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Two Years of Turbulence Leading to a Quarter Century of Cooperation: The Birth of UNOLS

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Abstract

It started in 1969 with *Our Nation and the Sea*. This seminal report of the Stratton Commission called for the establishment of University-National Laboratories (UNLs). In order to maintain the United States as the world leader in ocean research, leading academic ocean research laboratories would be recognized as UNLs. They would receive adequate facilities and the assurance of adequate funding.

Building on this recommendation, the National Science Foundation (NSF) in 1970 proposed a National Oceanographic Laboratory System (NOLS). NOLS would be an association of institutions, grouped regionally; ship scheduling, assessment, and planning would be coordinated and NSF would provide management functions matching those of the academic sector. "To the extent possible," members would be assured of multiyear funding for ship operations.

To the oceanographic institutions that were looking for long-term stable funding, the NOLS proposal threatened to vest management authority, if not the actual operation of the ships, in the hands of NSF. These institutions resisted.

Following a year of intense debate, a compromise proposal was drafted by laboratory representatives and NSF staff. This proposal for a *University-National* Oceanography Laboratory System (UNOLS) was adopted unanimously by 18 institutions that operated the 35-ship academic fleet. UNOLS would be cooperatively managed by the 18 institutions; it would coordinate schedules and create seagoing opportunities for any competent and funded ocean scientist. It would assess the adequacy of facilities and make recommendations to the funding agencies for new construction, modifications, and replacements. To the extent possible, multiple-year funding would be ensured for ship operations by NSF and other federal funding agencies.

Since its adoption in 1971, UNOLS has served the U.S. academic ocean community. It has grown to 57 members, of which 19 members operate 29 vessels. It has been central to maintaining and assisting in the operation of the most effective ocean research fleet in the world. It has served as a model of scientific cooperation.

UNOLS and the Fleet

The voyage of the HMS *Challenger* in the 1870s was the beginning of modern oceanography—at least some would say it was. If so, then World War II was the beginning of "postmodern" oceanography. Ocean research as we know it at the end of the twentieth century really had its start during World War II and immediately following with the creation of the Office of Naval Research (ONR) in 1946. During the last four years of the 1940s ONR gave oceanography in the United States a vigorous thrust toward the development that would take place during the 1950s.

The 1950s—New Beginnings

Efforts by ONR immediately following World War II set the tone and the style of oceanography (see Knauss, this volume). Marked by the creation of the National Science Foundation (NSF) in 1950, the early 1950s were a period of organization and beginnings. Oceanography programs were started or stimulated at a number of universities. Programs at the Woods Hole Oceanographic Institution, the Scripps Institution of Oceanography, the University of Washington, and Columbia's Lamont Geological Laboratory were reinvigorated. In 1957, at the request of ONR, the National Academy of Sciences (NAS) created the NAS Committee on Oceanography (NASCO)[1] to study the needs of oceanography and the opportunities before it.

1957 saw the beginning of the International Geophysical Year, the creation of the President's Science Advisory Committee (PSAC), and with the launching of *Sputnik* the wake-up call for all science within the United States.

The 1960s—A Decade of Promotion

It was 1959 when the course was set for the 1960s. In early January, the Navy released its TENOC report, *Ten Years in Oceanography* (Lill et al., 1959). Scarcely six weeks later the National Academy of Sciences released the report of its Committee on Oceanography, *Oceanography 1960-1970* (NAS, 1959). These two reports raised the hopes and fired the aspirations of ocean laboratory directors throughout the nation.

NASCO called for the federal government to double its support of basic research over a 10-year period. (In 1958, about $23 million was spent for all research in the ocean; about $9 million was considered to be in support of basic research, of which $8 million were federal funds.) Further, the committee recommended a program of ocean-wide surveys, particularly in waters more than 100 miles from U.S. shores; it suggested that private foundations, universities, industry, and state governments take an active part in the expansion of oceanography programs. But its fourth recommendation and the specific recommendations associated with it received the greatest attention. The fourth recommendation called for an increase in financial support of basic ocean research by specified federal agencies; it recommended that the Navy, the Maritime Administration, and NSF finance new research ship construction. It also included the specifics of a plan for fleet expansion:

> A shipbuilding program should be started aimed at replacing, modernizing and enlarging the number of oceangoing ships now being used for research, surveying and development. Specifically in the period 1960-1970 the research, development and survey fleet should be increased from its present size of about 45 ships to 85 ships. Taking into account the replacement of ships which must be retired during the next decade, this means that 70 ships should be constructed at a total estimated cost of $213 million.

