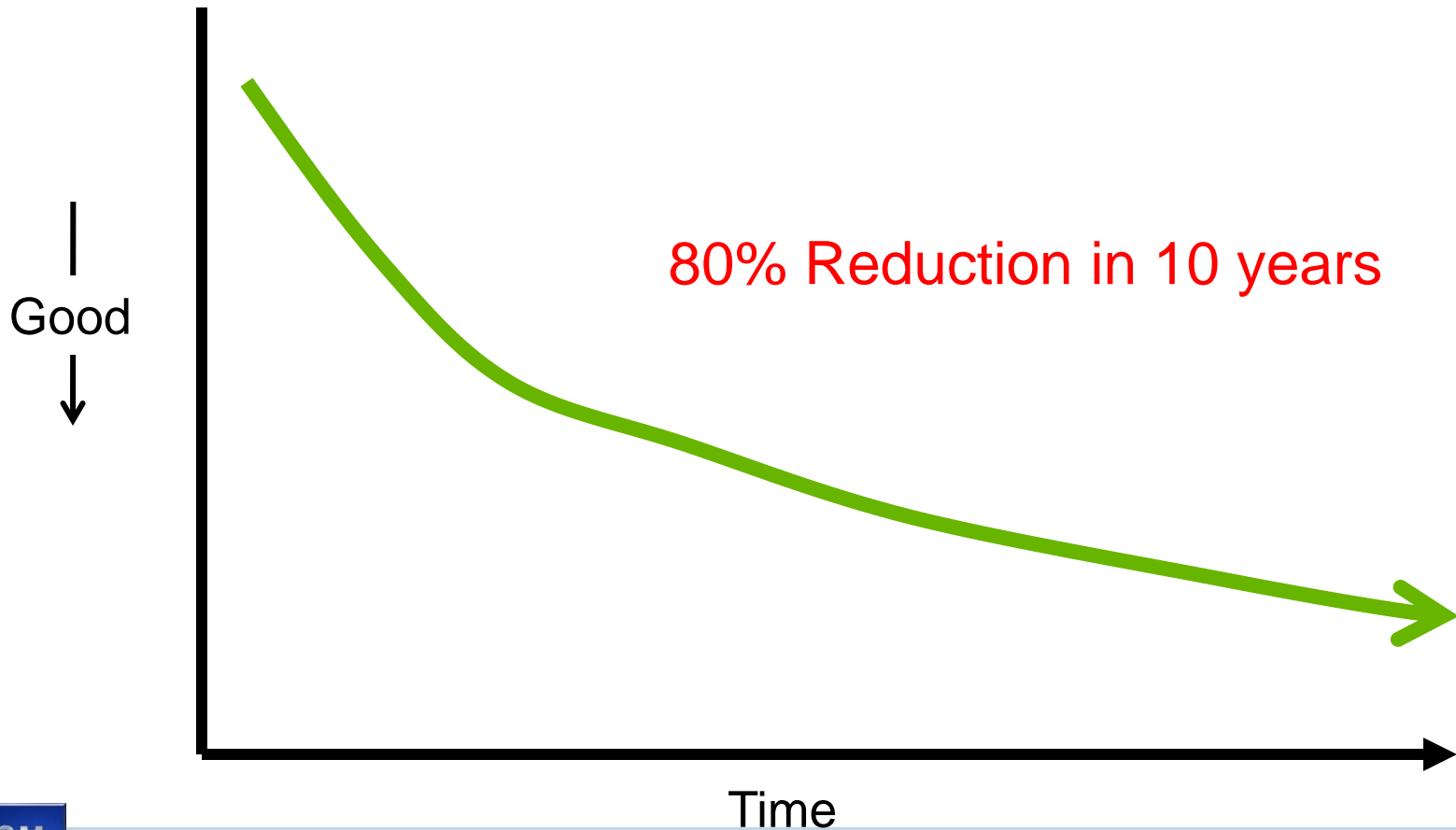
- Develop the solution, validate it, and reuse it
- Incremental change to add features



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Total Cost of Change – Post Deployment



“Creating more value for less resource”

Our Key Strategy – Software reuse

More Quality

- Develop the solution, validate it, and reuse it
- Incremental change to add features

More Efficiency (time & cost)

- Increase in development cost is easily offset by lower “system” costs
- We don’t develop (or pay for) the same solution multiple times



