Automotive industry: laggards or innovators?

The industry faces many challenges and uncertainty, creating partnering opportunities.

GM is involved in a wide spectrum of collaborations with the DOE playing a key role in many.

GM has learned much about how to succeed with partnering and collaborations.
Since the early 1970s:
- Reduced emissions by 99%
- Improved fuel economy by 130% for cars and 80% for trucks
- Crash fatality rate reduced by 66% in U.S., 75% in Europe
- Improved affordability by 40% (comparing price of new vehicle relative to prices of all consumer goods)
OUR INDUSTRY TODAY FACES REMARKABLE CHALLENGES...

- **Customers**
  Connectivity, Safety, Design, Emerging Markets, High Price & Operating Costs, Value

- **Suppliers**
  Consolidation, Bankruptcies, Disruptions, Technology

- **Substitutes**
  Mobility-On-Demand, Mass Transit, Used Vehicles

- **Structure**
  Capital Intensity, Regulations, Cyclicality, Long Lead Times, Infrastructure, Technological Complexity & Cost

- **Competition**
  New Entrants, Low Margins, Global Competition
...WITH DISRUPTIVE IMPLICATIONS FOR THE FUTURE...

<table>
<thead>
<tr>
<th>Conventional</th>
<th>Disruption</th>
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<tbody>
<tr>
<td>Petroleum fuel</td>
<td>Energy diversity</td>
</tr>
<tr>
<td>Internal combustion engines</td>
<td>Electric motors</td>
</tr>
<tr>
<td>Independent mechanical components</td>
<td>Integrated electronic systems</td>
</tr>
<tr>
<td>Human control, stand-alone</td>
<td>Autonomous, smart and connected</td>
</tr>
<tr>
<td>Stamped steel</td>
<td>Bio–based and advanced materials</td>
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<tr>
<td>Mass production</td>
<td>Mass customization</td>
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<tr>
<td>Expensive</td>
<td>Cheap</td>
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<tr>
<td>Developed markets</td>
<td>Emerging markets</td>
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<tr>
<td>High barriers to entry</td>
<td>New entrants</td>
</tr>
<tr>
<td>Banker’s capital</td>
<td>Sovereign and private equity</td>
</tr>
</tbody>
</table>
...AND SIGNIFICANT OPPORTUNITY FOR PARTNERSHIP AND ALLIANCES

Global Partnering Opportunities

- Energy and Infrastructure Partnering
- University Research Agreements
- Government Cooperative Programs
- Co-Development with Suppliers & Other Key Stakeholders
- Equity Alliances
- Joint Ventures
- Licensing Agreements
Partnership & alliance opportunities along the technology commercialization pipeline

Technology Commercialization Business Cycle

- Technology Creation
  - Research
  - Pre-Seed
- Market & Product Development
- Commercialization
  - Sales
  - Cash Flow

Valley of Death

University & Government (DOE) Cooperative Programs (e.g. Allison Bus)

Venture Investments (e.g. Coskata, Bright, Envia, Sunlogics)

Co-Development & Licensing

Licensing, Joint Ventures, Alliances (Market Access & Product focused)

See next slide examples
GM IS INVOLVED IN MANY JVs AND EQUITY ALLIANCES...

MARKET ACCESS

TECHNOLOGY ACCESS

FINANCING FOR DEALERS/ CUSTOMERS

Examples: Not all-inclusive
GSPA & NBD IS FOCUSED ON PARTNERING & LICENSING

- Develop and Manage GM IP Strategy and Process
  - Ensure the IP strategy supports the Technology strategy to support the Business strategy
  - Identify critical technologies for competitive advantage to develop or in-license

- Partnering and Licensing for Product Technologies
  - Identify, develop, and negotiate product & IP related deals
  - Support incoming & proactively identify new opportunities
    - 3 legs of the stool for proactive intellectual property strategy（commercial potential, ownership, need）

- Management of Alliance（JV & Partner）Relationships
  - Ensure Alliance relationship is healthy & delivers according to goals
  - Restructure relationships/agreements to evolve with changing business and technical strategies of the parties
GM LESSONS LEARNED

- Important to have clarity and understanding of partnership from outset — the reasons for it, synergies, and strategy

- Parties must be aligned — extent of commitment, resources to be dedicated, goals/objectives, deliverables, and time expectation

- Agreement on expectations and scope

- Communication is critical

- Mutual respect with common objectives for win–win

- Relationships must be flexible with compromise — not just “the company” way

- Alliance strategy integrated with overall business strategy

- Partner selection — fit
Please enjoy viewing these GM products...

- 2011 Chevrolet Volt
- 2012 Chevrolet Sonic
- 2012 Buick Regal
- 2012 Cadillac CTS Coupe
- 2012 Chevrolet Cruze
- 2012 Chevrolet Tahoe Hybrid