In hunt for Olympic gold, techies are major players

By Jodi Upton, USA TODAY 6-23-08

COLORADO SPRINGS — The charts and tables on Peter Vint's computer last summer all pointed to one thing: With the right training program, there was a pretty good chance of adding one more gold medal to the USA's potential total at the Beijing Olympics, this one in the 110-meter hurdles.

Vint is the wizard-in-residence of the U.S. Olympic Training Center's performance technology division. It's his job to read scatter plots like tea leaves, to determine what athletes might be on the cusp of a breakthrough and where scarce dollars might be most judiciously spent.

So when Vint lined up records from nine years of top U.S. hurdler Terrence Trammell's races against China's Liu Xiang, the defending Olympic champion, Vint predicted Trammell could overtake Liu by mid-2009.

Now all Vint had to do was find a way to nudge Trammell's rate of improvement ahead — a few hundredths of a second faster and 10 months earlier — to the Summer Games in August.

This is what happens in the boiler room, the affectionate name for the secretive pressure cooker where people such as Vint — whose actual title is sport technologist — harvest data, scan academic journals and hunt for the narrowest of competitive edges. It's a place where the performances of some of the world's best athletes are broken down, analyzed and reprogrammed to help the athletes become bigger, better, faster.

Vint and his team have influenced the diets of lugers and beach volleyball players, tweaked the flip turns of swimmers, persuaded track athletes to wear weight vests and even helped to increase the flexibility of men involved in mixed pairs figure skating.

The results of some these changes will be on display beginning this week at the U.S. Olympic track and field trials in Eugene, Ore., and the swimming trials in Omaha. Several other innovations are closely guarded secrets Vint promises to reveal after the Beijing Games.

A visitor here might expect to see lab coats and lots of machines that ping, but the boiler room is mostly computer modeling done in what could pass for an insurance office. It's one of the U.S. Olympic Committee's newest tools in the effort to win gold and is occurring in advance of what is expected to be one of the tightest medal races in Olympic history.

Such in-depth analysis of athletes' performances is relatively new in a nation that has shied from building the massive athletics machines of China and the former Soviet Union, where children are plucked from their families to train at state-run camps. But the new approach by the USOC has the feel of a Cold War-type effort, officials acknowledge.

"We've referred to this as our Sputnik moment," says Steve Roush, the USOC's chief of sport performance, recalling how the launch of the Soviet satellite in 1957 propelled the USA into the space race.

For the USOC, giving unprecedented analysis of athletes' performances represents a way to counter a range of factors threatening the USA's typical standing as the leader in Olympic medals. Athletics juggernauts are building in China and Russia. And countries such as Britain are taking a more precise approach to medal-winning.

In the USA, meanwhile, rising participation in non-Olympic sports such as football and lacrosse, and declining collegiate opportunities in some traditional Olympic sports such as wrestling, has reduced the number of athletes coming up through the official U.S. Olympic development system.

Finding factors that affect performance

The idea of using statistical analysis isn't new to the Games, but a series of lawsuits before the 2000 Games that accused the USOC of using questionable criteria to select athletes for some teams refocused the committee's efforts to collect data, Roush says. That led to the current effort to quantify athletes' performances and look for the best opportunities to win.

Vint's data gathering and sports analysis might have a bigger impact on future U.S. athletes and where they come from. He hopes his research will lead to a new crop of Olympians, possibly drawn from more traditional U.S. college sports such as basketball and football.

"We're becoming progressively more data-driven," he says of the center's training efforts. "We are trying to pursue what Sabermetrics and Billy Beane did for baseball, identifying factors that can truly influence performance."

The idea is to break down motion into basic elements that can be measured and analyzed objectively.

At that level, nearly imperceptible weight shifts, angle adjustments or body rotations can make a big difference. Beane — made famous in the book *Moneyball* for using objective statistical performance to sign seemingly unorthodox talent cheaply as general manager of Major League Baseball's Oakland Athletics — is a symbol for getting the most out of training dollars.