Vessel size, construction schedules, and costs were laid out. The seeds of much of what was to come during the 1960s can be found in this NASCO report.

With the TENOC and NASCO reports as ammunition, the selling job for oceanography took off. NSF and ONR increased their budgets for oceanographic research. Federal attention to the oceans was stimulated. A Subcommittee on Oceanography was added to the Federal Council for Science and Technology. In 1966, the National Sea Grant College Program Act was passed. Internationally, new interest in the resources of the sea was aroused by a proposal to the United Nations by the Ambassador from Malta, Arvid Pardo. Pardo proposed that the UN

internationalize the deep seabed and that the resources of the seabed (largely manganese nodules) be a part of the "common heritage of all mankind." The resulting United Nations Law of the Sea Convention would continue for years. Also in 1966, the passage of the Marine Resources and Engineering Development Act created the National Council on Marine Resources and Engineering Development ("the council"), with Vice-President Hubert H. Humphrey as its chair. The Vice-President was much more than a figurehead. He was a knowledgeable and active chairman. Ed Wenk, the Executive Secretary, was even more active. Together they stimulated a high level of attention to the oceans at the congressional and federal agency levels. National attention was invigorated by the work of the council and the active role of the vice-president. Congressional attention had risen significantly (Wenk, 1972). The same act that created the council also called for a 15-member Advisory Commission on Marine Science, Engineering and Resources. It would be chaired by Julius Stratton and henceforth would be known as the Stratton Commission. The commission was:

1. to examine the Nation's stake in the development, utilization, and preservation of our marine environment;
2. to review all current and contemplated marine activities and to assess their adequacy to achieve the national goals set forth in the Act;
3. to formulate a comprehensive, long-term, national program for marine affairs designed to meet present and future national needs in the most effective possible manner;
4. to recommend a plan of Government organization best adapted to the support of the program and to indicate the expected costs.

By 1968, annual oceanographic research and education budgets in a number of laboratories were in the multimillion-dollar range, and the academic oceangoing research fleet consisted of 35 vessels greater than 65 feet in length.

The rapid expansion of oceanography during the 1960s had been stimulated by the NASCO and TENOC reports of 1959. During the 1970s and beyond, oceanography would be shaped by the Stratton Commission report, *Our Nation and the Sea*, released in January 1969 (CMSER, 1969a).

Our Nation and the Sea addressed our national capability in the sea, management of the coastal zone, marine resources, the global environment, technical and operating services, and organizing a national ocean effort. The report included more than 120 recommendations: it called for an independent civilian agency to administer federal civil marine and atmospheric programs to be known as the National Oceanic and Atmospheric Agency (NOAA); the appointment of a National Advisory Committee on Oceans and Atmospheres (NACOA); an International Decade of Exploration (IDOE); a Coastal Zone Management Program, including coastal zone laboratories; and in order to maintain U.S. leadership in ocean research, the creation of a number of University-National Laboratories (UNLs).

UNL to NOLS to UNOLS

This section describes the transition from University-National Laboratories to a National Oceanographic Laboratory System to a University-National Oceanographic Laboratory System.

The Stratton Commission declared:

1. U.S. leadership in marine science depended mainly on the work of a small number of major oceanographic institutions, such as the Scripps Institution of Oceanography, Woods Hole

Oceanographic Institution, and Columbia University's Lamont Geological Observatory.

2. Creation of big science capability in a few efficient centers is more economical than pursuing the major scientific tasks on a scattered project-by-project and facility-by-facility basis.
3. The laboratories must be assured of an adequate level of institutional support for broad program purposes.
4. The laboratories should be located to cover different parts of the ocean efficiently and to be readily available to other scientists and institutions.
5. The direct management of these laboratories should be assigned to universities with a strong interest and demonstrated competence in marine affairs.

