FRESH STARTS

In Simulation Work, the Demand Is Real

Eric Schultz for The New York Times

Bill Waite, left, chairman of AEgis Technologies, a simulation company, with Danny Thomas, senior research scientist, at its Huntsville, Ala., office.

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AS employment headlines go from grim to grimmer, it's appropriate that one job category with expanding demand involves helping people avoid reality. Designers of computer simulations are sought in many fields to help understand complex, multifaceted phenomena that are too expensive or perilous to study in real life.

Simulations are used to gauge the impact that new rivals in the market may have on a company's sales — or to help a manufacturer devise the cheapest, fastest means of delivering products.

To reduce costs measured in lives, not dollars, simulations examine responses in security threat situations, for instance, or how various factors affect aircraft or rocket-engine performance.

"The fundamental nature of modeling and simulation is to represent something that's in the world out there in a way that you can manipulate and think about without risk and at low cost," said Bill Waite, chairman of the AEgis Technologies Group, a Huntsville, Ala., company that creates simulations for various military and civilian applications.

"It almost doesn't matter what kind of world you care about; you can use simulations," Mr. Waite explained. "If you're a defense agency, you want to create a simulation that will allow a missile that gets built to fly up to an enemy something-or-other and detonate. The same tools and same set of skills are used in the pharmaceutical industry to figure out

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how the little beads in a Bufferin are going to get from your stomach to your brain."

He estimates that 400,000 people make a living in the United States in one aspect or another of simulation. His company employs close to 200 people, with an average salary of $85,000.

The profession draws on expertise in a number of areas and does not fit neatly into any single category. Many types of employers in private industry, the military and other branches of government hire simulation experts.

Simulation "overlaps engineering, math and computer science, but it isn't the same as any one of those," Mr. Waite said. "The discipline is extremely ecumenical and moves gracefully from representing lots of different things in different ways, while requiring a core set of skills."

Those skills include a facility with technology but mainly an aptitude for "conceptualizing the world," he said. Developing a simulation requires enough native intelligence to view a problem abstractly, research the issues and tease out the myriad key elements. Then they must be incorporated into a model in which they are poked, prodded and tweaked to reach useful solutions.

The results must then be presented so that colleagues who use them — engineers, scientists and marketing staff, not to mention the suits upstairs who pay the bills — can follow. An ability to communicate is deemed essential.

So is a knack for working with others. Modeling tasks tend to be done in teams because "we solved most of the problems that one person can do a long time ago," said Danny Thomas, senior research scientist at AEgis. "Modeling space flight or missile defense is too complex for one person to understand."

The use of simulations has grown recently in line with the brute strength of computers and developments in artificial intelligence and data analysis.

"The ability to find optimal solutions quickly has grown by leaps and bounds," said Corey Clark, an associate professor in game and simulation programming at the Irving, Tex., campus of DeVry University. "Fifteen years ago, you had to have mainframes and cluster computing to do any of this. Now you just need a person in a cubicle."

Progress is also being driven, he said, by "massive collection of data — every click, every customer entering and exiting a store and using discount cards."

But while simulations require less time and space than before, the field has existed for many years, as Mr. Thomas's career shows. He got his start 38 years ago modeling systems for Apollo moon missions and moved to missile defense programs and the space shuttle.

When he started, people entered the field through a general science background; then software programmers gravitated to it. Now simulation is seen as an academic and professional discipline in its own right, said D. J. Weed, executive director of the Society for Modeling and Simulation International.

MS. WEED pointed to a proliferation in simulation degree programs at universities. Auburn, Old Dominion, the Naval Postgraduate School, Alabama-Huntsville, Central Florida, Georgia Tech and Arizona are well regarded for courses related to simulation and modeling, she said.

Many of those schools have close ties to military or other government institutions. That's where much of the work is.

"The military is big in its use of simulations because it's always trying to be on the leading edge of technology," Ms. Weed explained. But she said that economic conditions today were conducive to growth in private-sector work.

While the skills are used in different industries, simulation professionals tend to stay in just one, often because they become adept at using certain types of hardware or software, she said.

But one aspect of modeling applies mainly to work for the military or organizations like NASA that people should consider before entering the field: Reality can't be avoided forever.

"No matter where they are, there is this question of plausibility and credibility of the simulation," said Mr. Waite, the AEgis chairman. Applying a simulation "is often a life-or-death decision. Kids going into battle will behave this way instead of that way depending on whether you did your job right."

Fresh Starts is a monthly column about emerging jobs and job trends.

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