L OLD INDUSTRY
INDUSTRIAL LOCATION

Background

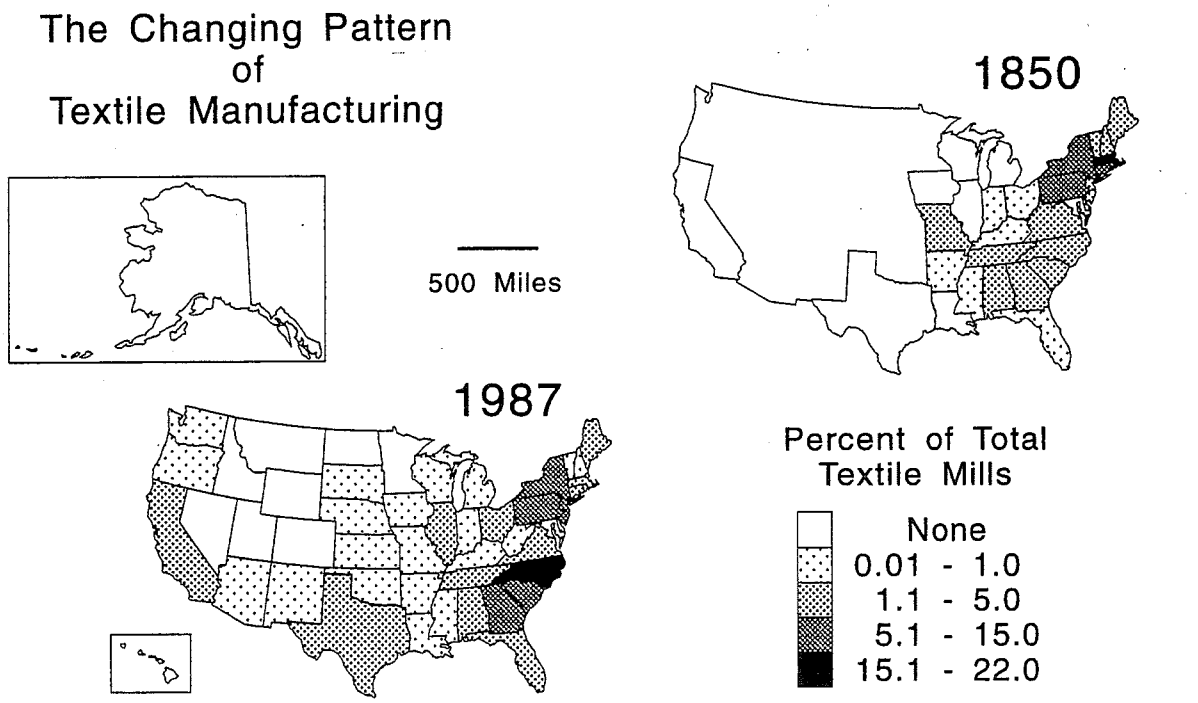
Connecticut and Massachusetts have many old brick buildings next to rivers. These buildings are hardly ideal for the 20th-century. They are noisy, drafty, and hard to heat, although they are solid and (in their own way) beautiful.

Locational advantage

Many of the old brick buildings are abandoned *textile* mills, which used water power to make cloth out of wool or cotton in the early 1800s. Other water-powered mills made furniture, tools, or military supplies. When steam, diesel, and electric motors were invented, water-power mills lost their *locational advantage*. To stay in business, they had to cut costs. In the process, some became notoriously bad places to work. They hired orphans, unmarried women, new immigrants, and others desperate enough to put up with low pay and dangerous working conditions. In time, many mills were abandoned, and thousands of people lost their jobs.

What can we learn from this? One big point is that the advantages of a given location depend on the time in history as well as what you are doing. As times change, places may gain or lose their advantage because of new markets or technologies. To survive, people might have to change their jobs or move to a new location.

In this Activity, you will learn how to identify factors that allow industry to expand in a place. Those ideas apply whether a factory is making shoes, bicycles, or video games. You will also examine the history of iron-making, an important industry that has employed hundreds of thousands of people and made different places in the United States important at different times in the past.



