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Innovator tracks everything his body does

Gary Robbins

12–15 minutes

Quantified SelfLarry Smarr stops a visitor and says, “Before you go, let me show you my stool sample.”

The UC San Diego physicist-futurist reaches into his kitchen refrigerator, past the milk, and pulls out a small white box. He marvels over its contents.

“The bacteria in here contains more info than you’d find on a computer chip,” Smarr says. “It’s a window into your health. Within 10 years, people won’t dream of going to a doctor without first getting a sample like this.”

Feeling squeamish? Smarr can have that effect on people. Virtually nothing is out-of-bounds these days when he promotes the "Quantified Self," an emerging movement in which people use biosensors and other gadgets to closely monitor their bodies in the name of wellness.

At 63, Smarr thinks he's found the future of personal health care. Time will tell. But colleagues note that he's one of the most original thinkers in the country, with an almost eerie gift for sensing and shaping where society and technology are going.

Think Steve Jobs without the abrasive personality.

Smarr sparked a revolution in supercomputing, aiding the rise of the Internet. He was among the first to recognize that the cost of sequencing a person's genome would plummet, leading him to push genomic medicine.

And Smarr founded Calit2, a UC San Diego technology test bed that's run like a hungry start-up rather than a fiefdom. Lab space only goes to those who collaborate, and only for limited periods of time. Big ideas trump big egos.

Learning to thinkCalit2 has ended up developing things like tiny camera-

toting helicopters that hover above archaeological sites, and a possible way to use text messaging to encourage people to lose weight.

“Larry’s a visionary,” says Robert Dynes, chancellor emeritus of UC San Diego. “So if he says something that sounds a little crazy, remember that he’s delivered in the past. Hear him out.”

Smarr says, “I look at a trend and try to project my brain to, say, 2020 and see how things will be different. Then I think, ‘What could we be doing in 2012 to make that future happen, and happen faster?’

“Everyone sees the world, but the great thinkers conceptualize.”

At the moment, Smarr’s focus is on quantifying his health, which on balance is good. He’s not obsessed with the specter of death. He’s obsessed with measuring things that can be turned into useful scientific data.

“That’s what the last 500 years of Western civilization were all about,” Smarr says. “That’s what I’m about.”

He had parts of his DNA sequenced, revealing a pre-disposition to inflammation. He sends stool samples out for analysis to see if certain microbes will cause trouble in his intestines. He wears a monitor that assesses every moment of his sleep. The temperature in his bedroom is digitally projected on to the ceiling. If it’s not optimal, he opens or closes doors and windows.

As for his colon, well, you can check out the photos on the web.

All of the data — along with his heart rate, blood pressure, and exercise — are logged in an Excel spreadsheet, which he also uses to record 100 blood variables, from triglycerides to five types of white blood cells.

He equates his behavior to sports fans who constantly pore over statistics about their favorite teams. But Smarr also is a “scientific

Libertarian," tartly saying, "If everybody took responsibility for their bodies, three-quarters of our population wouldn't be obese or overweight."

Not everyone can afford to be a "self-quanter," the name given to those who constantly monitor their bodies. Smarr, who lives in the Crystal Bay section of La Jolla, spends at least $5,000 a year on tests and doctors visits that aren't covered by his health plan.

But change appears imminent; the marketplace is beginning to see lots of wearable devices that do such things as measure a person's glucose and send the data to smartphones.

"The things Larry is doing right now are going to be standard medicine in 20 years," said Phillip Smith, former head of the National Research Council, which advises the president and Congress on science and technology.

Smarr hasn't taken to flat-out prosletyizing, although it can sometimes seem like it.

"I have always been a scientist," says Smarr, who has a broad smile and a short laugh that can sound sinister-ish. "This goes back to my first memories in life."

His life began in Columbia, Mo., a college town half-way between Kansas City and St. Louis. His grandfather, Robert Smarr, settled there in the 1930s with a specific purpose; he wanted his family to be within walking distance of the University of Missouri.

The elder Smarr had only an eighth-grade education, but was determined to position his family to go further in life. They did. Seventeen members of the larger Smarr family have since earned degrees at "Mizzou."

As a kid, Smarr was all energy-and-questions. His mother, Jane, would often say, “Who wound you up?”

The answer, frequently, was his grandfather, a farmer, accountant, inventor and tinkerer. He taught Smarr how to self-publish, take apart and reassemble TVs, and build crystal radios from spare parts.

On summer evenings, over the drone of cicadas, Smarr would tune in stations from places like Boonville and Jefferson City. Then, in small, clear, meticulous script, he would write down the frequency and call letters of the stations, logging data as a scientist writes in a lab book.

He also took notes from college-level engineering textbooks left behind by his namesake uncle, Lawrence, who was killed in World War II. The younger Smarr was then 10 years old.

“I devoured data of all kinds,” Smarr recalls. “I made detailed tables of the properties of stars within 100 light years of the sun, drew out the family tree of quartz minerals, and even brought home a book of one million random numbers because I thought they might come in handy someday.”

Back then, his grandfather would tell him of the early days of telephone and radio in the 1920s, when he was living in Kansas. It was common for people in some rural neighborhoods to have different phone numbers, but the same phone line. They were called party lines, and Robert Smarr saw an opportunity to reach out.

