InformationWeek

THE BUSINESS VALUE OF TECHNOLOGY

NOV. 21, 2011

CAUTION
Distribution
Speed
Bump

Low
Margins
Ahead

Follow The Data

Apply advanced analytics to the sales pipeline, Web traffic, and social buzz to anticipate what's coming, instead of just looking at the past >>

By Doug Henschen

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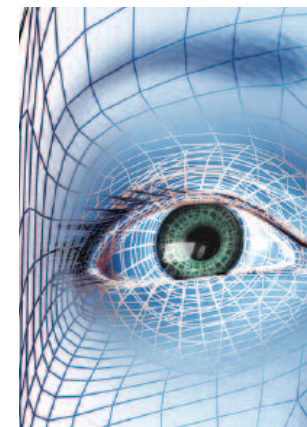
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How To Cultivate High-Potential IT Leaders

LARRY TIEMAN

A young man who used to work for me recently sent me a career update: He had landed a higher-level job at a different company. That's no knock on my former employer. Great IT organizations tend to develop more talented, ambitious people than they can absorb. In fact, IT organizations should take pride in their ability to cultivate people other companies want.

However, for both the IT organization and the employee leaving, it's a time to take stock. Did the organization do all that it should have done to retain the bright, high-potential individual? A long recession and even longer period of hiring freezes and head-count attrition may have left the organization with a talent and age gap. More on that critical issue below.

There are risks for job seekers as well. They need to understand that they're not the only ones exhibiting dating behavior; employers courting talent also are adept at emphasizing their attributes while minimizing their weaknesses. I was recruited a lot and changed jobs many times during my 40-year IT career, and never—absolutely never—was the actual job just like what had been described.

For those considering a new opportunity, consider my four "C" framework.

Company: Is this a company in an industry where you really want to work?

I have always had a short list of companies and industries where I wouldn't work. I would never work for a cigarette company. Some people I know would never work for a defense contractor. But even in desirable companies and industries, the high-potential IT leader must take a five-year view. Is this company going to survive intact over that time frame, and do you want to be associated with its reputation? You don't want to be the most recent hire if a company fails or is acquired.

But most important to your career success, and almost impossible to assess as a director or VP candidate, is how the CEO and other senior business leaders view IT. The reputation of the IT organization is a good surrogate.

Career: Surprisingly few people have solid, actionable career plans. Too many people think getting a promotion is a career plan.

How does this new job support your career objectives? Is there a reasonable opportunity to reach your career goals in the new job, or will you have to change jobs again? Frequent job changes, if even possible today, can be bad for your career.

A good example: One high-potential manager with the career ambition to be a CTO and to drive technology change took a promotion as an applications director knowing that the experience working with business partners would be invaluable.

A not-so-good example: An application development manager left to become a network systems director at a company where the entire IT shop was smaller than a typical director organization in a large company. He wanted the title.

Chemistry/Culture: Can you be successful in this new environment?

Culture matters. American Airlines in the 1980s was a contentious, combative place to work. FedEx today has a collegial, hospitable culture, very Memphis-centric. Both environments were/are demanding and difficult for

globalCIO

an outsider to adapt to. To be successful as a new hire, you will need help from people immersed in the culture, and that help isn't always easy to get.

I have seen people fail because their office was in an out-of-the-way place, their first project was a disaster through no fault of theirs, or

> **There's a saying in business that if you aren't growing, you're dying. I think a lot of IT organizations are dying and don't know it.**

they were attacked by a colleague—and supporters of that colleague—who thought he/she should have gotten the promotion.

Compensation: Never, ever make compensation the top reason for taking a new job.

I almost fell into this trap once. I was in an incubator company within GE Capital when I was approached by a company wanting to do something similar. The pay topped what I was making at GE by more than $100,000. At the

last minute, I decided to stay with GE—and found out a year later that the startup quickly failed and didn't pay most of the people there.

Some IT Organizations Are Dying

There's a saying in business that if you aren't growing, you're dying. I think a lot of IT organizations are dying and don't know it. The prolonged hiring freeze and the permanent reduction of head-count budget as staff retire or leave mean a higher percentage of the IT staff are working on legacy systems and fewer are available for new, growth-oriented projects.

The prolonged hiring freeze also means new skills aren't coming into the organization just as there's an explosion in new ways to reach customers. Social media, mobility, software as a service, and BYOD (bring your own device) are among the pressures that will further stress many IT organizations. Already I see articles saying that marketing departments should take over mobile application development and that organizations should contract software services with the help of the CFO.

Each IT organization needs to determine

whether it can meet new business needs with its existing staff and any forecast budget growth (head count and/or contractor). If not, it may need to team with HR to develop a plan to retrain and refresh staff skills. Rapid changes in the way companies want to deliver products and services are transforming the expectations of the IT organization. CIOs can't meet those challenges with an organization stuck at 2005 head-count levels and, most desperately, pre-2005 skills.

There's plenty of blame to go around if a company has let its IT organization ossify. Has the company provided access to adequate training? Have employees taken advantage of it? But regardless of fault, my experience is the most trainable, flexible, and highest-performing individuals are the ones who leave when they don't see promotional opportunities.

No longer do I view the departure of a high-potential director or VP as a positive reflection on the organization. I now view it as lost opportunity.

Dr. Larry Tieman has been a senior VP at FedEx, a CIO, or a CTO for the last 20 years. Write to us at iwletters@techweb.com.

CIOprofiles

MONTE E. FORD
Senior VP and CIO, American Airlines and AMR

Business-related pet peeve: Governmental red tape and business impedance

Business leader I'd like to have lunch with: James Cash

Last vacation: Cabo San Lucas, Mexico

Personal computer: HP and Apple

If I weren't a CIO, I'd be ... a college professor

CAREER TRACK
How long at American Airlines and AMR: 10 years

Career accomplishment I'm most proud of: I'm most proud about developing mutual, reciprocal, and symbiotic business relationships with the business units we work with and support. We've reached a point where we don't have the typical challenges between IT and the business unit that you see at many companies today.