BACKGROUND: IRON TECHNOLOGY IN THREE TIME PERIODS.

Blast furnaces

In this time, a *blast furnace* can make a ton of steel out of three tons of bituminous coal, two tons of hematite iron ore, and one ton of limestone (which is available in almost every state). A blast furnace is a tall metal cylinder with a smokestack on top, several side doors where raw materials are put in, and a pipe that allows liquid metal to flow out. A blast furnace is expensive to build. Therefore, it has to run most of the time to pay for itself. It makes a huge amount of iron, so it is better to be located near a major market area. In this year, the biggest user of steel is railroad companies, which are rapidly building tracks in all directions from hubs in Saint Louis, Chicago, and Denver. Blast furnaces hired many immigrants from Poland and other parts of eastern Europe.

When do you think this is: late 1700s, late 1800s, or late 1900s?

Electric furnaces

In this time, an *electric-arc furnace* can make a ton of steel out of about a ton and a half of scrap iron (primarily sheet-steel trimmings and old cars) and perhaps some taconite (a low-grade iron ore). An electric furnace produces a medium amount of steel and can make different alloys (mixtures of metals) for special uses. In this year, the primary uses of steel are in buildings, automobiles, and consumer appliances, which are made in many places around the country. Electric-arc furnaces require fewer workers than a blast furnace, but they must be skilled in using complex machinery.

When do you think this is: late 1700s, late 1800s, or late 1900s?

Charcoal ovens

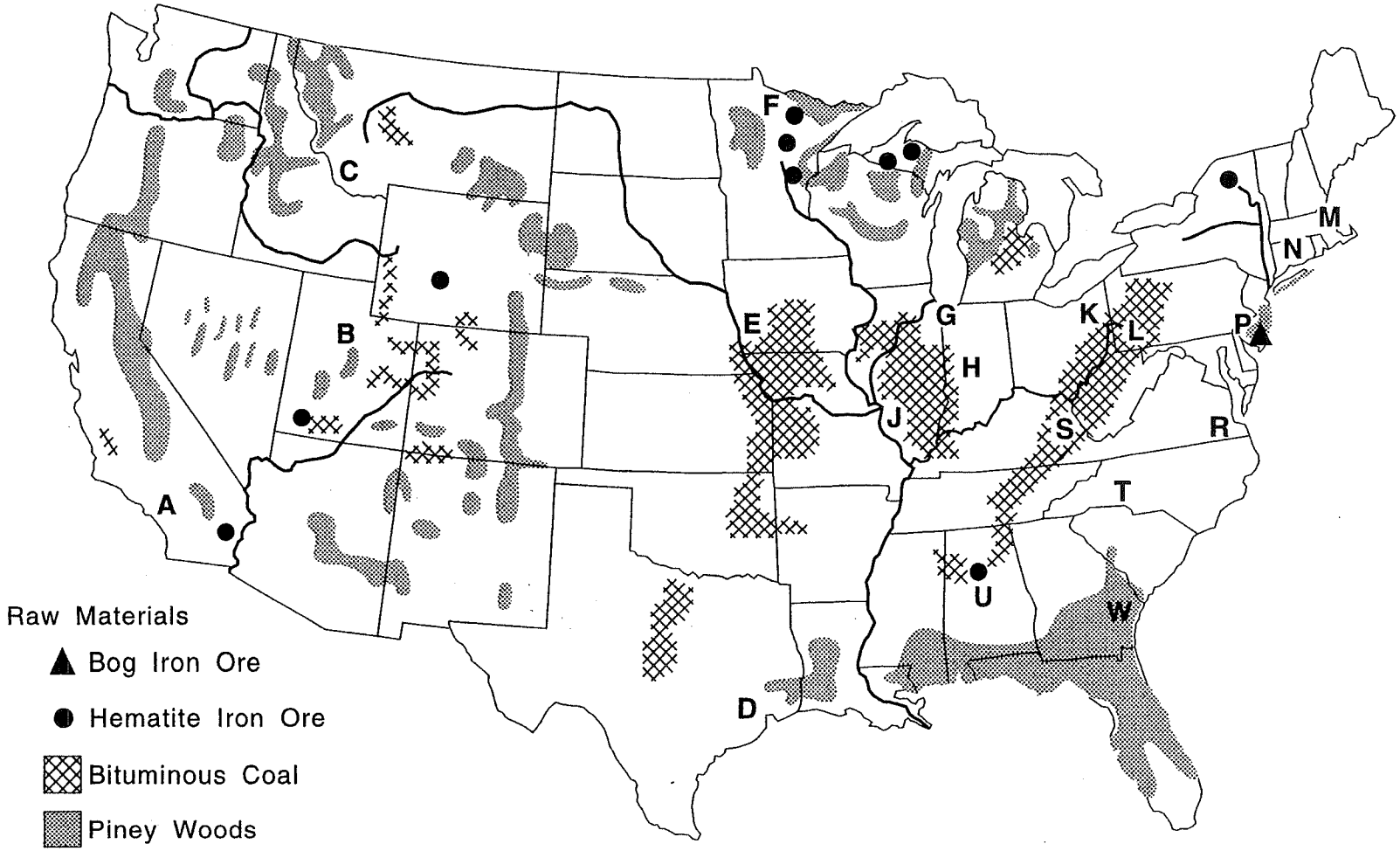
In this time, a *charcoal oven* can make a ton of iron out of two tons of bog iron ore and about four tons of charcoal. Charcoal comes mainly from pine trees, which must be heated in ovens to drive off the resins and leave pure carbon. A charcoal oven is usually rather small, because a big oven would soon consume all of the trees in the area. In this year, the major uses of iron are for tools, wagon wheels, cannons, and building materials such as door hinges or window frames. These items can be forged in almost any small blacksmith shop. A blacksmith shop needs workers who are strong enough to use a heavy hammer all day long.