The commission went on to suggest that the laboratories would include but not be restricted to the leading laboratories mentioned earlier and that they certainly would be needed on the Atlantic, Pacific, and Gulf Coasts, the Great Lakes, in the Arctic, and in the mid-Pacific.

The commission recommended "that University-National Laboratories (UNL's) be established at appropriate locations, equipped with the facilities necessary to undertake global and regional programs in ocean science, and assured of adequate institutional funding for continuity and maintenance of both programs and facilities."

In the reports supporting the Stratton Commission's final recommendations (CMSER, 1969 a,b), the Panel on Basic Science and Research, chaired by Robert M. White and John A. Knauss (Volume 1), stated that the laboratories selected to be UNLs must make some formal provision for outside investigators. Further, a partnership between marine science and technology should be fostered and engineering competence should be closely aligned with the laboratory or established within the laboratory.

The recommendation and supporting rationale to establish UNLs were to stimulate subsequent discussions, proposals, and lively debate among the directors of existing laboratories and the personnel of federal funding agencies, most notably the NSF. Adrenalin surged in every ocean laboratory director. Each director saw great opportunities for his own laboratory.

A National Oceanographic Laboratory System—Starting the Debate

When the Stratton Commission report was published a distinct operational pattern of oceanographic research had already been established within the academic community. The system had evolved so that each institution doing ocean research did so from its own research vessel or vessels. "If you were going to be an oceanographic research institution, you needed a research vessel" (Knauss, this volume).

In addition to the vessels at Scripps, Woods Hole, and Lamont, research vessels, new or converted, had been provided by ONR and NSF to the Universities of Rhode Island, Miami, Texas A&M, Oregon State, Washington, and Hawaii. In all, the academic oceanographic research fleet included 35 vessels more than 65 feet in length, 15 of them greater than 150 feet in length, and 9 of these longer than 200 feet. For the most part, their operation was funded through block grants by NSF, and early on by ONR. Although the research conducted from these vessels was done primarily by researchers of the operating institution, visiting scientists from other laboratories were often accommodated. Scheduling and operational management of the vessels were in the hands of the oceanographic research institution.

The future of any university laboratory would be ensured if that laboratory were selected to be one of the Stratton Commission's University-National Laboratories. Every laboratory director recognized the opportunity and positioned his or her laboratory to take advantage of it. Their sense of anticipation was high—and optimistic.

Following the release of *Our Nation and the Sea*, federal agencies began gearing up to carry out the Stratton Commission recommendations. At the Department of Interior, organization was initiated to incorporate the new National Oceanic and Atmospheric Administration (NOAA) within the department. (Later circumstances resulted in NOAA becoming part of the Department of Commerce.) NSF saw a role for itself with regard to the University-National Laboratory recommendation, and convened a meeting of representatives of the major oceanographic laboratories in Washington, D.C. on May 13, 1970. At the meeting, NSF proposed a National Oceanographic Laboratory System (NOLS), and on May 25 it followed with a memorandum from William D. McElroy, Director of NSF, with details. Labeled a "discussion paper," the NSF proposal called for mechanisms to enhance the coordination and operation of oceanographic research vessels on a regional basis, with the vessels available to all users on an equal basis. (It had been rumored that during prior years, vessels from several laboratories had sailed to the Mediterranean unbeknownst to each other. The lack of coordination had resulted in the loss of an opportunity to conduct synoptic research and, furthermore, led to expenses that might have been reduced had the operational plans been coordinated.)

The major features of the proposal called for "block funding" of "key capabilities" of NOLS labs; multiple-year funding or some "alternative form" of long-term commitment, the sharing or coordinated use of specialized facilities, and "coordination in the planning and the conduct of research to effect national specialization within a balanced program." Several alternative management structures were proposed, but a grouping in seven regions was favored by NSF. There was an implication in the wording of the discussion paper that Woods Hole and Scripps would be the operators for "worldwide cruises of well-defined and well-reviewed programs of national interest."

The directors of the medium-sized but aspiring laboratories (e.g., Rhode Island, Oregon State, Washington) were concerned. The directors of Woods Hole and Scripps were pleased at the thought of stable long-term support, but were dismayed by the possibility of centralized federal control of their ship operations. One can only imagine the thoughts of those at Lamont —mentioned by Stratton, but omitted by NSF. McElroy called for "frank and informal" responses to the NSF proposal. He would receive them.

