The communication problem is bound to grow worse, not better. As the program goes forward, its opponents get angrier. And their objections strike to the heart of the project. Even if overland flights are limited, they ask, what about the well-traveled sea-lanes?

The critics are at an extraordinary disadvantage. Their strongest argument —their largest political lever—would be the voluminous citizen complaints about SST overflights. This sort of vindication, however, requires the existence of the SST, and, once the plane is in production and the airlines have made large commitments, the fighting will become much more intense.

A more fundamental problem is the fact that people may not be so sensitive as the boom critics would like. Americans may, as the plane's supporters hope, adjust to, or at least accept grudgingly, the noise and inconvenience. This would leave the plane's opponents in a weak position of a minority protesting for the sake of principle. Says Bo Lundberg, the director general of the Aeronautical Research Institute of Sweden and the best-informed of the critics, "Even if the majority [accepting the boom] were really overwhelming—say 90 percent—democracy's majority rule must not be so perverted as to give the majority the right to subject a minority—even a small one—to sufferings."

In simplest terms, the fight over the SST raises old questions of controlling the effect of technology on the environment. "I am convinced we have long since passed the point where we can make transportation decisions—affecting any or all forms of transportation —without weighing in advance their social as well as their economic impact upon communities and regions they serve," Secretary Boyd has said.

It is not that easy. The plane's promoters are not weak, and they are already beginning to feel the project's benefits; the opponents can only argue on what they *think* will be its drawbacks. This is largely a struggle between ideas and interests, and so far there's been no contest.

—ROBERT J. SAMUELSON

Oregon Graduate Center: A New Portland Scientific Institution

Portland, Oregon. "Why does Portland lag so far behind in the great surge of science-based industry?" a committee of the Portland City Club asked in 1963. The committee noted that many other western cities, even those with smaller populations, had been more successful than Portland in attracting such industry. In its 1963 report, the committee gave particular emphasis to the answer it had found to its question: *"Portland is the largest metropolitan area in the West without a full university."*

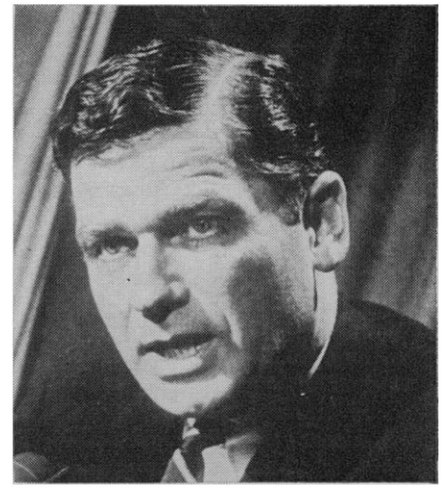
The committee's report called this lack of a university in Portland "a hard unpalatable fact." It concluded that Oregon has great need of the science-based industry which a university would help stimulate, especially because employment in the state's main industries—agriculture and timber—has substantially declined in recent years and because the rate of income growth in the state has been well below the national average.

The lack of a university has long bothered many Portlanders. Although Portland is by far the largest city in Oregon (with a metropolitan population of more than 800,000), the state's two universities are located a fair distance to the south. The University of Oregon at Eugene is 110 miles from Portland; Oregon State University at Corvallis is 82 miles away. The rapidly growing Portland State College is basically an undergraduate institution, as are the private colleges in the Portland area. Portlanders feel that their city is the logical place in Oregon for industrial development, but that growth is hindered because graduate programs in most scientific disciplines are not available locally.

During the last several years, the need for a fully developed university in Portland has been the topic of special study and discussion. In an interview with *Science,* Mark Hatfield (who began serving in the U.S. Senate this year) recalls that the "single main thrust" of his 1958 campaign as the Republican candidate for governor was the need to hasten Oregon's slow growth and to reduce its high unemployment rate. After his election as governor, Hatfield said that he tried to attract new industries. "The companies would ask questions," Hatfield said. "They wanted to know what kind of educational institutions we had. We had to face up to the fact that there was no graduate center in Portland to which sophisticated industry could relate." In the early 1960's, Hatfield appointed two committees on Science, Engineering, and New Technologies. After the report of the second committee in 1962, Hatfield and others made special efforts to obtain state money to help create a graduate center in Portland. These efforts failed for a variety of reasons: the unwillingness of many Oregon taxpayers to increase the amounts spent on higher education; the desire of some backers of the state's two major universities to preserve their institution's prerogatives and existing piece of the state financial pie; and the desire of some Portlanders to make Portland State College into a full-scale university rather than to create a separate graduate center.