Chevrolet Volt Software Examples

An Extended Range Electric Vehicle (EREV)

Engine → Generator

~ 90% reuse

2-Mode Strong Hybrid Electric Drive Unit → EREV
Electric Drive Unit

~ 80% reuse

Conventional HVAC → EREV HVAC

~ 60% reuse

Instrument Cluster → Volt LCD Cluster

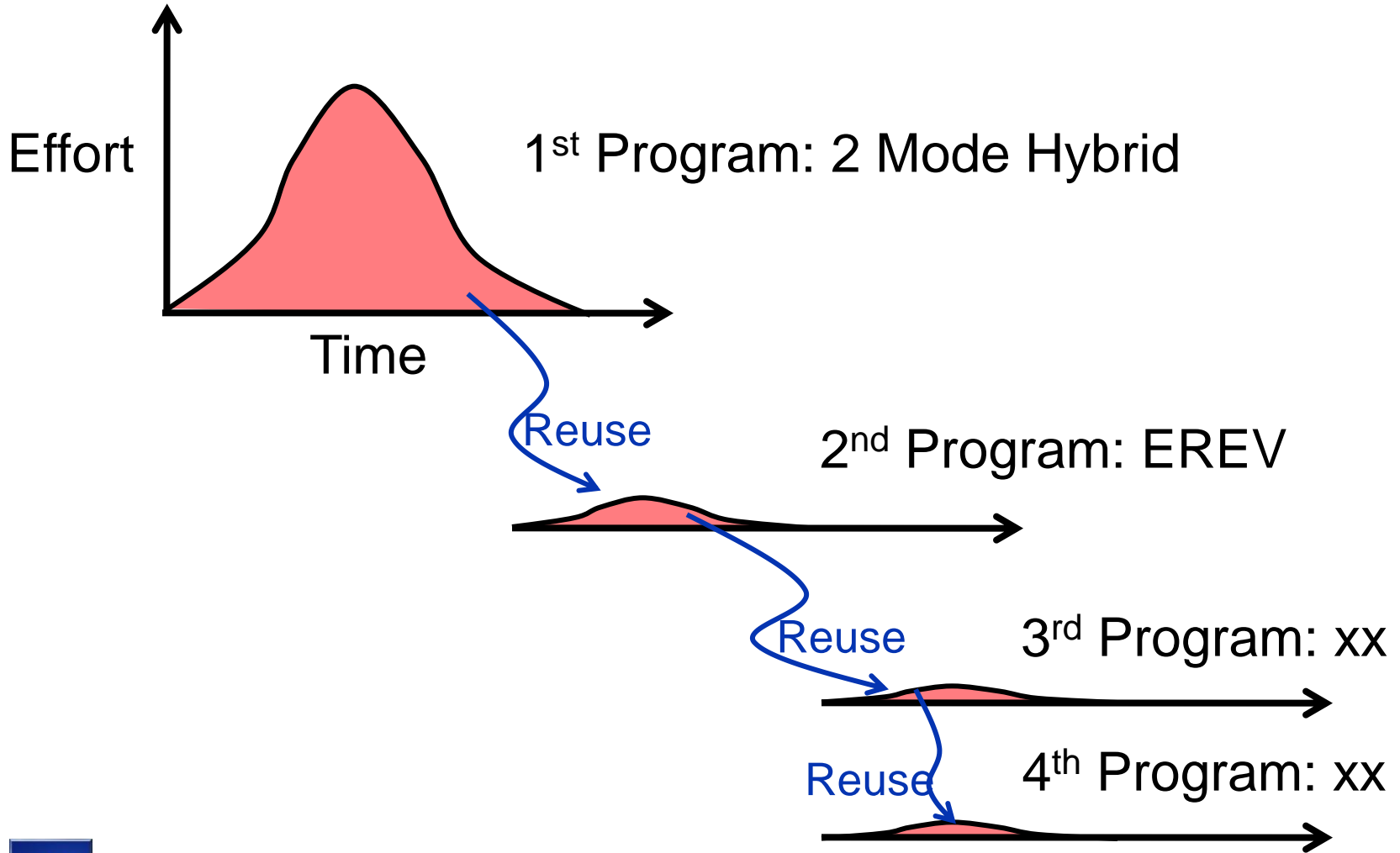
~ 90% reuse on the vehicle interface micro