Most important career influencer: Someone I encountered early in my career, who told me all the reasons why I couldn't do all the things I've ended up doing. The motivation I got from that experience has caused me to work as hard and smart as I can and to encourage others to do the same. Telling me what I couldn't do was just the catalyst I needed to learn as much as I could.

ON THE JOB
IT budget: We don't disclose IT budget. But I'd argue that's not the right question—rather, what matters is, are you getting the most out of your IT budget that you possibly can? I'd say we're always 90% toward where we need to be. We always have room for improvement because we continuously evaluate and re-evaluate how and why we spend money on the things we do. But measuring budget in dollar terms is much less effective than measuring effectiveness of technology spending as applied to business needs.

Top initiatives: Faster implementation in IT development, continuous improvement for business problem resolution, and a maniacal focus on our technology platforms.

VISION
The next big thing for my industry will be ... Customer centricity, packaging, and customizing product delivery—essentially, those things that help us provide better service to our customers, simplify their travel, and make for a more cost-efficient and smoother-running operation. This could be as simple as an app tailored to their specific device or information at their fingertips about a great place to eat at their destination or the opportunity to pick and choose the services and products they want.

The federal government's top technology should be ... putting together technology that encourages businesses to build jobs.

Kids and technology careers: Of my three children, two have graduated from college and are now working in the tech industry, focused on the intersection of energy and technology. That was their choice, and I'm proud of the decisions they've made about their careers.

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Quicktakes

BIG DATA STORAGE

NetApp Teams With Cloudera To Back Hadoop

Cloudera and NetApp are striking back at EMC with a partnership in which NetApp will make available Cloudera's Apache Hadoop distribution and enterprise management software. Cloudera will support a NetApp Open Solution for Hadoop, which is a storage reference architecture set to release in December.

EMC and NetApp are fierce storage rivals. The partnership is a response to EMC's alliance with MapR Technologies, announced in May. In that deal, EMC entered the Hadoop enterprise support business in competition with Cloudera and incorporated MapR's software as part of a Greenplum HD Enterprise Edition Hadoop software distribution.

Hadoop is a Java-based platform for distributed data processing that can handle the hundreds of terabytes and even petabytes of data that companies such as Internet businesses process.

Cloudera is the oldest and largest provider of Hadoop enterprise support and management software and has more than 100 customers, but it's tiny compared with NetApp and stands to gain a huge lift from the partnership. Cloudera and NetApp say they've tested the suggested software and hardware configurations of their reference architecture in NetApp's labs. That should help companies deploy Hadoop faster.

In typical Hadoop deployments, companies use commodity servers that require a fixed ratio of compute capacity to storage. The companies' Open Solution architecture uncouples storage and computing, and provides higher availability and reliability, and improved manageability compared with commodity hardware and pure open source software deployments, Cloudera and NetApp say.

This approach lets compute capacity grow at the rate of application requirements and storage at the rate of data requirements, says Jeffrey O'Neal, NetApp's senior director of data center solutions. "That's a huge benefit as customers start to build out their workloads," he says.

Hadoop nodes on pizza-box-style commodity servers often house eight hard drives, but O'Neal says NetApp's hardware can put as many as 14 2-TB drives on a single computer node with provisions for hot spares. RAID storage is also built in for data protection. Disk drives are held on trays, and failed drives can be swapped out with hot spares without bringing down a node and removing a server. The architecture also provides NetApp Network File System backup protection for the named node, which can be a single point of failure in Hadoop deployments because the named node controls all other nodes.

EMC's Hadoop offering runs on the EMC Greenplum Modular Data Computing Appliance, which only runs EMC's Greenplum database for relational data warehousing needs. Cloudera supports connectivity with a variety of databases, including Teradata, Netezza, Oracle, MySQL, and Vertica.

With IBM having released Hadoop-based BigInsights software and support, and Oracle and Microsoft having announced their intention to add Hadoop distributions and support, it's clear this data processing platform is headed for wider use. —*Doug Henschen* (*dhenschen@techweb.com*)
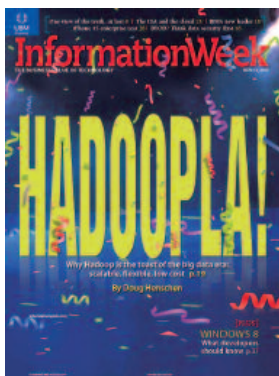
More Online

The Hadoop data processing platform has won over Web giants for its low cost, scalability, and flexibility. Now it's moving into more enterprises, Doug Henschen explains in this story.

Download

Quicktakes

IT AUTOMATION

HCL Exec: Low-Cost Outsourcing Is Waning

The offshore outsourcing model is undergoing fundamental change as routine data center functions are automated and businesses use IT for more strategic purposes and seek service providers that can help them along that path, says a senior industry exec at HCL Technologies, an IT outsourcer based in India.

HCL is seeing "early signs that the Indian IT model is over," says Krishnan Chatterjee, head of global strategy and marketing, refering to U.S. companies farming out work to workers in low-cost countries such as India. Customers are asking, "Are you willing to blend multiple services into an integrated offering, so we can talk as business partners, rather than you giving me 10 bodies who will churn out X lines of code at the cheapest rate?" he says.

A recent deal illustrates this higher-level engagement: U.S. health insurance company United Health Group hired HCL to develop proprietary software to support adoption of ICD-10 disease classification codes, which are more detailed descriptions that go into effect in 2013.