When do you think this is: late 1700s, late 1800s, or late 1900s?

Clues about where to put factories

The point is not just to figure out which description fits which time. Search each description carefully to get clues about what *locations* might be best for each kind of factory. You might find it useful to list the factors you think are most important at each time.

Iron and Steel Production: Raw Materials and Industrial Location



Map compiled from information in Paullin, 1932; Kuchler, 1975; and Goode's World Atlas;.

INSTRUCTIONS FOR ACTIVITY L

Situation

You are the locational analyst for an iron-processing company. Your job is to recommend the best locations for factories.

Information sources

- a map showing the raw materials needed for iron making.
- brief descriptions of metal technology in the late 1700s, late 1800s, and late 1900s.
- an optional atlas or textbook map of cities, lakes, rivers, canals, railroads, and other modes of transportation.

Start

1) Recall what iron-making needed in the late 1700s. Study the map and choose two good locations for factories at that time. Try to put each one close to both the main population areas and the source of the heaviest raw materials.
2) Write the letters of your recommended locations on the Response Sheet. Then write brief reasons for your choices.

Research

Do the same for the late 1800s and 1900s. In each time, a good factory location is a place where people can bring raw materials together, run the factory, and ship the product to market at the lowest cost. In practical terms, this means taking into account:

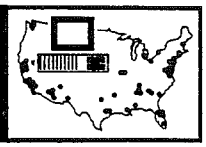
- where iron was needed in each time. Think about where the frontier and big cities were.
- how iron was made in each time. Think about iron-making technology and the locations of the raw materials.
- how people transported heavy things each time. In the late 1700s people used horses, wagons, and canal boats. In the late 1800s, railroads, canals, and lake ships were important. How about in the late 1900s?

It costs a lot of money and/or time to transfer heavy cargo from one *mode of transportation* to another (e.g. from ocean ships to train cars or canal boats). One way to minimize this cost is by locating your factories at *transfer points*, so that people can unload cargo directly to the factory from either kind of transport.