During the years of their studies, the committees appointed by Hatfield documented a number of reasons why Portland needs a university. Many Portland companies reported that they wanted graduate training: (i) to enable their employees to finish their masters' and Ph.D. programs, (ii) to assist in enticing new employees into the area, and (iii) to help stop the "brain drain" from Oregon to other parts of the country. The area's largest employer, Tektronix, a major manufacturer of oscilloscopes, called the creation of a graduate center "an absolute necessity" for its operations because "we find it extremely difficult to attract competent people to our plant, and we find those who have acquired with us a degree of scientific competence often leave us for

Donald Benedict



Senator Mark Hatfield (R–Oregon)

the specific reason that they do not find here further help or stimulation to their scientific development." Tektronix stated that it would have to establish research and development facilities elsewhere near universities if a graduate training and research center was not founded in Portland.

After these studies, Hatfield arranged for the incorporation of a new Graduate Center as a nonprofit organization in 1963 and appointed the Center's trustees. Samuel L. Diack was appointed chairman; he is a retired M.D. who has been very active in promoting scientific education in Oregon. Diack and some of the other people connected with the Center seem to feel that the Center is better off if it can remain free of the entanglements caused by heavy reliance on public funds, either from the federal government or from the state. Some Oregon educators have found it a bother to have to work through the centralized financial structure for higher education in their state. Even Hatfield, who fought for public funds for the Center, now thinks that "it may have been a blessing in disguise" to lose that battle for state funds.

The Graduate Center began to make real movement as a private institution in the summer of 1966 when Governor Hatfield and the Board of Trustees announced the appointment of Donald Benedict as president of the Center. Since 1949, Benedict, who holds a Ph.D. in physics from the University of Wisconsin, had been at the Stanford Research Institute where he served as director of physical sciences.

Since Benedict took office a year ago, the Center has established its headquarters in a modern building at the western edge of Portland, initiated its first research project (a study of the propagation of laser beams through the atmosphere by J. R. Kerr of Portland State), and hired its first seven faculty members. Lynn R. Sarles, formerly with the Quantum Electronics Division of Varian Associates, has been serving as the Center's director of administration and facilities since February. Four chemists—Robert L. Autrey, Warren E. Buddenbaum, G. Doyle Daves, Jr., and Roger Eiss—arrive this month to take up faculty positions; two more chemists—Edward Baum and Erwin Rudy—are expected later in the academic year. A total of $700,000 in new equipment has been ordered to meet the requests of these men, Benedict said.

Although the Center is adequately housed for the moment, it will need more ample facilities in the near future as the size of the faculty increases. Although no final decision on site has been made yet, there has long been discussion that the Center would occupy a 74-acre tract in Beaverton (14 miles west of downtown Portland) which adjoins the facilities of the Oregon Primate Research Center. People connected with the Graduate Center believe that such a location would be advantageous for their institution since it would help establish close ties to the researchers in the life sciences at the Primate Center. Also, the tract is within convenient driving distance of some major Portland industries.

If the Beaverton location is chosen, it is thought that Tektronix will give the site to the Center. The founder and president of Tektronix, Howard Vollum, who has been a major proponent of the creation of the Graduate Center, now serves on the Center's Board of Trustees and has been its main source of financial support. The current $2 million development budget of the Graduate Center has been provided by the Tektronix Foundation which Vollum heads. Tektronix has also provided the building now occupied by the Center, which adjoins a Tektronix plant.

In its initial states, the Oregon Graduate Center has been successful in acquiring physical facilities, equipment, community goodwill, and the beginning of a faculty. The important question remaining to be answered is—What kind of institution will the Oregon Graduate Center become?

It should be noted first that the Center has a somewhat limited scope; its basic purpose is to provide graduate education, including Ph.D. programs, in chemistry, physics, and mathematics. At this time, it does not plan to offer degrees in the biological sciences or in disciplines outside the natural sciences area. The Center, according to Benedict, is primarily an educational institution. The research done at the Center will be basic, publishable, and related to the educational process. Benedict said that applied research would dilute the Center's educational quality and that it would be expensive as well. He noted that "Everybody wants institutes for contract research, but few want to pay to use them."

During an 18-month period in which he directed the European office of the Stanford Research Institute, Benedict spent considerable time visiting European research facilities. "I'm a great admirer of European research because it's aimed at a civilian economy; in the United States we're aimed at a wartime economy," he commented. Benedict hopes to invite civilian-oriented European scientists to spend time at his Center. The Center will not undertake military or space research and will not enter other expensive areas such as nuclear physics and nuclear reactors.

Within a few years, Benedict hopes that the Center will have 200 students and 50 faculty members, including 25 chemists, 20 physicists, and five mathematicians. Although no firm plans have been made, Benedict thinks that an institution with double this number of students and professors would be even stronger. During the first 5 years of Center operations, Benedict does not foresee a need for a conventional departmental structure, but he thinks that, after this initial period, the Center may

grow large enough to warrant departmentalization by discipline.