Driving this change are technologies like vir-

tualization, cloud computing, and smart analytics that are automating routine IT tasks—such as network provisioning and monitoring—that have often been offshored. Automation has

> **"When differentiation comes into play, the conversation is no longer about who is cheapest. "**
> —HCL's Krishnan Chatterjee

freed up budget resources for projects that drive growth, and companies need IT service providers that can keep up.

Many of these engagements—such as building a digital supply chain to support an e-commerce initiative—require on-site specialists with skills in project management and architectural design. "The more we move up the value chain, the more of our traditional services business we start killing. But that's OK because we're going to add value in new ways," Chatterjee says.

To meet demand for onshore services, HCL is building out its U.S. presence. About 8,000 of its 83,000 employees are in the United States, company officials say. HCL wants more than 12% of its employees in the U.S. or Europe by 2015. About 40% of HCL's U.S. workers are Americans or green card holders; the rest are on H-1B and other temporary visas. HCL also wants a larger percentage of its U.S. workers to be citizens or permanent residents.

In September, HCL said it's opening a development center in Redmond, Wash., where it plans to hire about 400 local workers over the next two years. It also has development centers in Rochester, N.Y., and Raleigh, N.C.

Higher labor costs mean that HCL will eventually have to charge more for services provided in the U.S., but customers will be willing to pay more if those services aren't just about keeping the lights on, Chatterjee says. "When differentiation comes into play, the conversation is no longer about who is cheapest and who has the most bodies," he says.

HCL's focus on higher-value work appears to be paying off. In its most recent quarter, net income spiked 49% year over year, while quarterly revenue passed the $1 billion mark for the first time. *—Paul McDougall (pmcdougall@techweb.com)*

Quicktakes

CLOUD EMAIL

Google Finally Lets Apps Users Call For Help

Google has some big-time customers for the business versions of its email and productivity apps, but the support it offers them has been somewhat minor league. Google is trying to change that by giving enterprise apps customers around-the-clock phone support.

Previously, the company offered phone support only for critical issues, such as outages. Now it says it's providing business customers with phone support for any problems related to what Google calls the "core services" of Google Apps: Gmail, Calendar, Groups, Docs, Sites, and Video. (Google wouldn't provide details about how or where it's running its call centers.)

Google's decision to expand phone support comes as it tries to attract companies away from conventional on-premises software to its online services, which list for $50 per user per year. Four million businesses use Google Apps, the company says, though it won't say how many are paying customers. Users of the free version of Google Apps don't get phone support.

Google recently announced a handful of converts to Google Apps, including Burberry, Casio, Goodyear, Guardian, Perry Ellis, and SoftBank. *The Wall Street Journal* recently reported, citing unnamed sources, that General Motors, a long-time user of Lotus Notes for email and collaboration, had signed on to use Google Apps, contingent on Google meeting certain requirements. GM says it hasn't made a decision to use Google Apps.

But GM's leadership is open minded. Two years ago, GM CIO Terry Kline recounted a meeting with Eric Schmidt, then Google's CEO, in which he told Schmidt Google Apps wasn't enterprise-ready. Schmidt asked for a list of requirements and said he'd see that the concerns were addressed. Kline at that time wanted improvements to Google's spreadsheets and better data audit trails, among other things.

Google says 80% of Google Apps users and 90% of large enterprise customers say they're satisfied with Google Apps support. Its goal is to get overall satisfaction to 95%. More than 90% of Google Apps customers renew, says Amit Singh, VP of enterprise sales and operations at Google.

One lingering problem with Google Apps is it that doesn't allow offline editing of documents and spreadsheets; Google only recently implemented offline viewing for those. Jonathan Rochelle, Web apps product manager, says Google's engineers are "working feverishly" on offline editing.

Google also is expanding its mobile device management tools for Google Apps administrators, letting them manage corporate Apps users' Android, iOS, and Windows mobile devices on a more granular level. Google has offered device management and sync capabilities since 2010. The new capabilities let admins set mobile policies such as password requirements and roaming sync preferences by user group.

—*Thomas Claburn* (tclaburn@techweb.com)

SaaS Or Not?
Likely or very likely to invest in social networking or collaboration apps

34% On premises

26% SaaS

Data: *InformationWeek* 2011 Enterprise Applications Survey

[COVER STORY]

Follow The Data

Apply advanced analytics to the sales pipeline, Web traffic, and social buzz to anticipate what's coming, instead of just looking at the past

By Doug Henschen

Data can offer a peek into business conditions weeks or months out, if you have the right predictive tools. That's the goal of Procter & Gamble's 2-year-old Business Sufficiency program, which gives executives a glimpse of performance indicators six to 12 months ahead. Using SAS tools for statistical analysis, P&G developed dozens of analytic models to assess production, shipments, and market share; sales trends by country, territory, product line, chain, and store; media and advertising activities; and regional and national economic conditions. Because P&G's analytic models are predictive and exception-oriented, they help execs address looming problems with production, sales, distribution, marketing, and merchandising performance—before they lead to real financial shortfalls.

And P&G analysts don't just offer one prediction for each model; they scope out the range of performance

possibilities so managers can devise backup plans, in case expectations don't hold up.

Talk about an edge.

Our *InformationWeek* 2012 Business Intelligence, Analytics, and Information Management Survey shows that the old practice of following the money—using lagging financial indicators to guide a company's decisions—is giving way to the forward-looking approach of following the data. Respondents' companies are following P&G's lead—gathering, managing, and analyzing not only more information, but also more types of information, using advanced predictive and statistical analytics to improve internal operations, get closer to customers, sell and market products more effectively across channels, and outperform competitors.

