Greg Bernas
Toyota Chief Engineer
Vehicle Responsibility
Education
TOYOTA in the SLC States

77,000 Direct and indirect employment
Voice of Customer

**Generation X: 41-55 Yrs. Old**

“A day in the life…” – David & Amy

- Check the news, weather & traffic
- Drop children off at school
- Take clients to business meetings
- Enjoy the winding road home

**Trail Boomers: 56-64 Yrs. Old**

“A trip to wine country…” - James & Mary

- Weekend trip with friends
- Long freeway drive outside of city
- Short trips on winding roads to sights and wineries, restaurants
Toyota Way in Education
Vehicle Concept
Vehicle Concept
## Genchi-Genbutsu

Continuous Go and See activity to enhance our Vehicle Concept.

<table>
<thead>
<tr>
<th>Platform Drive at TAPG</th>
<th>Target Setting Drive</th>
<th>Silicon Valley Visit – Innovation Hub, Suppliers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experience Latest Vehicle Condition</td>
<td>Long Drive to Experience Competitor Vehicles</td>
<td>Gather High Tech Trends and Ideas from Silicon Valley</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TTC Innovation Factory – Idea Generation</th>
<th>Supplier Collaboration – Customer research and new technology</th>
<th>Clinic and FGI to understand Gen X</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capture Innovative Ideas From Young Engineers</td>
<td>Work Closely with Suppliers for Concepts and New Product Proposals</td>
<td>Explore Technology, Styling and Vehicle Priorities</td>
</tr>
</tbody>
</table>
Vehicle Development Process
Vehicle Development Process

Planning Meeting
Vehicle Development Process

New Technology
Vehicle Development Process
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## Vehicle Development Process

<table>
<thead>
<tr>
<th>Positive (+)</th>
<th>Negative (-)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Avalon Owners V6 Model</strong></td>
<td></td>
</tr>
<tr>
<td>+ Exterior Styling</td>
<td>- Loyal buyers disliked Ride Comfort</td>
</tr>
<tr>
<td>+ Roominess, especially Rr seat</td>
<td>- Difficult to use Navi system</td>
</tr>
<tr>
<td>+ High Technology</td>
<td></td>
</tr>
<tr>
<td>+ Interior Quality/Layout</td>
<td></td>
</tr>
<tr>
<td>+ Touring Grade: Handling, Sporty Features</td>
<td></td>
</tr>
<tr>
<td><strong>Toyota Dealers</strong></td>
<td></td>
</tr>
<tr>
<td>+ Exterior Styling well received</td>
<td>- Need more competitive features</td>
</tr>
<tr>
<td>+ Interior Praised for comfort</td>
<td>(Power Steering Column, BGM, and Larger Wheels (19&quot;)</td>
</tr>
<tr>
<td><strong>Consumer Reports</strong></td>
<td></td>
</tr>
<tr>
<td>+ Overall Recommended: Best New Car Value in Segment</td>
<td>- &quot;Ride Comfort&quot; over harsh road and suspension travel&quot; - CR Test Drive</td>
</tr>
<tr>
<td>+ Fuel Economy, Roominess, NV</td>
<td></td>
</tr>
</tbody>
</table>
Vehicle development

- A “go and see” philosophy
Vehicle Development Process

Design Considerations
- Safety standards
- Fuel economy
- Other industry requirements
- Customer satisfaction
Voice of the Customer
Vehicle Development Process

Styling Concept
Instrument Panel and Console

2. Surprising Utility
   - MP3 Player holder

Made over 50 concepts before final design chosen
Benchmarked All popular devices in market
Venza Panel and Console

Hidden Wire Routing

Wires are routed through hole into the bin

World First
Voice of the Customer
Voice of the Customer
Voice of the Customer
Development Update

- May 20th Joint Venture announcement
- Learn from each others fields of expertise
- Toyota’s Engineering, manufacturing, and Production
- Tesla’s EV technology, daring spirit, and flexibility
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<tr>
<th>Dept</th>
<th>POV</th>
<th>Activity</th>
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<tr>
<td>ZAA</td>
<td>EV Unique</td>
<td>Development</td>
</tr>
</tbody>
</table>

**Challenge**

**Revolutionary business model & brand strategy**
- Establish Brand Image with exhilarating EV in partnership with Tesla
- Innovative and creative use of IT

**Product Planning Concept**
- “Eco + Fun to Drive + Design + Function” Top-in-class.
- Leverage Tesla’s outside-the-box thought process with Motivated technology team with goal of ‘Changing the world by EV.’

**Action/Result**
- Developed “Top-in-class EV vehicle compared to competitors in performance, versatility and range
- Increased TTC engineering capability by expanding our area in terms of new technology
- Positive media acceptance further supporting Toyota’s brand image

**Learning /Yokoten:**

**Study continuous product improvement**
- Collect Field Data for pro-active problem analysis
- Study FW Level Up in field – product continues to evolve over vehicle life!

**Superior Product Performance for next phase**
- Range & Acceleration improvements

Project:
Future Vehicle Development
TOYOTA WAY APPROACH TO EDUCATION

A “hands-on” approach
Toyota Way Approach to Education
Toyota Way Approach to Education

[Images of people working on projects in a classroom setting]
AWIM PRESENTATION

Elementary School
Step 1. Understanding Use
Step 2. Understanding User Wants
Step 3. Styling

1. Hand Sketch
2. Computer Drawing
3. Milling Clay Model
4. Hand Finishing
Step 4. Designing Vehicle & Parts

We must design vehicles for strength and safety.

\[ H_{1,\beta} = d \left( \frac{1}{3} \int_0^\beta \sigma(T)\,dT \right)^{2.5} \]

\[ f(x) = \frac{1}{x^2 + 1} \]

\[ N_{ij} = \frac{F_Z}{F_{int}} + \frac{M_Y}{M_{int}} \]
Who's This Guy?
Sir Isaac Newton

Newton's Law of Gravity

Car's are design based on Newton's Law's of Motion
Newton's First Law of Motion

When a car STOPS the people inside keep moving

No Seat Belt = Big Headache
Let’s try Newton’s Laws
Newton's Second Law of Motion

\[ F = MA \]

Acceleration is produced when a force act on mass
Newton’s Third Law of Motion

For every action there is a equal and opposite reaction
Thank You

よい品  よい考
(yoi shina,  yoi kangae)
GOOD THINKING  GOOD PRODUCTS
Toyota Way Approach to Education
Toyota Way Approach to Education
Toyota Way Approach to Education
TOYOTA WAY APPROACH TO EDUCATION

How is it applied?
Toyota Way Approach to Education
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Toyota Way Approach to Education
Let's Go Places

Greg Bernas
Toyota Chief Engineer