A LONG VOYAGE TO GET

by Kathryn Eident

On a cold, blustery day in April 1997, hundreds of people swarmed Iselin Dock at Woods Hole Oceanographic Institution (WHOI) to welcome the research vessel *Atlantis* into the nation's oceanographic fleet. Politicians and other government officials lined the decks as the 274-foot ship eased in. The cheering crowd on the pier almost drowned out a local college band heralding *Atlantis*, the new support ship for the submersible *Alvin* and a symbol of WHOI's status as a world-class research ship operator.

Atlantis had taken more than ten years to design and build, and Dick Pittenger, then vice president for marine operations at WHOI, was aboard, celebrating its long-awaited arrival. But even then, he had started thinking about the next new ship.

"You can't rest on your oars," he said to himself. "You've got to get on with it."

Pittenger knew well that from concept to keel, the process of acquiring new ships is long, arduous, and fraught with pitfalls. He also knew that, like children, ships grow older before you know it. In only a decade or so, WHOI's two other large research vessels, *Knorr* and *Oceanus*, would be nearing the end of their service lives.

So with *Atlantis* in full bloom, he began sowing seeds that bore fruit 13 years later, when WHOI was selected to operate one of two new ships that will join the national research fleet. If all goes according to schedule, the ship will come into service by 2015.

Boom times for science

Few realized it at the time, but the welcome for *Atlantis* also signaled the end of a golden era for U.S. research vessels. From 1989 to 1997, ten large- and intermediate-scale ships were either built or retrofitted by the Navy, the National Science Foundation (NSF), or private institutions.

By 2003, however, times, and the economy, had changed. As federal deficits climbed and budgets shrank, oceanographic research fell lower on the list of national priorities. In the past decade, only four ships have been added to the national research fleet, but 12 were retired, diminishing the fleet from 28 to 20. Pittenger, who was Oceanographer for the Navy before he came to WHOI, knew that federal support for the nation's research fleet has always proceeded in roller-coaster cycles.

When WHOI was established in 1930, it used funds from a private endowment to commission the building of the original *Atlantis*, a 143-foot ketch. *Atlantis* was the first American ship built specifically for oceanographic research.

During World War II and early in the Cold War, the Navy dramatically increased funding for basic oceanographic research, which paid huge dividends in enhancing the Navy's effectiveness in its watery theater of operations, especially in submarine warfare. But America's research fleet still consisted mostly of refitted military ships, yachts, and supply vessels.

The next crest came in the early 1960s—a boom time for basic science. The nation's space program ramped up, and while NASA engineers were building Saturn rockets and Apollo space capsules, ocean engineers and scientists at WHOI were designing *Alvin*, a human-occupied submersible that would lead to momentous discoveries in the deep ocean. The 1960s brought an influx of federal funds to design and build ships specifically for doing marine science. Twenty new research ships came on line during the decade, including R/V *Knorr* at WHOI.

Inner and outer space

How the nation pursued explorations of space and the ocean, however, was quite different. The space program was a high-profile endeavor that featured astronaut heroes and a visible goal of landing men on the moon. Its goals and assets were, and still are, guided by NASA, which owned and operated rockets and the space shuttle fleet.

Ships in the national oceanographic research fleet are owned by several departments of the federal government, primarily the Navy and NSF, or by individual academic institutions. But each ship is operated by an institution, such as WHOI, which is responsible for maintaining the vessel and providing the crew.

The host institution does not control where the ship goes or who gets to use it. That task falls to the University-National Oceanographic Laboratory System, or UNOLS, a consortium of 61 universities and institutions involved in oceanographic research. At present the UNOLS fleet boasts 20 ships at 15 institutions.

Researchers all over the country, including ones who don't work at UNOLS institutions, can submit proposals to use UNOLS ships. Balancing vessels and scientists, UNOLS arranges schedules and itineraries as efficiently as possible. A majority of the scientists working on WHOI-operated UNOLS ships come from other institutions, and WHOI scientists often go to sea on ships based elsewhere.

A NEW SHIP

Revitalized after a dry spell

By the early 1980s, the space shuttle program was in high gear and NASA rolled out the shuttles *Atlantis*, *Columbia*, *Challenger*, *Discovery*, and *Endeavour*. Each of these was named after a famous seafaring vessel.

Meanwhile, funding for oceanography had dropped low enough to put the U.S. research fleet at risk. Ships that dated back to World War II had become obsolete, no new ships were in the works, and ships built during the flush days of the '60s were approaching middle age and would need to be refitted and updated to extend their service lives.