Other top trends: The 542 respondents to our survey say business intelligence/analytics software as a service is making its mark, despite the fact that, as the de facto stewards of enterprise data, BI and information management professionals have reservations about the cloud—63% worry about data security, and 47% foresee integration problems. Mobile interfaces for BI and analytics are in high demand, with 44% of respondents planning to add such options for smartphones and tablets. Compared with our survey last year, the number of respondents who cite data-quality problems as a barrier to adopting BI/analytics products enterprise-wide fell nine points, to 46%—an accomplishment in the big data era. But if there's one über trend
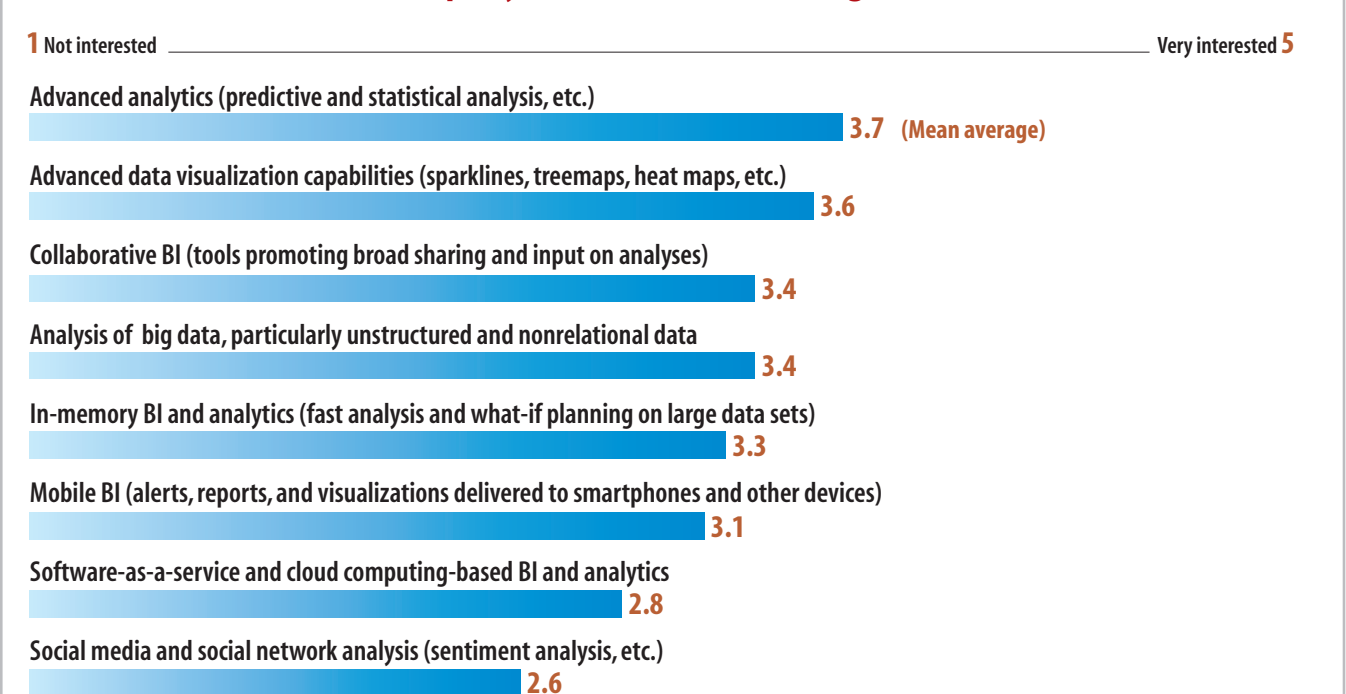
in BI and information management, it's the meteoric rise of analytics, particularly advanced statistical and predictive analytics. For the third year in a row, survey respondents rate advanced analytics as the most compelling among a dozen leading-edge technologies.

Once an elite niche, analytics has become the proverbial tail wagging the dog, with vendors and practitioners alike making analytic capabilities and initiatives their top priority. The trend goes hand in hand with rising interest in using big data sets to mitigate risk, anticipate customer demand, and formulate more successful product and service offerings. Name a business scenario, and you can likely apply advanced analytic techniques to make better, more pre-emptive decisions rather than react to failures later.

That's the key contrast with what's now disparagingly dubbed "rearview mirror BI." Business intelligence has long been associated

How Interested Is Your Company In These BI Technologies?

1 Not interested ————————————————————————— Very interested **5**

Advanced analytics (predictive and statistical analysis, etc.)
3.7   (Mean average)

Advanced data visualization capabilities (sparklines, treemaps, heat maps, etc.)
3.6

Collaborative BI (tools promoting broad sharing and input on analyses)
3.4

Analysis of big data, particularly unstructured and nonrelational data
3.4

In-memory BI and analytics (fast analysis and what-if planning on large data sets)
3.3

Mobile BI (alerts, reports, and visualizations delivered to smartphones and other devices)
3.1

Software-as-a-service and cloud computing-based BI and analytics
2.8

Social media and social network analysis (sentiment analysis, etc.)
2.6

Data: *InformationWeek* 2012 Business Intelligence, Analytics, and Information Management Survey of 414 business tech pros using or planning to deploy BI, data analytics, or statistical analysis software, October 2011

with activities that explore and extrapolate on historical data. Summary statistics, queries, reports, and even threshold-triggered alerts and low-latency dashboards based on historical information are rearview mirror. They provide a picture of where you've been. Advanced
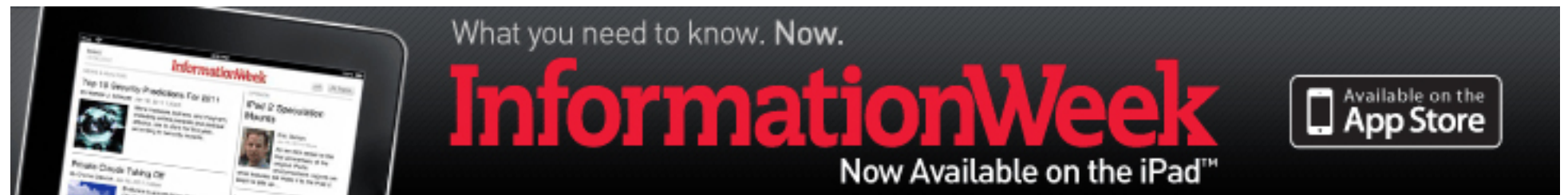
analytics applies statistical and predictive algorithms to come up with calculated, predictive measures, scores, and models. It shows where you're headed.