To the laboratory directors, who were focused on the possibility of stable financial support, it looked like an attempt by NSF to take over the control—if not the actual operation—of the oceanographic fleet. The suggestion that the fleet be regionalized was an added threat, particularly to the larger laboratories, which sent their vessels to all oceans of the world.

Woods Hole took the lead in reacting. In a graciously worded letter (July 16, 1970), the Director of Woods Hole, Paul Fye "Paul," wrote to William D. McElroy, Director of NSF "Dear Bill". Fye responded to the NSF proposal for a regionalized NOLS. The letter included an addendum as to how Woods Hole would operate within NOLS, should NOLS in the proposed form be adopted.

Woods Hole "enthusiastically supports *the efforts* you are undertaking *to explore new ways* to meet the *growing problems* of oceanographic research" (emphasis by the authors). Fye pointed out that the key factors in the NOLS concept of cooperative planning and cooperative use of facilities were already happening, particularly at Woods Hole. Mention was made of the Joint

Oceanographic Institutions for Deep Earth Sampling (JOIDES), the International Indian Ocean Expedition (IIOE), the Global Atmospheric Research Program (GARP), the Geochemical Ocean Sections Study (GEOSECS), and so forth. "These illustrations point out that a great deal of cooperative planning and operation already exist . . .. Perhaps more significant to the NOLS plan is the extensive use of Woods Hole ships by non-Woods Hole staff members . . . we contend that we have an excellent record in making facilities available to oceanographers from outside our Institution."

Fye then went on to indicate that any strategy should ensure that good science would have top priority, that ships would be used efficiently, and that cruises would be planned to achieve optimum scientific results; duplication should be avoided and seagoing opportunities should be provided to competent scientists from laboratories not operating ships. Then, "In order to achieve these objectives, we feel the following conditions are essential. First, *adequate funding must be available on a long-term and flexible basis*. Next, *organization and coordination must be such that they involve minimum bureaucratic procedures*. Further, *the scheduling of ships must be in the hands of the operating institution which has the responsibility to ensure these are managed properly.* " (emphasis Fye's). Essentially the labs wanted more and stable funding, few constraints, and autonomy to continue scheduling and operating their vessels.

With regard to regional coordination. Fye recommended that Scripps, Woods Hole, and Lamont form an interinstitutional committee to review scientific programs and ship scheduling for worldwide ship operations, and that similar groups be established for operations for the East Coast, West Coast, Gulf of Mexico, and Great Lake s regions. In the remainder of his four-page letter, he made a strong plea for stable core support for the oceanographic laboratories and that the laboratories be free to manage themselves. He would also take a shot at the funding agencies.

> ". . . each oceanographic laboratory has problems facing it today which the implementation of the continuing core support aspect of NOLS could alleviate. There is a general crisis in ship funding; currently no one has assurances as to whether or not they will be able to operate research ships, submersibles, or aircraft in the next calendar year. Since this involves expenditure of many millions of dollars (3.5 million for Woods Hole next year) any mistake in estimating the available funding could prove to be extremely damaging to the financial status of the operating laboratory. In addition, research proposals submitted to NSF and other agencies are not approved in sufficient time to permit the development of an optimum or realistic ship schedule. These difficulties now exist within all oceanographic institutions and could be significantly improved if NOLS provided stable funding. It is, of course, most important that our present difficulties in funding and scheduling not be compounded by the imposition of unworkable outside constraints.

Paul Fye's letter framed the debate.

The directors of Woods Hole, Lamont, and Scripps would meet in August at Woods Hole to consolidate their resistance to the NSF plan for NOLS and would request an audience with McElroy. In the meantime, virtually every oceanography laboratory director responded to McElroy with concern and alternatives to the NSF plan (e.g., not seven regions, but two; an unrestricted directors' fund). The Navy weighed in, too. Assistant Secretary of the Navy Robert A. Frosch, in a letter to McElroy (August 10, 1970), urged that any implementation of the NOLS concept recognize the Navy's research needs and permit flexibility of the oceanographic laboratories to respond to these needs.