Navy Secretary John Lehman, appointed by President Ronald Reagan, recognized that the nation's research fleet was on the verge of obsolescence. His concern was not strictly scientific; knowledge of the oceans was crucial to maintain the Navy's readiness to detect and confront threats at sea. In 1984, Lehman and Chief of Naval Operations Adm. James Watkins issued a policy statement declaring the research fleet a Navy priority. They committed tens of millions of dollars to build four new research ships and to overhaul six others. For comparison, the space shuttle *Endeavour* cost $1.7 billion.

WHOI rode the Lehman/Watkins-led wave of ship funding through the 1990s. *Atlantis* arrived, and *Knorr* and another WHOI ship, *Oceanus*, underwent major midlife retrofits.

At the same time, Navy officials also had the forethought to lay the groundwork to build four more new vessels. Two would replace *Knorr* and its sister ship *Melville*, which would need to be retired in 2015. The other two new ships might replace other aging vessels but potentially could expand the fleet, if all other ships remained in service.

In July 2002, the Navy made it official: It was ready to proceed with plans for four new ships. But the ships would be a new, smaller "Ocean Class" category of vessels that were intended to cost less to build and operate than Global Class ships such as the 279-foot-long *Knorr*, while retaining many of the capabilities of the larger ships.

Summit in Salt Lake City

Federal agencies turned to the science community for input on what it wanted the ship to be capable of doing. The Navy, NSF, and NOAA mandated a UNOLS-sponsored committee to devise Scientific Mission Requirements, or SMRs.

In 2002, UNOLS invited 70 people involved with the fleet to landlocked Salt Lake City to devise the SMRs. This was oceanographers' one big chance to persuade the agencies of their vision and needs for new research ships and offer advice on details from deck fittings to the number of berths to the width of the ship's passageways. These guidelines would be fashioned into specifications that architects and shipyards would use in the formal design process—with little additional input from the scientists.

"It was a challenging process," said Al Suchy, WHOI director of ship operations. "We had to pare down requirements so we could get an Ocean Class ship."

Even seemingly minor details could affect the design in major ways. Increasing the number of scientists that a ship can host, for instance, means not only more berths, but also more storage space for food, water, and gear. Each additional person could add up to 50 tons to the ship's displacement, according to Suchy.

Coming to consensus

A year later, in March 2003, UNOLS approved the 60-page final draft of the SMRs and sent it to the Navy, NSF, and other interested parties. The science community, through its grass-roots process, had spoken.

The final SMR document recommended a ship with berth and workspace for 25 scientists. It included:

- provisions for adequate deck space, and necessary cranes, winches, and cables to maneuver scientific equipment between the deck and ocean
- features such as anti-roll tanks, so the ship could venture into the roughest waters of the North Atlantic and Southern Ocean
- a Dynamic Positioning System to keep the ship on a target point in up to 8-foot seas and 35-knot winds
- low noise and vibration to prevent interference with sensitive sonar and other instruments
- a relatively fuel-efficient engine to reduce operating costs

Rendering by Guido Perla & Associates

Courtesy of WHOI Archives

Built in 1931, *Atlantis* was WHOI's first ship. As the first vessel built specifically for deep-water oceanographic research, the 143-foot ketch rejuvenated the field, making 299 cruises until it was retired in 1964.

- living features such as ample portholes to provide natural light; pleasant (non-military) color of walls, floors, and furnishings; sleeping and recreational spaces suitable for people who are not experienced sailors; passageways wide enough to accommodate people with disabilities; and alarms that can be noticed by blind or deaf workers

- flexibility to adapt to yet-to-be-invented technologies

In short, the group asked for ships that could do what a Global Class ship could do, even though they would be smaller.

"You can imagine all the different ideas about what this ought to look like," said Robert Munier, who became vice president of marine operations at WHOI in 2010. "Someone has to be the referee, and that ends up being the Navy."

Even a more economical ship takes money, and WHOI officials knew that a bumpy road still lay ahead. In the mid-2000s, the federal budget came under increasing strain and competing priorities. UNOLS pressed its case hard, and finally, in July 2009, the Navy announced that it had budgeted $176 million for two identical Ocean Class research ships, not four as planned in 2002. Each of the new ships would incorporate berthing for at least 24 scientists and the ability to stay at sea for up to 40 days and cruise at 12 knots. Other details would be worked out in the formal design phase.

Start the bidding

Shortly after, the Navy explained the bidding process for institutions hoping to be chosen to operate one of the new ships. Each winning ship operator would need to retire a ship from service. Nobody's fleet was going to grow.

Most of the time, oceanographers at UNOLS institutions work together collegially. After all, there are only so many ships, so much time at sea, and so much money to go around. But come time to bid for a new ship, it's every institution for itself.

For institutions that do a lot of oceanography, there are several reasons to want to operate at least one UNOLS vessel. The main reason is that ships create scientific opportunities, to which scientists at the host institution usually have first access. An institution with ships will have more engineers, technicians, and crew members with more skill and experience handling scientific equipment at sea, than institutions without ships.