There's a middle ground, where trending or algebraic predictions give you some idea of what to expect in terms of production or sales. Advanced analytics is far more sophisticated. Say trend analysis will simply extrapolate last quarter's sales velocity into the next quarter; in contrast, a sophisticated predictive model might take into account seasonality, historical sales patterns, correlations between strong and weak quarters, even the effects of weather or macroeconomic conditions.

Before its Business Sufficiency program, P&G pulled together reports and correlated information from various silos. Country and product-line managers could see their own performance, but developing enterprise comparisons and goals required time-consuming data manipulation and analysis. Supporting infrastructure for data gathering and data mining has helped synthesize data analysis, and the resulting advanced analytics has helped P&G get to a holistic, forward-looking view.

BI On An iPad?

Whether it's a rearview-mirror report, a real-time dashboard, or a forward-looking analytic projection, BI and analytics professionals tell us they want to consume that information through mobile interfaces. For now, mobile platforms are the least-used means of

THE **VIRTUALIZATION** ADVANTAGE

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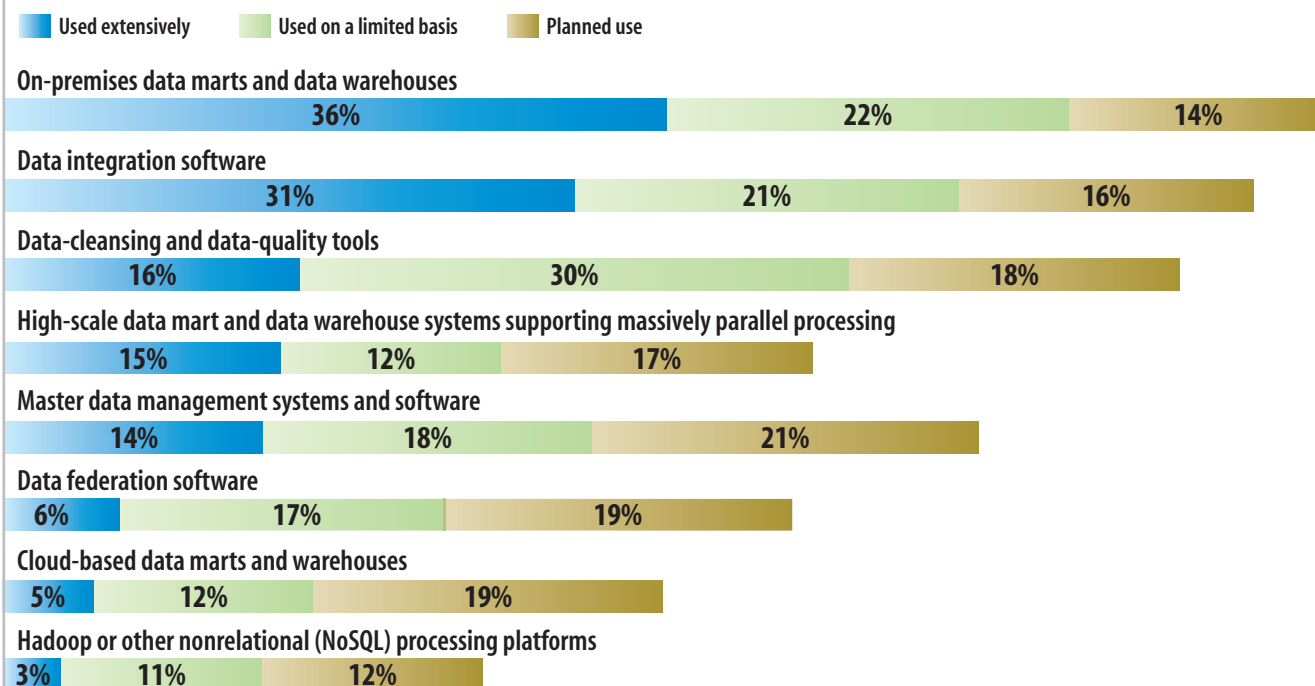TechWeb

Sponsors: hp intel vmware

sharing BI and analytic insights, employed extensively by only 5% and used on a limited basis by an additional 20% of respondents. However, a whopping 44% say they plan to add mobile BI interfaces. In response, vendors including Actuate, IBM Cognos, Information Builders, Jaspersoft, LogiXML, Oracle, SAP BusinessObjects, SAS, Tableau, and Tibco have introduced new or improved iPad (and, in some cases, Android tablet) apps or browser-based interfaces this year.

What's driving all this interest? In a word, democratization—taking BI out of the ivory tower (in other words, the hands of just a few analysts and top executives) and sharing insights with knowledge workers at every level. The small screens of smartphones and tablets are advancing this effort by forcing a much-simplified approach to sharing BI and analytics. More-accessible mobile BI interfaces will promote wider and more frequent use.

That's exactly what's happening at the Cincinnati Zoo and Botanical Gardens, where managers are using IBM's Cognos Mobile software for the iPad. Released in October, the native iPad (and iPhone) app lets managers bring together sales and attendance data and make decisions to improve the visitor experience,

To What Extent Are These Systems And Technologies Used At Your Company?