~ 0% reuse on graphics micro



Chevrolet Volt Software Examples

An Extended Range Electric Vehicle (EREV)



The Chevrolet Volt

An Extended Range Electric Vehicle

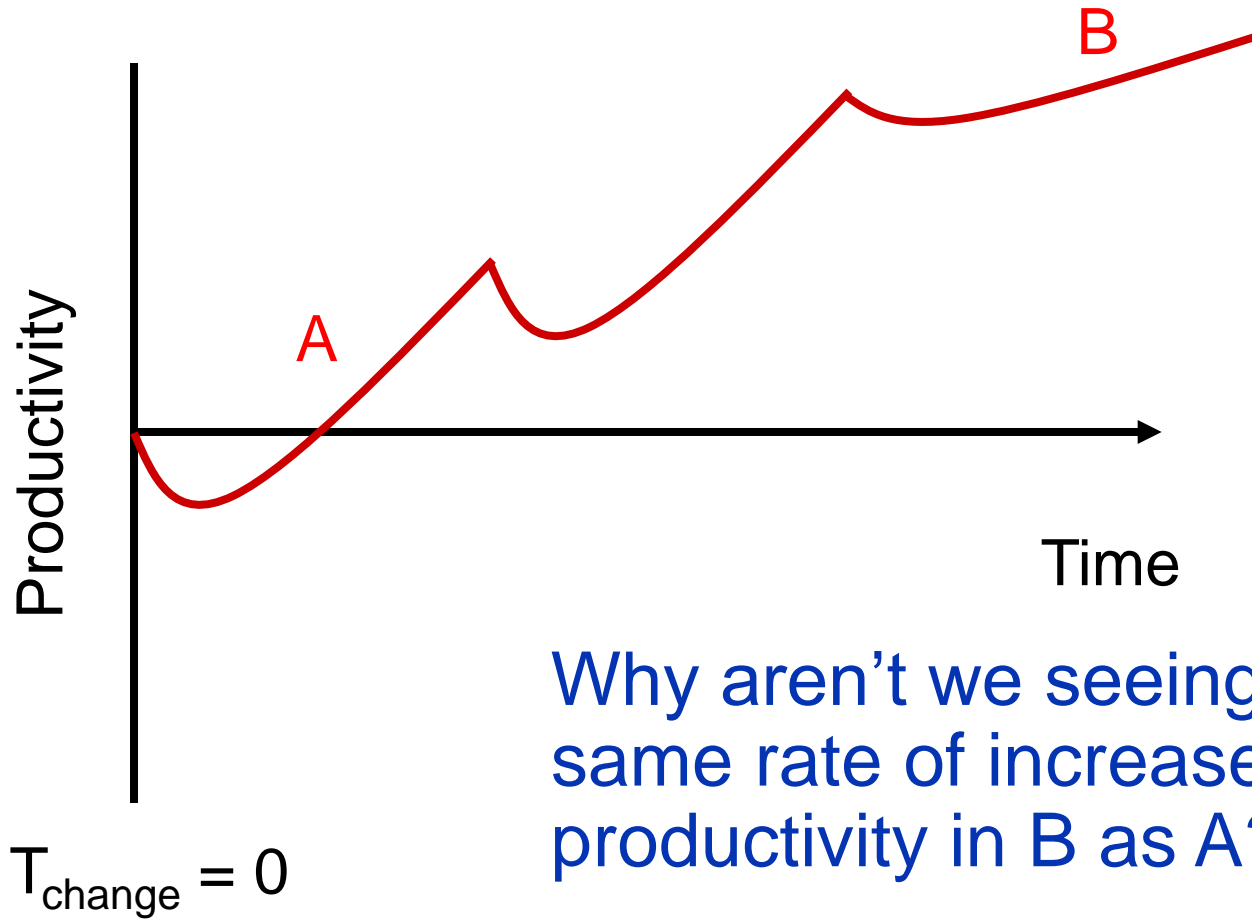
The Volt has the most complex software set GM has ever put into production

Yet it was executed on-time, with quality!



