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## Paper Session I-C - CORABI - The Impact of the University on Corporate, Regional, and State Commercial Space Development

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Space Research Institute  
Florida Institute of Technology

## The Impact of the University on Corporate, Regional, and State Commercial Space Development

J. Bruce Rafert, Acting Executive Director  
Space Research Institute (F.I.T.)

Presented: 25 April, 1989  
Space Congress  
Cocoa Beach, Florida

## Background

### Studies and Recommendations for Bilateral Action

- Florida Governor's Commission on Space
- National Academy of Sciences
- Business Higher Education Forum
- "Space Business, a Financial Analysis"
- "Spaceport Activity Impact Study"
- "Survey of Factors Enhancing the Growth of Aerospace Industry in Florida
- "Evaluation of Impact of Space Related Activities in the State of Hawaii"

## **List (General) of Action Categories**

- Corporate Financial Support of Colleges and Universities
- Corporate Associate and Affiliate Programs
- Cooperative Education
- Corporate Financial Support of Students
- Corporate Financial Support of Faculty
- Research Agreements -- bilateral and consortium
- Training Programs
- Personnel Exchanges
- Conferences, Colloquia and Symposia
- Consultancies
- Volunteer Programs
- Corporate Access to Unique Resources
- Corporate Recruiting of Students
- Joint Projects that Address National Concerns

### Statement of the Problem (Potential Defects)

1. How do you maximize Impact (given so many categories)?
2. Correlation of Elements.
3. Regional and Local Constraints.
4. Real-World Data not Precise.
5. Feedback: Chicken or Egg?

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## Definition of Variables (General)

1. **The University**
  - Number of Undergraduates in area(s) of consideration
  - Number of Graduate students in area(s) of consideration
  - Number Faculty in area(s) of consideration
  - Number of Departments in area(s) of consideration
  - Number of specialized Institutes
  - Gross Operating Budget
  - Research and Development Budget (in area(s) of consideration)
  - Training Programs and Curricula in area(s) of consideration
  - Capital Outlay in area(s) of consideration
  - Geographic Location
  
2. **The Region and State**
  - Federal Labor Force (number)
  - Federal R&D Budget Captured in area(s) of consideration
  - Air Transportation
  - Tax Environment
  - Proximity to University
  - Vocational Capability
  - Energy Cost(s)
  - University R&D Capability
  - Weather/Climate



### **Region and State (Continued)**

- Developable Land
- Labor Skill/Availability
- Local Business (manpower, capital, R&D)
- Work Ethic
- Labor Cost(s)
- Cost of Living
- Highways
- Other Transportation Elements

### **3. The Corporation**

- Workforce Number in area(s) of consideration
- Profitability
- Growth Rate
- Competitive Posture
- Number of Employees in Degree Programs
- Corporate Contributions to Academia
- Aggregate Contract Research in area(s) of consideration
- Joint/Partnership Contract Research
- Cooperative Education
- Capital Outlay
- In-house Education Expenditures
- Expenditures for Consultants
- Corporate Use of University Resources
- Corporate Recruiting of Students
- Educational Budget Resources

## A Linear Model

Dependent Variable -- Any of the Above  
Independent Variables -- Any or all of the others

- Form of the Equation

$$y_i = a_1 x_{i1} + \dots + a_n x_{in}$$

- System of Equations

$$y_1 = a_1 x_{11} + \dots + a_n x_{n1}$$

$$y_2 = a_1 x_{21} + \dots + a_n x_{n2}$$

$$y_i = a_1 x_{i1} + \dots + a_n x_{ni}$$

- Constraints (trivial)

$i$  greater than or equal to  $n$

## Solution Method

- Linear Least Squares
- Matrix Inversion Technique  
Values of a's  
Formal Errors of a's  
Correlation of a's

## Sample Calculations

1. Real World (Aggregate Model for Texas, Florida, Hawaii)
2. Fictional Calculation for 10 universities, 10 businesses and 10 regions.
3. Refinements
  - Investigate to see if Variables Non-Linear
  - Develop Extensive Database (of relevant quantities)
  - Make Some Projections