Summarize

In the spaces on the Response Sheet, write a short paragraph to explain your choice of locations for new iron-making factories at each time. Then, if your teacher assigns, write a short speech that outlines what might be done for a place where factories should be closed because their locations are no longer suitable.

M HIGH TECHNOLOGY INDUSTRY
HIGH-TECHNOLOGY INDUSTRIAL LOCATION



Background

Technology is constantly changing. For example, communication between places used to go at the speed of animals: vehicles could go no faster than the horses pulling them. Trains and automobiles could move information much faster. Telephones carry messages almost instantaneously. Satellites can move digital data and pictures to and from almost anywhere on the globe.

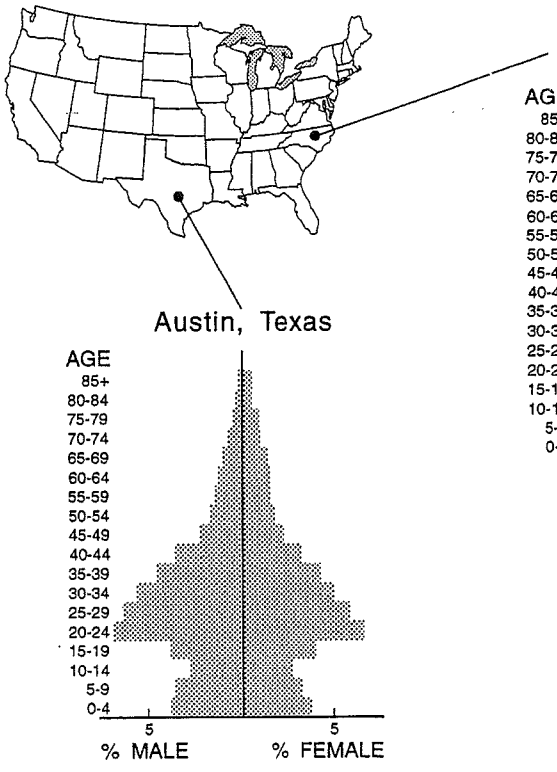
How do telecommunications and other high-technology firms decide where to locate? Distance to raw materials or markets is less important than for steel or other heavy products. It is more important to have skilled workers and related businesses nearby. As a result, some cities and regions have big clusters of hi-tech companies.

Hi-tech industries depend on inventions. Much scientific research in the United States takes place at large universities. But hi-tech industry needs more than just research. Hi-tech products can take a long time to develop. Some, such as compact disk players and personal computers, quickly become successful. At the other extreme, a cure for a complicated disease may take years to perfect. Moreover, developing a promising idea into a successful product usually takes a lot of money. Places with large amounts of both research time and venture capital are better for a new hi-tech company than places without these advantages.

The establishment of high-technology industry in a place will increase the demand for people with specific skills in science and engineering. People with these skills may move into the area. The result often is apparent in a population graph for the region.

Age-gender pyramids for hi-tech areas show a high percentage of 20-39 year-olds.

This is the age group most likely to have the education and skills to help hi-tech business.