He built a radio capable of picking up the sermon of a pastor in Kansas City. Smarr told his neighbors to pick up the phone at a specific time on a Sunday morning. Like magic, everyone was able to listen to the sermon live.

“Thinking back, no wonder I have worked on hooking people and

computers up with the Internet for over 25 years," Smarr says. "Grandpa was a pioneer in distributed systems!"

Smarr's intensively focused way of working was also profoundly shaped by John Archibald Wheeler, a legendary theoretical physicist who was his professor at Princeton.

Smarr recalls a moment when Wheeler used his hands to trace a picture frame in the air, then said, "Larry, life is like a painting. Without a frame, the painting has no scale. So with life. Death is the frame of life. Death means we only have a small time in which to accomplish something great."

The remark helped crystallize Smarr's resolve to act on his ideas. He also became a master storyteller, in part, by listening to the passionate, evocative way Wheeler had of speaking about the potential of science.

"The thing that is interesting about Larry's storytelling is that some of the stories sound like fantasy, but they're not," said Vincent Cerf, the computer scientist who is known as one of the fathers of the Internet.

"His ideas are ambitious, but implementable. They lead scientists to want to work together to accomplish what he's talking about."

One of Smarr's biggest ideas arose from a challenge posed to him at a beer garden in Munich, Germany, in the early 1980s.

At the time, Smarr was an astrophysicist and supercomputing in the United States was largely the domain of the military and the national laboratories. Smarr, who was then on the faculty at the University of Illinois, chafed at this and traveled to Munich to use an American-made Cray supercomputer that was more freely accessible.

He remembers sitting in the beer garden and a German colleague asking, "Don't you feel ashamed? You come over here to our occupied

country to mooch off our first supercomputer because you guys don't have the foresight to put one in your universities. How did you win the war?' "

"It was a helluva good question." Smarr said. "I didn't know the answer."

When he returned to Illinois, Smarr began surveying faculty, asking if they could significantly advance their work if they had access to a supercomputer. The answer was a resounding yes.

Smarr and his collaborators wrote a proposal in 1983 that asked the National Science Foundation to spend tens of millions of dollars to create a network of supercomputer centers at American universities. The plan sought to shift the center of gravity in computational research from the military to college campuses.

It was an audacious and unsolicited idea. He delivered it anyway. Less than two years later, the foundation created five supercomputer centers, one of which was placed at UC San Diego. Another — the National Center for Supercomputing Applications, or NCSA — was created at Illinois, and Smarr was put in charge.

Robert Dynes shakes his head, still amazed that it happened.

"He must have really inspired people," says Dynes. "The NSF is one of the most conservative funding organizations on earth. They don't like risk."

The National Center for Supercomputing Applications focused on software that would make information more quickly and widely available. The center became a magnet for talent; Smarr's wunderkids included student Marc Andreessen, who teamed with co-worker Eric Bina to develop Mosaic, the first broadly used web browser.

"It took my breath away," Smarr says. "You just knew it was going to

change how people communicate."

Andreessen left Illinois and later co-founded the company that became Netscape, a great catalyst in the dot-com boom. In 2000, Gov. Gray Davis decided to tap into the boom by spending $100 million to help build four multi-campus research institutes in the University of California system.

A latter-day gold rush followed. UC San Diego and UC Irvine teamed up to pursue an institute that would focus on telecommunications and information technology, hot industries in Southern California. The thing the schools needed was a single leader for what came to be known as Calit2. Their attention turned to Smarr, who was ready for a change.

Smarr said yes, sending a thrill through campus; he's known as a genial consensus maker who brings in lots of money. But he also can be blunt. Smarr made it clear that scientists who gave lip service to collaboration wouldn't step foot in Calit2's pricey labs.

It's the sort of thing that causes stress, which was the last thing Smarr needed when he rolled into La Jolla in the summer of 2000. At times, he'd work himself to exhausation at Illinois, and his weight had risen to 210 pounds. He'd become a dumpling.

"People in La Jolla were in great shape, especially Chancellor Dynes and (University of California) President Atkinson," Smarr says. "I felt like I had to do the same to fit in."

In 2000, he began slowly by weighing himself daily. Then things accelerated; Smarr took on a personal fitness trainer, and he virtually eliminated bad food from his diet, which now rarely exceeds 1,500 calories a day. Today, he weighs 178 pounds.

"My wife said, 'What are we going to put gravy on if we don't have

mashed potatoes?' I said, 'Janet, where we're going, there ain't no gravy.' "

Smarr also began to catalog and analyze his health, paying special attention to his blood chemistry. It led to something of a manifesto; last year, he published a 28-page document online that revealed lots of highly specific information about his health, and what he had been doing to improve it.

It wasn't an impulsive move. Smarr foresees — and is pushing for — a future that's far different than the present.

Think of your health being monitored by a "global brain," or a network of supercomputers that constantly draw data about your well-being from biosensors located on — and in — your body.

Your data would be compared to that of others. Not a few people. Entire populations. Software would be used to spot emerging problems.

"I am personally not going to change medicine. I'm just experimenting on myself in a world in which we have a data-rich environment," Smarr says.

"But there are 'thought leaders' who say, 'We're going to do this' and they prove its importance to others. It can be hard. But I've been through digital transformations before. People like that have the winds of history unfolding in their sails."

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