I. Context

- South Carolina
- Upstate of South Carolina
- Clemson University

II. Clemson University-International Center for Automotive Research

III. Challenges
### Economic Performance

<table>
<thead>
<tr>
<th>Metric</th>
<th>SC</th>
<th>US</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employment Growth (’90-'02)</td>
<td>1.3%</td>
<td>1.5%</td>
</tr>
<tr>
<td>Wage Growth (’90-'01)</td>
<td>3.6%</td>
<td>3.9%</td>
</tr>
<tr>
<td>Unemployment Rate (10/03)</td>
<td>7.1%</td>
<td>6.0%</td>
</tr>
<tr>
<td>Average Wage (2001)</td>
<td>$28,634</td>
<td>$35,550</td>
</tr>
</tbody>
</table>

### Innovation Output

<table>
<thead>
<tr>
<th>Metric</th>
<th>SC</th>
<th>US</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patents per 10K Employee (2001)</td>
<td>3.6</td>
<td>7.7</td>
</tr>
<tr>
<td>Patent Growth (’90–’01)</td>
<td>4.3%</td>
<td>6.5%</td>
</tr>
<tr>
<td>VC Investments per worker (2002)</td>
<td>$3</td>
<td>$155</td>
</tr>
<tr>
<td>SBIR Awards per worker (2001)</td>
<td>$2.56</td>
<td>$8.50</td>
</tr>
</tbody>
</table>
Context: South Carolina

Business Environment (Disadvantages)

- limited number of advanced degree holders: science and engineering
- relatively weak K-12 system
- limited supply of highly skilled workers
- lack of first-tier research universities

Business Environment (Advantages)

- highly competitive cost structure: wages, taxes, rents and utilities
- renowned technical college system: national model
- excellent transportation infrastructure
- high quality of life
Context: Upstate South Carolina

Business Environment

- I-85 “Boom Belt” – between Charlotte and Atlanta
- largest per capita diversified foreign investment in the US
- $8.9B investment since 1990
- lowest unionization rate in the US

Context: Upstate South Carolina

Business Environment (con’t)

- best workforce training program in the US
- progressive business climate
- strong industry/government/education collaboration
- excellent quality of life
Historically:
- Clemson University founded in 1889
- Focus on agriculture and engineering
- Tradition of economic transformation in agriculture, textiles, ceramics, chemicals

Today:
- Technically oriented public research university
- 17,000 graduate and undergraduate students
- $170 million in research expenditures
- Strength in engineering, architecture, agriculture, entrepreneurship and communication
Clemson will be one of the nation’s top-20 public universities.

Clemson University Vision Statement

Clemson’s Roadmap

Selection criteria for emphasis areas

- Existing faculty research strengths and basic infrastructure
- Correlation with existing or emerging cluster industries in South Carolina
- Significant potential for external funding
Clemson University Emphasis Areas

<table>
<thead>
<tr>
<th>Leadership and Entrepreneurship</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced Materials</td>
</tr>
<tr>
<td>Automotive and Transportation</td>
</tr>
<tr>
<td>Technology</td>
</tr>
<tr>
<td>Biotechnology and Biomedical</td>
</tr>
<tr>
<td>Sciences</td>
</tr>
<tr>
<td>Information and Communication</td>
</tr>
<tr>
<td>Technology</td>
</tr>
<tr>
<td>Sustainable Environment</td>
</tr>
</tbody>
</table>

Family and Community Living

General Education

Philosophical Premises

- Innovation drives productivity, standard of living and leadership in global markets
- Innovation economy thrives in regional clusters
- Innovation is a “contact sport”
“Clusters” and Economic Development: Lessons Learned

- Target areas where there is existing capability at research university(s) and a key user(s) in the region
- Recruit “superstar” researchers, build graduate programs
- Construct research parks and incubators
- Recruit young firms and R&D-intensive activities (international firms), network into the university activities
- Cultivate entrepreneurial resources (experienced entrepreneurs, law firms, seed capital sources . . .)
- Maintain high quality of life (low taxes, school quality, health care, arts/outdoor)
The Clemson University-ICAR Vision

To be the premier automotive and motorsports research and educational facility in the world.
The Mission

➢ To establish world-class facilities for automotive/motorsports research.
➢ To provide internationally recognized graduate automotive engineering programs.
➢ To be the university/industry interface for the associated engineering, management, marketing and communication disciplines.

Why South Carolina?