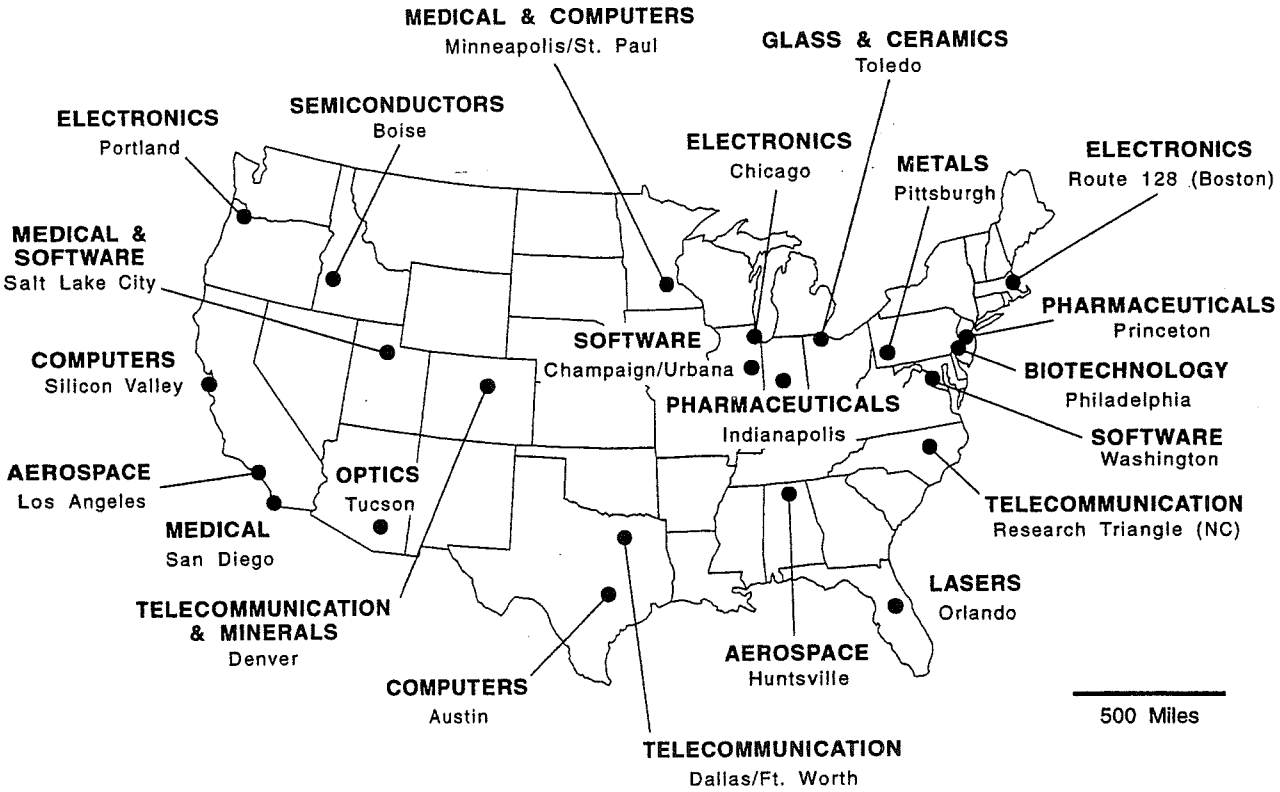


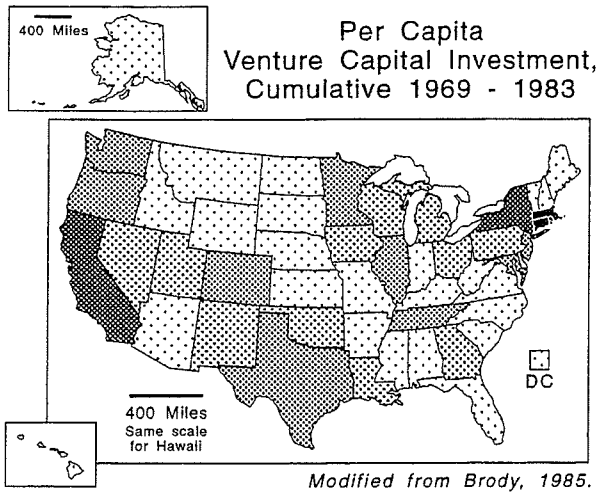
The Microelectronics and Computer-Technology Corporation (MCC) provides a good example of how a hi-tech enterprise makes a location decision. MCC is a joint venture of a dozen major computer and semi-conductor firms. It was founded in 1982 to do research on advanced technologies such as robotics and artificial intelligence. MCC began its search for a site by examining 57 cities around the country. Various cities made presentations to lure the firm's 400 engineers and scientists. The panel then pruned the list to four finalists -- Atlanta, Georgia; Austin, Texas; Raleigh-Durham, North Carolina; and San Diego, California. What do these four cities have in common? Can you picture them on a map? All of them are in the Sunbelt, and all have major universities. All except San Diego are also state capitals.