In creating an exclusively graduate natural sciences institution, the people at the Oregon Graduate Center are well aware that they are departing from the academic norm. The example of the Rockefeller University in New York City has some relevance to the Oregon Graduate Center, but Rockefeller became a university from a position of existing prestige and wealth. In setting up this unusual graduate center, Benedict said that he had learned some surprising things. For instance, he remarked that he has yet to find any procedure in existence for the accreditation of graduate schools.

Benedict hopes to admit a few graduate students in the autumn of 1968 and grant the Center's first Ph.D. degree by 1974. He has said that the Center will be able to give degrees in chemistry before it is able to grant them in physics, a judgment given further credence by the fact that, so far, the Center has been able to recruit only chemists for its faculty. Benedict feels that the next 2 years will be a crucial time of development for the Center. He does not think it wise to solicit funds from other private sources, from foundations, or from the federal government until the Center develops successful, continuing programs on its own.

Benedict believes that the Center must elicit financial backing from the Portland area before gaining support from national sources. During his year in Portland, he has been able to discuss the Center in speeches before several influential Portland groups, including the City Club and the Chamber of Commerce. In July, the *Oregonian*, one of the West's important newspapers, carried an editorial sympathetic to the Center. In an interview, Hatfield commented, "Don Benedict has been the right man; he is sensitive and diplomatic and brings prestige to the job." Board chairman Diack said that Benedict "has made a great impact on the community. If we can bring in faculty members like we have so far, the community will rally behind us."

Obviously, Portland will have to rally behind the Center if it is going to achieve some of the high hopes which have been proclaimed for it. Benedict told the Portland Chamber of Commerce last October that "The Center will attract the sort of developments that occurred around MIT, Caltech, and Stanford. When the NASA of the future wants to build a large new research center, we want it to be built here." Benedict also spoke of the Center attaining academic quality "equivalent to Stanford, Caltech and MIT." Certainly, it will take great effort before the Oregon Graduate Center attains such heights. Benedict notes that the Center "started with $2 million, a building, and lots of enthusiasm." Except for the beginning of a faculty, it has not had enough time to acquire much else.

Before it begins to achieve its ambitious goals, the Center will have to overcome several built-in problems. First, because of financial and political considerations, the Center has had to confine itself to a narrow disciplinary base. The Center may be too specialized to attract some of the high-quality scientists and students it desires. Doubts about the limitations of the academic base were expressed by some of those concerned with the founding of the Center. This disciplinary narrowness creates practical difficulties. For instance, the Center will have to hire language tutors from Portland State so that its students can pass Ph.D. language requirements.

A second danger is that the Center's reliance on local funds may make it difficult to establish its intellectual independence from industry, a problem which some, including Hatfield, think is a serious one. The Center has already made plans to hold summer conferences for which industry support will be solicited. "These summer conferences will enable me to raise money," Benedict said. "Industries back these things like they back motherhood."

Attracting adequate funds is, of course, the Center's primary long-term problem. Benedict estimates that, within a few years, the Center's program will cost from $3.5 million to $4.5 million annually, about $1 million of which will have to come from gifts. The Center will probably need $3 million for buildings when it moves to a larger site. "It is easy to say that we should have $25 million in endowment," Benedict said, "and we don't have it yet."

The Center's principal financial "angel," Howard Vollum, said in an interview that there is "a commitment by Tektronix to continue funding the Center, but we may not be able to fund it to the extent we have in the past." Board chairman Diack states that there is "plenty of finance for the next 2 or 3 years." Although Diack thinks the Portland business community does not now feel a financial commitment to the Center, he believes that there will be such a commitment when the Center proves itself successful.

Some Portland educators think that Portland State College is destined to become a university within a few years and that the Oregon Graduate Center may gradually merge with Portland State. For the present, the Center has committed itself to helping facilitate study of the physical sciences at Portland State, Reed College, and the other colleges in the area. During the next decade, Portland scientists will be looking with interest to determine whether the Center can become a first-rate educational institution. Observers throughout the country will be watching to see if the Oregon Graduate Center helps Portland attract the science-based industry which many community leaders feel this city sorely needs.

—BRYCE NELSON

Oceanography: Woods Hole and MIT Pool Their Resources

Woods Hole, Mass. Feeling the competition for brain power from newly flourishing university-affiliated centers of oceanographic research, the Woods Hole Oceanographic Institution (WHOI) is collaborating with the Massachusetts Institute of Technology in an unusual, if not unprecedented, venture in American graduate education. Woods Hole and MIT are initiating a program in which a Ph.D. degree will be conferred jointly, in the name of both institutions.

Through the joint program, Woods Hole, which has never awarded degrees, expects to attract first-rate graduate students, without offering the variety of courses in science, languages, and