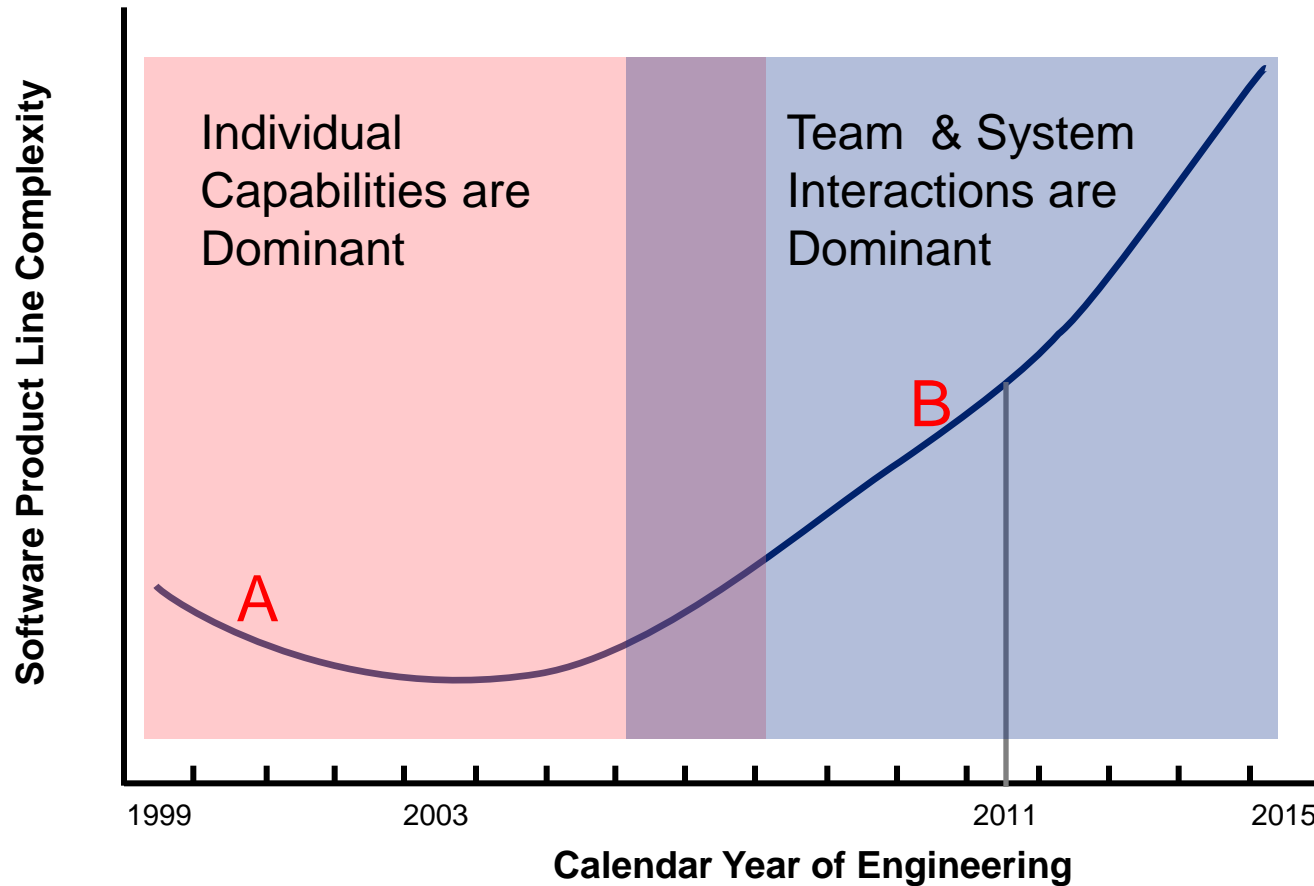
Productivity through Process and Tooling

15 years of change



Why aren't we seeing the same rate of increase in productivity in B as A?

As Product Line Complexity Increased, Effects of Scale Increased



Meeting the Team Productivity Challenge

- Improve management of system data using Jazz with Rational Asset Manager **SE-1560**
- Improve global collaboration with Rational Team Concert
- Improve requirements capture, definition, management and traceability with Rational DOORS and Rational Publishing Engine **RDM-1659**
- Improve product line management of variants with Big Lever Gears **SE-1669**
- Improve process definition and enactment with Method Park Stages and RTC **CCM-1153**
- Amplify critical skills and expertise over a larger span of projects, using model transformation via IBM Rational Rhapsody and MDWorkbench **CS-1373**



There has never been a better time to . . .



Design, Build and Sell the World's Best Vehicles.