But the lab directors felt they needed more clout. They turned to the National Academy of Sciences Committee on Oceanography to engage its support. Essentially from its membership, NASCO created a Facilities Utilization Panel to address NSF's NOLS proposal. Not too surprisingly the panel consisted of laboratory directors, former directors, and other leaders.[2]

The panel indicated that the NOLS plan as formulated by NSF "has substantial merit and that its adoption in the *modified* form proposed below will result in a significant advance in the U.S. Oceanographic Programs . . . ." The panel laid out guiding principles, the foremost of which was "to improve the level and stability of federal support for academic oceanography."

Other principles included leaving control of ships programs in the hands of working scientists, building on the ship-operating experience of existing laboratories, enhancing the sharing of facilities among qualified investigators, maintaining mutually agreed upon cooperative arrangements rather than establishing centralized control, maintaining freedom for scientists from any laboratory to work in any geographic area, and involving other federal agencies. The panel also proposed that a review committee reporting to NSF be established to assess the effectiveness of all ship and laboratory programs. In addition, an implementation plan was described that called for cooperative planning based not on the geographic location of laboratories but on common interest in areas of operation or major oceanographic problems. There were no surprises, but this report did come from the Academy.

Although the debate was on, and was intense, innovative ideas were surfacing. The laboratory directors argued for stable core funding (at an increased level) but not fettered by federal control or bureaucracy. On the other hand, NSF was concerned about fragmentation, the random distribution of facilities and scientists, the rising costs of ship operations, the decline of ONR support, the need for greater accountability, and the pressure to accommodate scientists from non-ship-operating institutions. NSF believed these factors called for greater centralization of planning, scheduling, and assessment. NSF had the input from the lab directors McElroy had requested. It was time to act.

Mary Johrde had been given responsibility for NOLS within NSF. Her short version of a NOLS Planning Document was issued in January 1971 with the opening caveat from Benjamin Franklin, "We must all hang together, or assuredly we shall all hang separately." It reflected the tone of concern within NSF. It was vintage Johrde. Her perspective was from Washington; she cared; she was determined. Eight or so lab directors on one side; Mary Johrde on the other— the odds were almost even.

The proposed NOLS plan of January 1971 succinctly defined the NSF position. It described the factors leading to the NSF position and stated firmly NSF's intentions with respect to how the academic oceanographic fleet would be managed and what NSF's role would be.

NOLS (January 1971)

In the "NOLS Planning Document: Short Version," Mary Johrde reviewed the development of federal support of oceanographic vessels (32 vessels operated by 18 institutions), and the factors NSF believed called for a change in management and operation of the facilities (ships, submersibles, aircraft, data acquisition systems, docks, shops, etc.).

The objective, it said, was "to preserve to the maximum extent the independence and integrity of existing oceanographic institutions and concurrently to create a mechanism for cooperative utilization of oceanographic facilities."

Then, "This objective will be achieved by an association of institutions in a national system in which utilization and acquisition of oceanographic facilities will be justified in terms of the facilities requirements of those qualified scientists who can make a contribution to the national oceanographic effort. *Individual institutions will continue to operate facilities, but scheduling, assessment and planning with respect to their utilization and acquisition will be handled cooperatively by the System*" (emphasis by the authors).

Further, only those institutions electing to participate would receive support for acquisition and operation of ships, and for this agreement to participate, NSF "will, *in so far as possible* , express its intent two years in advance to commit NOLS support for operation of ships and other shared facilities" and will urge ONR to do likewise. No promises would be made with regard to facilities added to the mix after the establishment of NOLS.

A description of the NOLS organization then followed. There would be two regions: an Eastern Region and a Western Region; the Gulf of Mexico and the Great Lakes might be subdivisions of the Eastern Region; Hawaii, Alaska, and the Pacific Territories, part of the Western Region. There would be operating committees for each region to schedule the facilities within the region and to assess needs for additional or replacement facilities. In addition, there would be a Central Committee for Planning and Assessment for the entire system.

The NOLS office within NSF would be designed to provide management functions matching those of the academic sector. NSF and ONR would establish joint panels to consider ship operation requirements and ship construction and conversion. NSF would select two "host institutions" to take the lead for organizing meetings, and so forth in the Eastern and the Western Regions; NSF would provide funding for meetings and would approve the nominations by the institutions for the Regional Organizing Committees. The document then went on the describe how NOLS would actually function.