	Used extensively	Used on a limited basis	Planned use

On-premises data marts and data warehouses
36% | 22% | 14%

Data integration software
31% | 21% | 16%

Data-cleansing and data-quality tools
16% | 30% | 18%

High-scale data mart and data warehouse systems supporting massively parallel processing
15% | 12% | 17%

Master data management systems and software
14% | 18% | 21%

Data federation software
6% | 17% | 19%

Cloud-based data marts and warehouses
5% | 12% | 19%

Hadoop or other nonrelational (NoSQL) processing platforms
3% | 11% | 12%

Data: *InformationWeek* 2012 Business Intelligence, Analytics, and Information Management Survey of 431 business tech pros involved with information management technologies, October 2011

whether they're in meetings or roaming around the 75-acre grounds. In 2010, the zoo implemented Cognos BI software as part of a sweeping systems integration project. It previously handled membership, admissions, and retail sales on separate point-of-sale systems that didn't talk to one another, and 16 food service locations were running on unconnected cash registers. Those disconnects made

tracking and correlating revenue-generating activities a laborious, spreadsheet-based weekly process. A system deployed in 2010 linking all 51 POS locations yielded a treasure trove of data, and the zoo promptly put the Cognos software to work correlating attendance and purchasing patterns. A big focus of that effort is on customer segmentation and marketing, yielding insights managers can use

for email and direct mail campaigns in which they send coupons and offers to zoo members, loyalty card holders, and other customers based on their past purchase patterns. Predictive capabilities also help zoo managers plan staffing, retail merchandise buying, and food and beverage stocking based on historical attendance patterns and weekly weather forecasts. With iPads in hand, managers can now make more decisions on the fly. Seeing empty shelves, they might check on inventory and reorder sold-out goods. Long lines at food stands near a special attraction might prompt them to reassign employees accordingly. Labor is the biggest cost variable for the zoo, so keeping staffing levels in tune with demand can yield significant savings.

Warming Up To The Cloud

As was the case in last year's BI and Information Management Survey, SaaS-based BI came in next to last among the technologies for which we asked participants to rate their interest, using a 1-to-5 scale. That said, the percentage of respondents rating their interest in SaaS-based BI a 4 or 5 increased four points over last year—from 28% to 32%. More significant, when we asked respondents specifically about what would drive adoption of cloud-based BI and analytics, they showed much higher interest across all the factors listed, including low overall cost (55% vs. 31% last year), minimal need for IT support (46% vs. 36%), and low initial cost (39% vs. 24%). But the biggest sign that IT pros are warming to the possibility of using cloud-based BI and analytics is that only 16% of respondents say this category isn't of interest to their companies, compared with 36% last year.

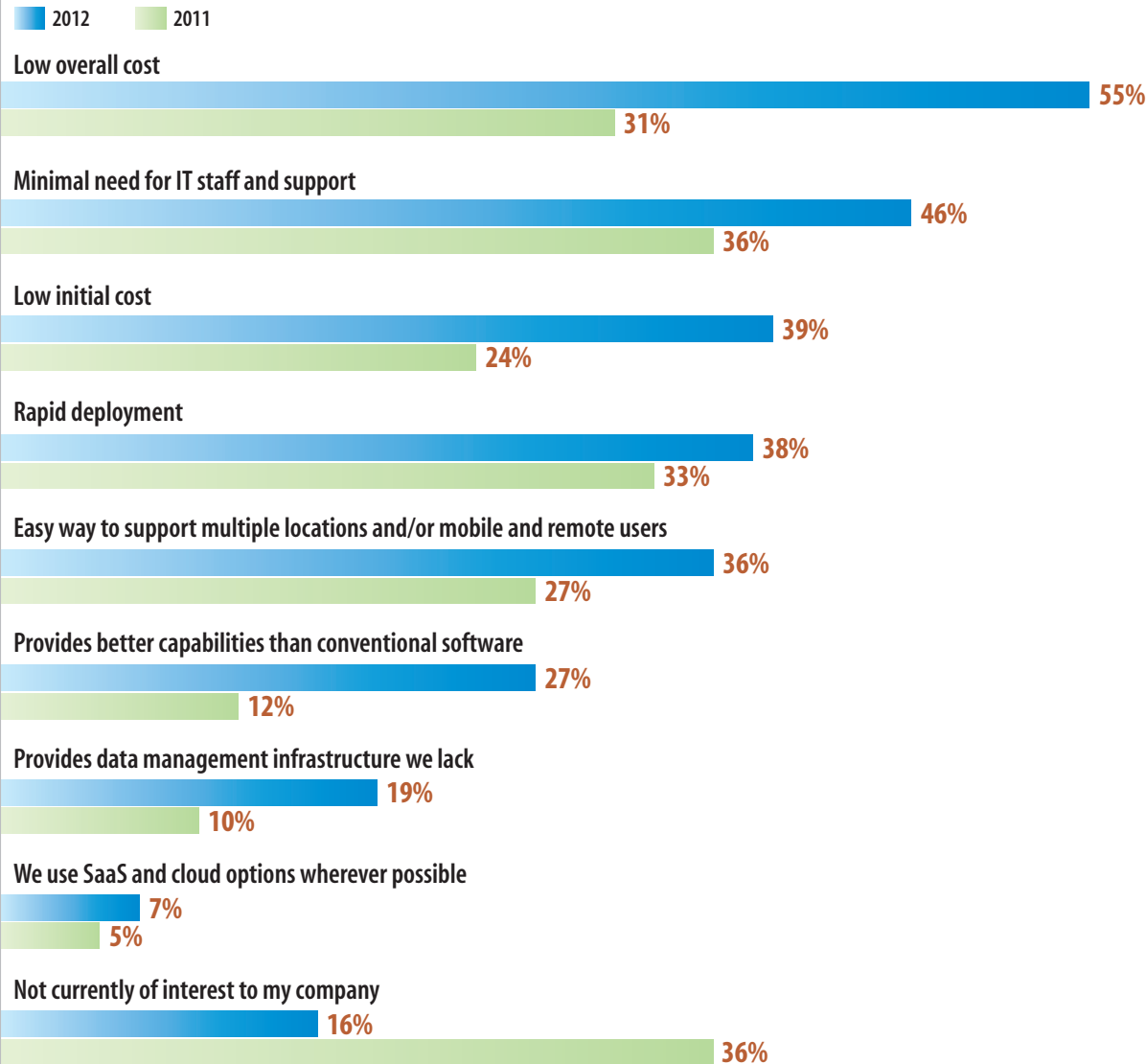Still, significant barriers to cloud BI and analytics adoption remain. Data security and privacy (63%) remains the top concern, while data integration (47%) and ongoing subscription costs (43%) are bigger worries this year. The silver lining in this black cloud may be that security and privacy are a knee-jerk complaint, whereas integration and cost objections might be based on investigations of available options and deployment challenges.