Why was Austin chosen? The university's reputation and the city's quality-of-life were key factors. The City of Austin and the State of Texas added a package of financial and other incentives, including a favorable lease on land, good road access, and subsidized mortgages for employees who had to move to Texas.

In the typical snowballing manner of hi-tech areas, other companies moved facilities to Austin, either to be near MCC or to take advantage of the same resources. Examples include Lockheed Missiles and Space Company, 3M Corporation, and Motorola. This expansion, in turn, had an indirect effect on cities such as Atlanta, Minneapolis, and Phoenix, where these companies did not expand as much as they might have.

Selected Concentrations of High-Technology Industry



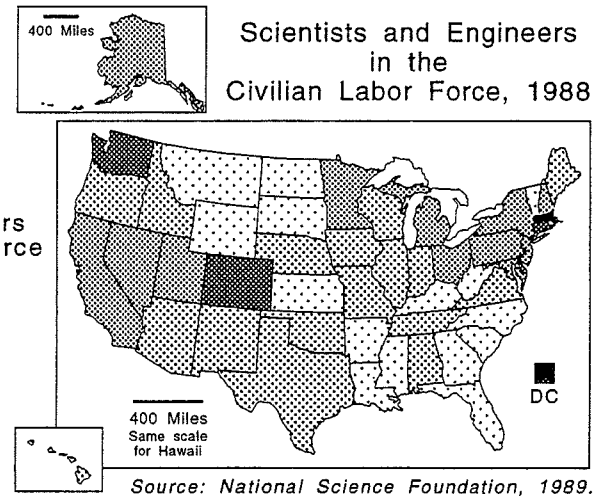


Per Capita
Venture Capital Investment,
Cumulative 1969 - 1983

Per Capita Investment in Dollars

- High (200.00 - 257.20)
- Medium High (100.00 - 199.99)
- Medium (20.00 - 99.99)
- Medium Low (5.00 - 19.99)
- Low (0 - 4.99)

Modified from Brody, 1985.