The reactions of the laboratory directors ranged from concern to outrage. In their eyes the NOLS plan was a proposal to take over a significant portion of their management responsibility and authority, the portion that determined where, when, and how they would conduct research in any part of the ocean. Their resistance stiffened.

Again, Paul Fye wrote to Bill McElroy (March 22, 1971): "Dear Bill; I know some of your staff have been puzzled at the strong opposition found within the oceanographic laboratories over the last form of the NOLS plan . . . Our concern with the NSF (January, 1971) statement of the NOLS operational plan is as much with the philosophy on which it is based as with the operational mechanics themselves."

He then went on to review the intent of the Stratton Commission in recommending UNLs, discussed the importance of the relationship "between the creative scientist and the tools of his research," and wrote of the concern about and resistance to the plan on the part of senior scientists at Woods Hole.

> Why is this so when admittedly its [the NOLS plan] purpose is good, its goals are desirable and overall it isn't a bad plan? The fundamental error is that it removes the operational control of research tools further from the creative scientist. Is this necessary to achieve these goals and this purpose? We think not.
>
> We are pleased that NSF has consulted the oceanographers who use the research ships about this plan. We recognize the sincere attempt by members of your staff to understand our objections. I understand that a continuing committee cosponsored by the Academy and the

> Foundation will explore ways for further improvement of the NOLS plan.

In his response (April 7, 1971), McElroy stressed the need for "participatory management of oceanographic facilities by the academic community *in conjunction* with the Foundation" (emphasis ours). The groundwork for collaboration was reinforced. McElroy then referred to a joint meeting in April of representatives of oceanographic laboratories and NSF staff to consider changes and possible improvements to the NOLS planning document.

To the credit of Mary Johrde and her NSF colleagues, some type of compromise seemed appropriate. The group of laboratory and NSF representatives met on April 23 and 24, 1971, and drafted a compromise plan. It met again in July and August to refine the compromise proposal and to prepare it for presentation to the academic community.

UNOLS

On August 4, 1971, "A Proposal to Establish a University-National Oceanographic Laboratory System" (UNOLS) was completed and then distributed to the academic oceanographic laboratories. The proposal acknowledged the development of a strong U.S. oceanographic program and of the importance of the academic oceanographic laboratories in this development, but it also recognized factors that could have an effect on the long-term viability of U.S. leadership in oceanography.

> The academic community is also acutely aware that the continued health of the programs depends heavily on its assuming greater responsibility to assist the funding agencies in an appropriate manner in monitoring the utilization of these resources to insure: that there is a proper balance between research and facility support, that available facilities are used efficiently, that scientists from both ship-operating and non-ship-operating laboratories have access to the sea, that needs for new facilities or the phasing out of old or excess ones are assessed and priorities established accordingly. that long-term support becomes an integral part of planning, and that consideration be given to the encouragement of new operating elements only to the extent that a demonstrable need for such exists and sufficient continuing support is available.
>
> In order to provide a mechanism whereby the academic community can assist the Federal agencies in meeting the responsibilities noted above and at the same time continue the high standards of research that have been exhibited in the past as well as to provide a flexibility of operation allowing for a coordinated approach to some of the future challenges—it is proposed that the academic laboratories organize a system in which they can work cooperatively together and with the funding agencies for the effective use, assessment and planning of oceanographic facilities. The organization will be known as the University-National Oceanographic Laboratory System (UNOLS).

Membership in the system would be open to academic institutions operating federally funded facilities. Facility use would be open to scientists from any institution, primarily for the conduct of federally funded programs. The purpose of the organization would be to provide a formal mechanism for community-wide coordination and review of the use of available facilities, equal opportunity for access to these facilities, community-wide assessments of the current match of facilities to the needs of federally funded oceanographic programs, and appropriate recommendations of priorities for replacing, modifying, improving, increasing, or decreasing the numbers and mix of facilities for the community of users.

There would be a UNOLS committee to monitor the activities of the system, provide advice and assistance to members, and submit reports to the funding agencies. It would consist of seven members, three of whom would be from nonmember institutions. A UNOLS office, with an executive secretary, would be established at a member institution to handle staff duties. Support for the office would be prorated among the funding agencies.