Another factor: Until recently, most top BI vendors didn't offer their software as services, and the few that did tended to have a narrow focus. But in 2011, IBM, SAP, and MicroStrategy all delivered their on-premises BI/analytics software through new public (and in some cases private) cloud services. The advantage megavendors have in bringing BI into the cloud is that they have huge numbers of customers who are familiar with their software. Indeed, we've long followed our readers' inclination to standardize on one or a few BI suites and tools, and that remains the dominant strategy for 2012, with 41% of respondents

The Appeal Of Cloud-Based BI And Analytics

What factors are driving, or would drive, your company's interest in software-as-a-service and cloud computing-based BI and analytics?

■ 2012   ■ 2011

Low overall cost
55%
31%

Minimal need for IT staff and support
46%
36%

Low initial cost
39%
24%

Rapid deployment
38%
33%

Easy way to support multiple locations and/or mobile and remote users
36%
27%

Provides better capabilities than conventional software
27%
12%

Provides data management infrastructure we lack
19%
10%

We use SaaS and cloud options wherever possible
7%
5%

Not currently of interest to my company
16%
36%

Data: *InformationWeek* Business Intelligence, Analytics, and Information Management Survey of 414 business tech pros in October 2011 and 410 respondents in September 2010 using or planning to deploy BI, data analytics, or statistical analysis software

saying they've done just that. It's notable, though, that standardization is slipping a bit, down six points from last year's survey.

Finally, there are skeptics who think big data is all hype, but a respectable 27% of our respondents already handle high-scale data marts and data warehouses; predictive analytics comes into play here as well, to serve up the right offers to the right customers at the right time. Mobile phones are both a contributor to and a subject of big data analyses: Call-data records, instant messaging traffic, and smartphone-based Web and app interactions are feeding the growing stockpiles of data, and this information is being used by e-commerce companies to segment mobile customers and deliver mobile ads and offers—which then drive even more customer data.

Cloud-based data marts and warehouses are used extensively by 5%, on a limited basis by 12%, and are planned for use by 19% of this year's respondents. As superlarge data sets come online, they'll drive future analytics efforts. In short, big data is going to be a pervasive problem—and a big driver of BI, analytics, and information management challenges for years to come.

Write to Doug Henschen at dhenschen@techweb.com.

From fingerprints and retina scans to DNA and gesture recognition, the technology is advancing while costs are declining. Here's what you need to know.

Biometrics
For The Rest Of Us

By Michael Cobb

Rising threat levels, increasing interconnectivity of systems, and the growing volume and value of data held by computers connected to the Internet have data owners re-evaluating access control methods. They need to do more than just check that authorized users have the correct login information; they also want to ensure that those people are actually the rightful owners of the login information they're using. Biometrics is the only way to do this.

With biometric authentication, every individual is unique. Most people are familiar with techniques such as fingerprint and facial recognition, which grant access based on physiological characteristics, but certain behavioral characteristics, such as typing rhythm, gait, and voice, also can be used.

User names and password combinations can be guessed or easily obtained by imposters. Tokens can be lost, forgotten, and stolen. But criminals can't guess fingerprints,

and users can't forget or misplace their fingerprints. Physical attributes can't be faked the way ID cards can. And once a person has authenticated himself using biometrics, he can be tied directly to any actions he performs. This isn't the case with other form of authentication.
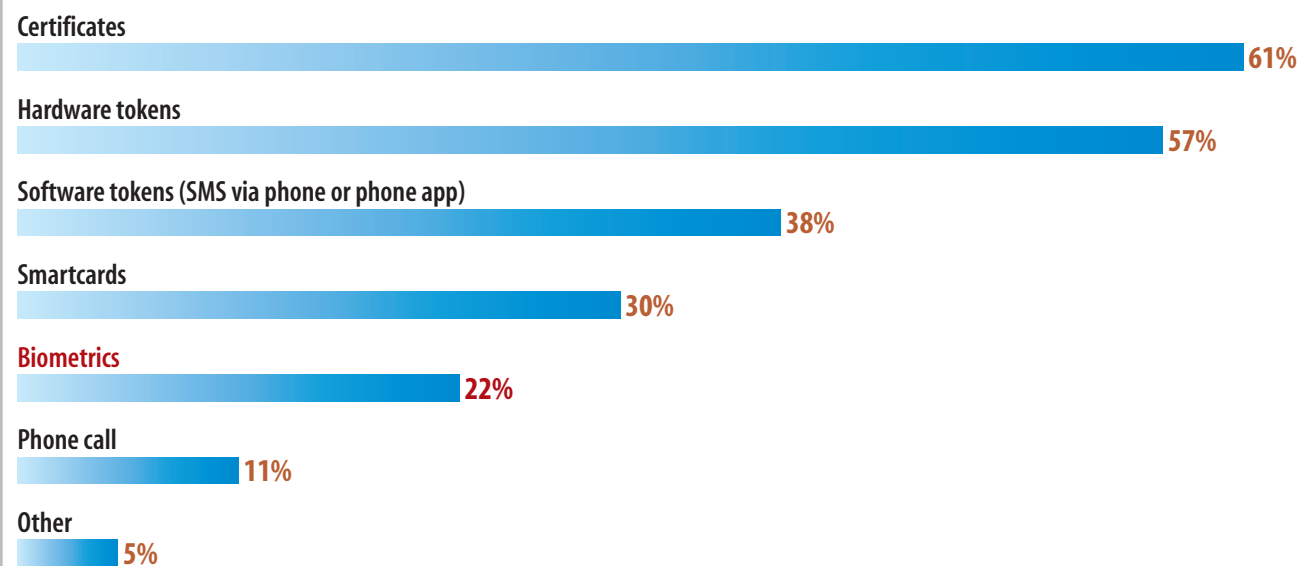
Biometric systems also have low administrative overhead. No more password resets. No more redistributing and renewing tokens, and no more revoking and replacing lost or stolen tokens. Most network operating systems allow for the easy integration of biometric authentication to replace and supplement passwords.