Gold is what Vint had in mind for Trammell, whose best time in the 110-meter hurdles is 12.95 seconds, seven-hundredths of a second off Liu's former world record — a mark surpassed June 12, when Cuba's Dayron Robles ran 12.87 in a meet in Ostrava, Czech Republic. "I've been told it's my job to make sure (Trammell) wins a gold medal," Vint told statisticians during a conference at Harvard last fall.

He came up with some training plan changes that his math suggested would push Trammell past Liu — and be one of the biggest tests of the center's stats-based training.

But early this year, Trammell and his coach weren't so sure. Six months before the Olympics, was it worth the injury risk of making a major training change? Even if science was behind it?

Vint says Trammell and his coach, Nat Page, initially agreed to his training suggestions — which are secret — but backed off out of fear of injury and overtraining so close to the Olympics.

Trammell says they didn't ignore Vint and incorporated his suggestions to work out with a weight vest to increase cardiovascular strength.

"We just did it for shorter periods over a longer time (than Vint recommended), to make sure there are no injuries," Trammell says.

"When you consider the source, and that there's data backing it up, that made it pretty reliable," he says. "I think it's pretty effective."

After the Games, Trammell says, he might consider using more of Vint's suggestions.

Trammell and Liu haven't faced each other in the 110 hurdles in 2008, and the best measure of Trammell's progress won't come unless he makes the U.S. team and faces Liu in the Olympics.

Trusting athletes' instincts

It's a common problem for Vint: Even athletes who have faith in the science of numbers sometimes have more faith in what their instincts and natural movements tell them.

"The relationship between the athletes and sports scientist is critical," Vint says. "But (for some), biomechanics has not yet provided useful enough suggestions."

Which is why Vint's research sometimes vindicates the athlete.

At a national team swimming camp last year, Vint noticed some athletes were pushing off from the wall after a turn with a slightly staggered step: first the strong leg, then immediately after the other.

U.S. swim coaches, meanwhile, were discouraging such turns, urging the swimmers to push off with both legs simultaneously.

Vint knew from other research that a staggered push — whether it was for a jump shot in basketball or a block in volleyball — is almost always more powerful than pushing with both feet at the same time.

Vint pulled out his data and presented them to the swim coaches. He talked about "bilateral deficit" and "sub-height correlations."

"We thought it was kind of cool," U.S. national team head coach Mark Schubert says. "We've all seen it done by good athletes, but we'd corrected it. What Peter did is show us why athletes were doing it naturally and why it's more effective."

After the Olympics, the swimming team plans to install an underwater plate on the training center's pool wall to measure force and further study flip turns and pushes, Vint says.

Vint focuses on computer models in his research, but in sports such as swimming, using technology to boost performance isn't new.

It might be one of the few sports in which the USA is technologically ahead of its foreign peers, says Genadijus Sokolovas, USA Swimming's sports science director, who has the James Bond-esque nickname "G."

"In Europe, sports science has longer tradition," Sokolovas says. "When I moved here (from Lithuania in 2000), my major goal was to introduce other tests. But the U.S. is catching up very quickly. I still have contacts; we talk. Already our equipment is better."

Among the gadgets: a fishing line that is attached to swimmers to measure their velocity, a pulley that can tow swimmers through the water to feel a world-record pace, and lactic acid blood tests to measure recovery after workouts.

Vint might use charts and graphs to understand how motion breaks down, but both he and Sokolovas still require observation to help target problems.

For example, Sokolovas noticed different levels of velocity between women's 1,500-meter freestyle world record holder Kate Ziegler's right and left sides (her right side was weaker).

So Ziegler's coach, Ray Benecki, and a personal trainer worked with her on specific exercises for improvement: accelerating her hands as they pass her hips, better timing on her hip rotation and trying to maintain velocity while breathing.

"It just got us to do a lot of thinking, and then it was a way to experiment and test our theory," Benecki says.

In Ziegler, Benecki says, he's seen "big, big, big improvements."

Persuading an athlete to make changes in something so fundamental takes faith and sometimes a little translation to get from output chart to faster stroke.

"They're always trying to find the little details that need to be fixed," says Ziegler, who won gold medals in the 2005 and 2007 world championships in the 800 and 1,500 freestyle.