Once a year, UNOLS members would meet to coordinate ship schedules. There would be three separate meetings: one to schedule ship operations in the open ocean (500 miles or more offshore); one for the coastal waters (less than 500 miles from shore) for the East Coast; and one for the West Coast coastal waters. Detailed logistics for preparation and coordination of schedules were suggested.

The UNOLS committee would consist of members elected to three-year terms and would devote its early attention to the effective use of existing oceanographic facilities. It would evaluate the need for replacement and additional facilities and would recommend to the funding agencies on behalf of the oceanographic community consideration of specialized facilities or new concepts in facilities.

Many of the attributes of earlier versions of the NOLS plan were included. There were significant differences, however. There would be one national program, not divided geographically, but considering separately only open ocean, West Coast, and East Coast operations. The overwhelming difference from all the NOLS proposals was that this system would be managed almost exclusively by the institutions themselves. It would be a *University*-National Oceanographic Laboratory System—a cooperative venture.

The drafters of the UNOLS proposal, Dick Barber (Duke University), John Byrne (Oregon State University), Art Maxwell (Woods Hole), Bob Ragotzkie (University of Wisconsin, Madison), and Jay Savage (University of Southern California), presented and discussed the proposal at a meeting of representatives of the oceanographic laboratories at the Lamont Geological Laboratory of Columbia University on September 22, 1971.

UNOLS—The First Year and Beyond

The laboratories that agreed to participate did so with misgivings. UNOLS represented a new way of doing business. Those that participated agreed to give up an element of autonomy for the good of the community. However, because there was the threat of losing funding if they failed to participate, there was a strong incentive to do so. Even so, UNOLS was considered to be an experiment. The proposal was not accepted until a "renewal or dissolution" clause was added to the charter. In order for UNOLS to continue, it would require a renewal every three years by vote of its members. The proposal was unanimously accepted. UNOLS was born.

There were 18 initial members:

Duke University

Florida State University

Johns Hopkins University

Lamont-Doherty Geological Laboratory of Columbia University

Nova University

Oregon State University

Scripps Institution of Oceanography

Skidaway Institute of Oceanography

Stanford University

Texas A&M University

University of Alaska

University of Hawaii

University of Miami

University of Michigan

University of Rhode Island

University of Southern California

University of Washington

Woods Hole Oceanographic Institution

These 18 institutions operated 33 vessels more than 65-feet long (Table 1).

TABLE 1

The UNOLS Fleet.

At the first meeting, Art Maxwell of Woods Hole was elected chairman and Jay Savage of the University of Southern California, vice-chairman. The UNOLS committee was also elected at the time and included John Byrne, Oregon State University, chair; John Craven, University of Hawaii; Charles Drake, Dartmouth; David Menzel, Skidaway; Bob Ragotzkie, Wisconsin; Hank Stommel, Massachusetts Institute of Technology; and Warren Wooster, Scripps Institution of Oceanography. Soon after the inception of UNOLS, with Woods Hole as the host institution and Art Maxwell as chair, Captain Robertson P. Dinsmore (Coast Guard, Retired), was selected to serve as the executive secretary. Maxwell, Dinsmore, and Woods Hole would lead UNOLS during the early years of its existence.

The charter of UNOLS was adopted at the first regular UNOLS meeting held at Texas A&M at College Station in May 1972. At the outset, the main function of UNOLS was to coordinate ships' schedules and to focus on the replacement of federally funded vessels. Early on, the Research Vessels Operators Council (RVOC), which had existed for some time, was incorporated into UNOLS to serve as an expert advisory group directly involved with the operation of vessels. During the first year, UNOLS' efforts began to focus on the development of coastal ships, uniform standards of operation, foreign clearances, uniformity of technical services, national facilities, and of course, the fleet replacement. Attention was also directed to specialized facilities. These included the expeditionary vessel *Alpha Helix*, the deep submersible, *Alvin*, Scripps aircraft, and other unique facilities that would be available to the entire oceanographic community.

During the first years of its operation, UNOLS membership changed. Stanford, Florida State, and Nova dropped out, while Texas, Delaware, and Moss Landing became members. Associate memberships (non-ship operators) were created in order to involve more of the research

community.