Operating a UNOLS ship also brings in money. Ship operators get federal grants that pay for research done using the ship. These grants help pay for institutions' basic operating expenses. At WHOI, grants for shipboard science provide about 20 percent of the institution's overhead income.

And, of course, operating a research ship enhances the institution's reputation as an oceanographic powerhouse. WHOI

Courtesy of WHOI Archives

Courtesy of WHOI Archives

At left, the new *Atlantis* is welcomed into the fleet in New York City harbor during one of its first voyages in 1997. Above, 34 feet was added to the middle of the research vessel *Knorr* during a mid-career refit in 1991.

is renowned for its seagoing and ship management expertise, honed through decades of ship operation. WHOI administrators were determined to uphold that legacy.

Even though WHOI's ship *Knorr* was scheduled for retirement, that didn't mean WHOI would automatically win a contract to operate one of the new ships. The institution would have to compete in a bidding process just like everybody else. And WHOI wasn't the only ship operator worried about its aging ships.

At the Navy meeting for potential bidders, representatives from WHOI, the University of Rhode Island, Scripps Institution of Oceanography in California, Oregon State University, the University of Washington, and the University of Miami were cordial to one another. But beneath their civil exterior lay a vein of cutthroat competition. There was a lot at stake, and everybody knew it.

"Everyone was kind of holding their cards—they were being very friendly, but basically they were saying that they would be deadly serious about winning the competition," said Pittenger, who represented WHOI at the meeting. The game was on.

WHOI makes its case

By then, Pittenger had officially retired, but he teamed with his successor, interim vice president of marine operations Susan Humphris, Suchy, and others to write the 75-page proposal highlighting WHOI's accomplishments and capabilities.

WHOI is the largest ocean research facility on the East Coast, with eight decades of experience. Since 1930, it has operated more than 30 ships—14 of them 100 feet or longer. Its crews and technicians have consistently demonstrated skill and care, extending the working lives of the ships. The institution maintains large deepwater docks in a protected harbor with adjacent shop and supporting infrastructure. Just in the span from 2004 to 2008, WHOI research ships completed 198 successful scientific cruises, with nearly 60 percent of the participants from institutions other than WHOI.

Satisfied that it had produced a solid proposal, the WHOI team e-mailed its bid to the Navy. Then it waited.

The 2009 winter holiday season came and went, spring arrived, and finally, so did the news: Four institutions had submitted bids, and WHOI and Scripps had been chosen to operate the new Ocean Class vessels. The new sister ships will replace the retiring sister ships, *Knorr* at WHOI and *Melville* at Scripps.

"WHOI's outstanding proposal was the unanimous recommendation for operation of the [first] Ocean Class research vessel," said U.S. Navy Rear Adm. Nevin Carr, Chief of Naval Research. "I am pleased to continue ONR's long and fruitful association with WHOI as a premier operator of Navy research vessels for the betterment of Navy and our nation's ocean science programs."

"WHOI is honored and thrilled with the opportunity to continue to serve the ocean science research community at a time when the need for increased ocean observations is so important," said WHOI President and Director Susan Avery.

The next ship in a long line

In many ways, the voyage to the new ship is just beginning. Two shipyards vied for the contract to build the new ships. In October 2011, the Navy selected the design of marine architect Guido Perla of Seattle, Wash. In February 2012, it awarded a $145 million contract to Dakota Creek Shipyard of Anacortes, Wash., to build them. Their challenge is to maximize the Scientific Mission Requirements desired by the scientists within a 238-foot ship and the allotted budget, Suchy said.

"There are a lot of players who want or need something," said Christopher MacDonald, a project manager with PEO Ships, the Navy department tasked with overseeing the ship's construction and keeping the project on time and on budget. "Even for me, the tendency is strong. I want to provide a great ship for the science community, but the reality is that the budget is what it is."

WHOI's winning bid also comes with financial responsibilities. The institution must invest $350,000 annually to operate and maintain the new research vessel as part of a cost-share arrangement with the Navy. In exchange, WHOI scientists, especially early-career researchers, will get preferential access to the ship for about ten days a year. The institution has embarked on a fundraising effort to create a $7 million endowment for the cost share.

The new ship will replace *Knorr*, one of two WHOI ships that Pittenger knew back in 1997 would be nearing the end of their service lives sometime after 2010. The other ship, *Oceanus*, was transferred in January 2012 to Oregon State University to replace its retiring vessel, *Wecoma*.

Sometime this year the Navy will choose the name by which the world will know the ship. If all goes according to schedule, WHOI's new ship will be delivered in late 2014 and be operating at full capacity in 2015.