"When they bring out all the technical and scientific stuff, I'm kind of like, 'OK, 'G,' I don't know what you're saying, just give it to me in swimmer's terms.' "

Some boiler-room fixes are less mathematical, Vint says. Until recently, beach volleyball athletes were still living a beach lifestyle — casual nutrition and not-so-disciplined workouts, Vint says. That has changed, as did viewing game footage and other data gathering.

In another case, U.S. women's luge coaches glanced worriedly at the large German athletes, concerned the American team members weren't heavy enough. But before they told the athletes to eat more, they turned it over to Vint.

Weight plays two roles in luge. It's an advantage going down the hill, but it can be a disadvantage pushing off. It can be placed in the sled; it can be carried by the athlete.

Vint measured the costs and benefits of adding weight and decided the only good extra weight was the pure-muscle kind.

"It had to be properly proportioned, and we're still experimenting with that," says Jon Lundin, spokesman for the U.S. luge team.

Making such training decisions with science and research in mind "is incredibly important," Lundin says. "We're in a sport that measures (results) in the thousandths of a second. Giving us a hundredth or a tenth of a second makes a huge difference."

As Vint and others study the microscopic margins that set the best athletes apart from the rest, he is also looking for similarities among players of various sports, studying "gross body motions" and "energy systems," he says.

The idea: to pluck potential gold medalists from the USA's more common college sports and saw a new generation of Olympic athletes.

For example, Vint says, the hand coordination and teamwork that good basketball players have could make them good team handball players. The explosive push-off of football players at the start of each play could translate to similar actions in bobsled and luge. And the upper-body strength and flexibility of wrestlers could make them good kayakers.

The next revolution, Vint says, is breaking down the last secrets of elite athletes: response time, how they read the field and other players — everything that goes into the vision, perception and split-second decision-making of an athlete.

"We've always looked at that as mysterious, something that's un-measurable and innate," Vint says.

"But we think it can be taught."

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Olympians use 'secret device' for improved flexibility

By Jodi Upton, USA TODAY

Considering their results, U.S. Olympic trainers are pretty low-key about a flexibility-improving unit that is one of the few research-based training devices made for athletes.

About the size of a shoebox, with a domed lid and covered in gray vinyl, the device doesn't do anything except vibrate at a particular frequency when it's plugged in.

But when athletes from swimmers to skaters put an ankle, a thigh or a hip to it — or use an adapted rod version that can be rested on a shoulder — amazing things happen to their flexibility.

In one study of boys in a community youth program in Colorado, there was a 400% improvement in their ability to do the splits after a one-minute session. In a test of 20 men in mixed-pairs figure skating, only two could do the splits; after one brief session, 10 could, says Bill Sands, a sports scientist and director of the USOC's Athlete Recovery Center in Colorado Springs, who helped lead the study.

Top figure skater Kimmie Meissner, who used the device a year ago to help her lift one foot backwards over her head while skating, called the device "amazing" in helping her get into some of the more complicated contortions now required in her sport.

"I was on it about 30 seconds and I was completely stretching. And the best part — no pain. I could hold the position and a conversation at the same time," says Meissner.

Sands says it's one of the best devices they have. "We don't have a lot of silver bullets, but this is one of them."

One of the bitter ironies for Olympic trainers is that for all the research generated by the American health-care system, there are remarkably few studies of how healthy adults function, let alone elite athletes. That means outside of some proprietary data that some professional teams may hold, there's very little research about what training and devices can help produce the best possible performance.

"You can get a lot (of research and data) about obesity, for example, but not on someone who is already fit," says Sands.

The runaway success of the U.S. flexibility device came from scouring old medical journals. Sands' team found a reference in a 1974 journal, written by an Israeli researcher, about a device some Russians had used to improve flexibility. Sands had a model built and with some experimentation, came up with a copy.

The device worked so well — with permanent results — that Sands and others have wondered how many other simple fixes might be out there, but few in the USA are doing the research.

For example, Sands has been working in an area called potentiation. It's a a training regimen under which, immediately before a performance, an athlete — with help — lifts as much as 120% of the maximum weight they can lift. For some reason, it seems to result in an intense, acute improvement in performance.

"It works best on simple sports, like running or weight lifting, but it works. The thing is, we don't know why," says Sands.