UNOLS Today

The past 27 years has seen a broadening, strengthening, and maturing of UNOLS. As a concept, UNOLS helped define a new cooperative way of conducting oceanographic research. Together with NSF's International Decade of Ocean Exploration program, a new era of U.S. oceanographic research was initiated—one that provided opportunities for all competent ocean scientists who were willing to engage in cooperative research. Today, UNOLS consists of 57 academic institutions that operate significant marine science programs: 19 of these institutions operate the fleet of 29 research vessels—the strongest, most capable fleet of oceanographic research vessels in the world.

Several of the institutions that dropped out are again members, but not as vessel operators. Over the years, several additional institutions have joined as vessel-operating laboratories. These include the Harbor Branch Oceanographic Institution, the Bermuda Biological Station, and the Louisiana Universities Marine Consortium.

Since 1972 the fleet has changed. Seven of the original thirty-five vessels are still in service, these have been joined by twenty-two new vessels. The size distribution of the fleet is shown in Table 2.

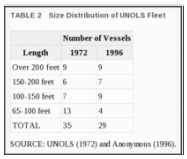

TABLE 2 Size Distribution of UNOLS Fleet

Length	Number of Vessels 1972	1996
Over 200 feet	9	9
150-200 feet	6	7
100-150 feet	7	9
65-100 feet	13	4
TOTAL	35	29

SOURCE: UNOLS (1972) and Anonymous (1996).

TABLE 2

Size Distribution of UNOLS Fleet.

During its more than quarter century of existence, the UNOLS charter has been repeatedly adopted every three years. It has been amended or revised 11 times. Today UNOLS still operates according to the original concept so laboriously formulated in 1970 and 1971; it is larger, more sophisticated, and stronger than ever. As pointed out in the 25-year history of UNOLS, available on the UNOLS Web site (www.gso.uri.edu/unols/25annpap.html), "UNOLS will continue to be a major presence in U.S. oceanography for the next twenty-five years. Today it stands as a model of inter-agency and federal/academic coordination. It has developed a flexible, cost-effective management structure. It emphasizes an entrepreneurial atmosphere to keep the fleet at the forefront of technology while maintaining the cost-effective structure. The close coordination with academic institutions results in substantial cost savings. It encourages the collegial atmosphere that leads to close cooperation between the operators. As a result of these factors, the UNOLS fleet is an integral part of our nation's science program."

The U.S. oceanographic research program is the foremost in the world. UNOLS has been a major contributor to this position of leadership. Moreover, it serves as a model of how scientists and scientific institutions can cooperate to reach the highest levels of scientific achievement.

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Footnotes

1 National Academy of Sciences Committee on Oceanography: Harrison Brown, professor of geochemistry, California Institute of Technology; Chairman; Maurice Ewing, Lamont Geological Observatory, Columbia University, Palisades, New York; Columbus O'D. Iselin, Woods Hole Oceanographic Institution, Woods Hole, Massachusetts; Fritz Koczy, Marine Laboratory of the University of Miami, Miami, Florida; Sumner Pike, Lubec, Maine, formerly commissioner, U.S. Atomic Energy Commission; Colin Pittendrigh, Department of Biology, Princeton University, Princeton, New Jersey; Roger Revelle, Scripps Institution of Oceanography, La Jolla, California; Gordon Riley, Bingham Oceanographic Laboratory, Yale University, New Haven, Connecticut; Milner B. Schaefer, Inter-American Tropical Tuna Commission, La Jolla, California; Athelstan Spilhaus, Institute of Technology, University of Minnesota, Minneapolis; Richard Vetter, (Executive Secretary) on leave from the Geophysics Branch of the Office of Naval Research, Washington, D.C.

2 The foxes were in the hen house. Their report was released in December 1970. The NASCO Facilities Utilization Panel included Richard B. Bader (Miami), chair; Wayne V. Burt (Oregon State University); Peter Dehlinger (OSU and ONR); Paul M. Fye (Woods Hole); Jeffrey Frautshchy (Scripps); John Lyman (formerly U.S. Navy Hydrographic Office and NSF); Robert A. Ragotzkie (Wisconsin); and George P. Woolard (Hawaii).

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