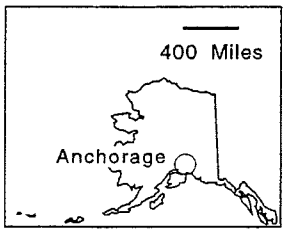


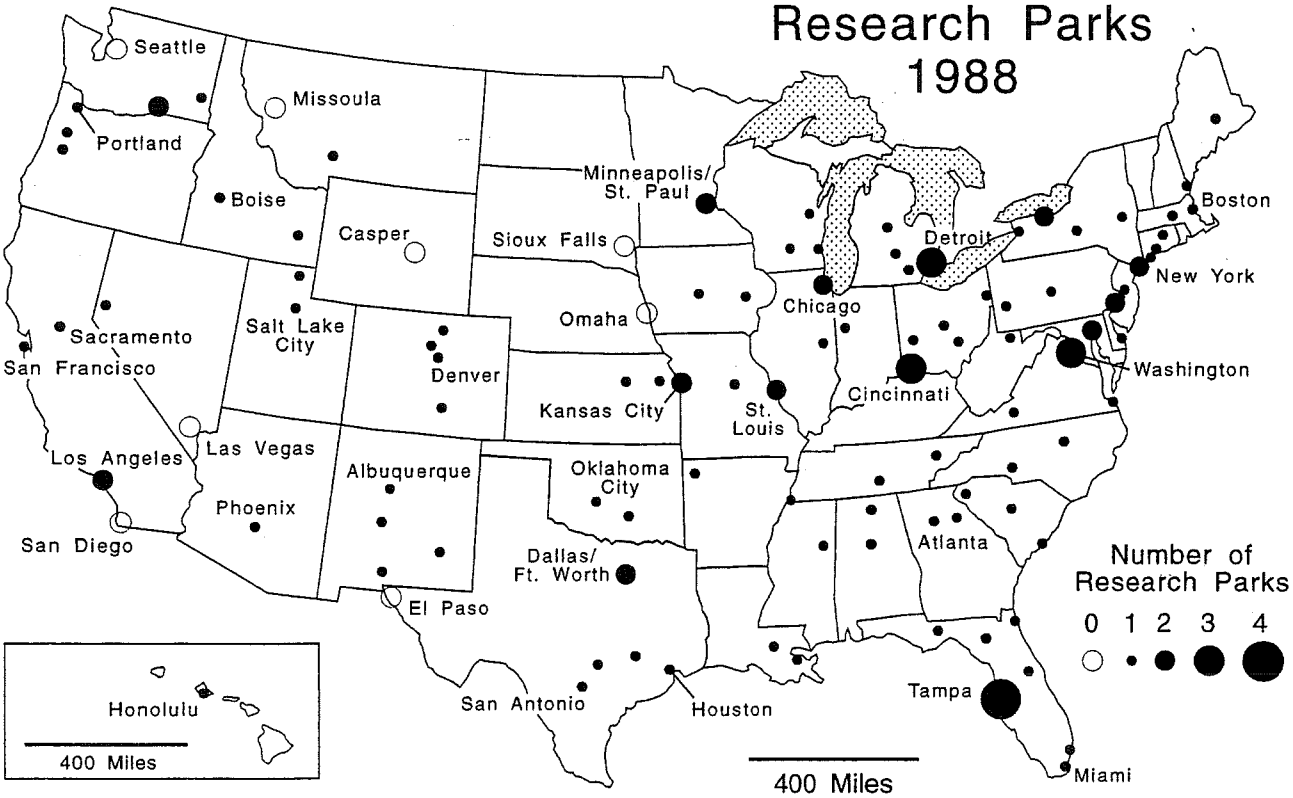
Scientists and Engineers
in the
Civilian Labor Force, 1988

Percentage of
Scientists and Engineers
in the Civilian Labor Force

- High (6.0 - 20.6%)
- Medium High (5.0 - 5.9%)
- Medium (4.0 - 4.9%)
- Medium Low (3.0 - 3.9%)
- Low (1.7 - 2.9%)

Source: National Science Foundation, 1989.





Source: Luger and Goldstein, 1991.

INSTRUCTIONS FOR ACTIVITY M

Situation

You are a consultant for an Eastern high-technology firm, which is planning to develop a Western Research Center. Your job is to recommend a location for the new research facilities.

Information sources

- maps of venture capital and scientists in each state
- map of existing research parks
- other maps or tables in the book, almanacs, or other sources

Start

1) A study using *weighting* may make the best use of available information. With this method, you assign a weight -- a numeric level of importance -- to various characteristics. Add the weights for each area, and see which place has the highest score.

2) Look at the maps of scientists and available venture capital in each state. Here are suggested weights for these variables:

   - for scientists and engineers, 0 for low, 1 for medium low, 2 for medium, 4 for medium high, and 6 for high;
   - for venture capital, 0 for low, 2 for medium low, 4 for medium, 6 for medium high, and 10 for high; .

   Study the maps and the table on the Response Sheet, make sure you understand how the weights were figured, and finish the first two columns of the table.

3) The third map shows research parks in the fifty largest urban areas in the United States. You have to choose your own weight for this information -- higher in places that you think are better for your center. Is it helpful to locate in a large city? How much competition is good for business? Put weights you think are reasonable in column 3, and answer question 2.

Research

Consult your notes, book, almanac, or other sources of information and choose <u>one</u> other kind of data you think would be important for hi-tech industry. Assign a weight for each place on the list and record it in column 4. Then add the numbers in the first four columns for each urban area; put the total in the last column.

Summarize

Outline a presentation to the directors. Name three cities you think would be best for the new research park and explain your reasons.

If this were real, your work would be just beginning. Before making a decision, a company would explore the history, infrastructure, and business climate of each possible site. They would visit each high-ranking place, to meet officials and business leaders who might be willing to make deals to encourage the company to move there.