➢ Southeast is now the largest US regional automotive cluster
➢ Dominated by international manufacturing facilities – OEM, Tier I, II & III
➢ Over 200 automotive companies in South Carolina
➢ 2/3 of major US racing teams located between Charlotte and Atlanta
"Southeast is now the U.S. center of a global industry with no supporting R&D facility at a time when more R&D being pushed down to suppliers…"

Cost pressure on tier suppliers will increasingly be complemented by risk taking
SC Economic Impact

- Largest economic impact industry in SC - BMW and suppliers’ investment over $4 billion and over 9,000 related employment
- Over 200 Automotive Companies in SC
- 115 First or Second Tier Automotive Suppliers in the State

US Motorsports Corridor

2/3 of Major US RACING TEAMS
Located Between Charlotte and Atlanta
South Carolina Competitiveness Initiative

Phase I Final Presentation (December 8, 2003)

Automotive Cluster

Vision Element: A center of R&D in the Southeast

Action Agenda:
- Continue to support Auto Research Park (CU-ICAR)
- Develop cluster specific institutions for collaboration
- Support engineering training

Dr. Michael E. Porter
Professor of Economics
Harvard University

Carolinias Competitiveness Forum (April 30, 2004)

. . . focus on a few industries to form a deeper infrastructure

Automotive: clear advantage needed against the Midwest/Mississippi Valley

e.g. ICAR at Clemson University needs to be further developed beyond BMW, Michelin, IBM and MS

Dr. Kenichi Ohmae
Former Director of McKinsey & Co.
Author bestselling book: The Borderless World
A Public/Private Partnership

CLEMSON UNIVERSITY

- Driven by its vision to be among the nation’s top 20 public universities

SOUTH CAROLINA DEPARTMENT OF COMMERCE/LOCAL AND REGIONAL ECONOMIC DEVELOPMENT PARTNERS

- Economic development through building knowledge-based cluster industries

PRIVATE SECTOR

- Companies with a strategic interest in automotive/motorsports research, development, education or advanced manufacturing

South Carolina Investments Driving Innovation

- Research Centers of Economic Excellence (2002)
- Research Infrastructure Bond Act (2004)
- Innovation Center Act (2005)
Private Sector Investments Announced

BMW
- Portion of Economic Development Incentive
- Endowed Chairs (2)

Michelin
- Endowed Chair (1)
- Access to Proving Grounds

Timken
- R&D Facility
- Endowed Chair (1)

SUN Microsystems
- Computational Center Equipment & Start-up Funds

Investment Summary

<table>
<thead>
<tr>
<th>Category</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land:</td>
<td>$ 7.0 M</td>
</tr>
<tr>
<td></td>
<td>$ 14.0 M</td>
</tr>
<tr>
<td>Infrastructure:</td>
<td>$ 45.5 M</td>
</tr>
<tr>
<td>Buildings:</td>
<td>$ 79.0 M</td>
</tr>
<tr>
<td>Faculty:</td>
<td>$ 36.0 M</td>
</tr>
<tr>
<td>Equipment/Other:</td>
<td>$ 27.7 M</td>
</tr>
<tr>
<td>TOTAL:</td>
<td>$209.2 M</td>
</tr>
</tbody>
</table>
The CU-ICAR Graduate Program Concept

Graduate Program in Automotive Engineering (M.S. and Ph.D)

- **Emphasis in product realization and system integration**
  - Underlying principles using the automobile as a platform
  - Graduates marketable in all manufacturing environments

Internationally respected faculty focused on systems integration

Industry-savvy graduates who will be unique in the world
Potential Research Facilities

- Information Technology Research Center (ITRC)
- High performance computing – modeling and simulation
- Full-scale wind tunnel
- Fuel economy and alternative fuels
- Safety/crashworthiness
- Chassis testing
- Tire and wheel testing
- Acoustic and environmental testing

CU-ICAR

- 252-acre project controlled by Clemson University
- Common architectural guidelines, covenants and conditions
- Class A office and research laboratory facilities
CU-ICAR
A True University
Research Campus

CU-ICAR will be a research campus, not a traditional research or business park

- Embraces the Campus Culture
- Campus Programs Drive Development
- Diverse Campus Environment
  - Includes Start-ups, small business, non-profits, major companies, government agencies
- Designed for Interaction
  - Dense, mixed-use, urban environment
- Relationships are key
- Partnership Developers build communities and measure interaction
Information Technology Research Center

ITRC Building: 85,000 sqft
Initial Focus:
  -- Automotive business IT and logistics
  -- Supply chain management and logistics
  -- Vehicle diagnostics
Announced Partners: BMW, IBM and Microsoft
BMW – ITRC

Interior Office

Clearstory
The Carroll A. Campbell Jr. Graduate Engineering Center

A 80,000 sqft facility dedicated to:

- Systems Integration Research Activities
- Graduate Program in Automotive Engineering
  - Linked to education and research activities in the College of Engineering and Science, as well as other Clemson University Units
Carroll A. Campbell Jr.

Graduate Engineering Center
Private Sector High Potential Prospects

Original Equipment Manufacturers
- US (1)
- European (1)
- Japanese (3)
- Chinese (1)

Motorsports
- US (3)
- European (2)

Automotive Suppliers
- European (3)
- Japanese (1)

Technology Partners
- US (2)
- European (1)
Challenges

Accountability – Legislature/Taxpayers
- Number of Jobs
- Salary/Wages per Job

Workforce
- K-12
- Technical Colleges

Sustainability
- University Commitments – Personnel and Funds
- Support from Stakeholders

“Driving the Future”

Clemson University’s International Center for Automotive Research is:

- A powerful statement to the global automobile and motorsports industries about competing in the future.

- A key initiative to move Clemson University to one of the top public universities in the country.

- A pivotal role in driving the economy of South Carolina with a regional industry cluster model.