How Biometrics Works

Many people are under the misconception that biometric authentication involves direct comparison of the biometric trait—comparing an actual image of a fingerprint with stored fingerprints. What actually happens is that the device capturing the image creates a numerical value to represent the fingerprint—a digital hash of distinct characteristics. This value is sent to the authentication server for comparison with stored values.

With facial recognition, the camera captures

What Techologies Do You Use For Authentication?

Certificates
61%

Hardware tokens
57%

Software tokens (SMS via phone or phone app)
38%

Smartcards
30%

Biometrics
22%

Phone call
11%

Other
5%

Data: *InformationWeek* 2011 Identity Management Survey of 175 business technology professionals using internal identity management for employees, June 2011

an image of the face and extracts relevant characteristics, such as the distance between the eyes, width of the nose, shape of the cheekbones, and length of the jawline. These values are used to create a template.

By discarding data not used for biometric measurements, the size of the template is reduced. The template can then be compared with all templates in the database. If a user name is also entered, the template is compared directly with the one associated with that user.

There are several downsides to biometrics,

not the least of which is the time and cost involved in collecting data. Readers and authentication servers that process biometric data are still more expensive than alternative authentication systems, such as challenge-response and one-time password tokens.

There's also the cost of adding users. Enrollment in a biometric system requires capturing and storing users' data. Even at an organization with only one site, enrollment requires careful planning. Remote enrollment can't be trusted, and in, say, a business-

to-consumer scenario, customers are unlikely to agree to line up to have their retinas scanned, and they're unlikely to install infrared cameras on their PCs to log in to online accounts.

Users' privacy concerns are also a barrier to adoption. The most accurate biometrics are those that can't be seen externally and require some form of physical intrusion, such as ob-

taining a sample of a person's DNA. And once you have biometric data, it must be afforded the same protection as other personally identifiable information. Access must be restricted and usage limited to predefined purposes, all of which have cost implications. Although it would be difficult for attackers to automate the abuse of stolen biometrics in the same way they do passwords (they still have to fool

the biometric reader), the implications for the victims are significant, as biometric characteristics can't be readily replaced.

Also, the ability of biometric systems to correctly match submitted data with the person is still a problem. With most biometric systems, there's an element of interpretation; the comparison is more "like" than "equal to." Authentication is subject to false nega-

THE BLEEDING EDGE

Beyond Fingerprints And Iris Scans

Fingerprint, palm, iris, and retina scans are familiar, as are face and voice recognition technology. But have you heard of these biometric options?

DNA profiling: DNA, the nucleic acid in nearly all living organisms that carries genetic information, is considered the ultimate biometric measurement. It produces proof-positive identification of a person, except in the case of identical twins. However, unlike other biometrics it compares actual samples rather than templates generated from samples. Its main drawback is that its comparisons can't be made in real time, so for now its use is lim-

ited to forensic applications. Although there will no doubt be advances in DNA capture and analysis, the technology is unlikely to be suitable for anything other than highly secure government environments.

Ear recognition: Human ears are unique in size, shape, and structure. Obtaining data on users' ears is very similar to obtaining it for faces, but this form of biometrics will probably never take hold in a big way, as face recognition will always be more palatable and intuitive for users.

Gesture recognition: Every person has unique mannerisms and body language.

Analysis of body movements such as gait can be used to identify people from a distance. Gait is hard to disguise because a person's musculature limits the variation of motion. This data can be obtained unobtrusively as measuring it doesn't require personal contact.

Gesture recognition can provide continuous authentication, ensuring that only authorized people are in restricted areas. But a walking person generates lots of data, so this technology requires additional resources to store and analyze the data in real time. In addition, cameras must be set to

tives, which prevent valid users from authenticating successfully, and false positives, which let unauthorized users authenticate successfully—the last thing you want.

A biometric system's matching algorithm makes a decision based on an acceptance threshold, which determines how close to a template the input must be for it to be considered a match. Users won't tolerate frequent false negatives, so the threshold must be set below the level where no one would be granted access incorrectly, increasing the number of false positives.

Some systems let you set different thresholds for different users. This capability is important, as the quality of each user's biometrics will vary—for example, as we age our fingerprints fade.

What To Watch For

There are a number of different biometric traits to choose from (). When assessing their suitability, consider factors such as ease of measurement, how willing users are to have a particular trait captured and assessed, and how easy it is to imitate a specific trait.

To ensure that you make the right choice for your company, gather input from IT and security pros, business process owners, and users. Consider these points:

Deployment and configuration: Your risk environment must justify the price of a biometric authentication system. Factor in setup, integration, and training costs. The best products come with drivers and software preloaded on the scanning device. Avoid ones that require anything beyond basic user interaction.

Suitability and ease of use: Spend time testing products that suit you and your users. Where do your users work and how do they work? For example, do they need rapid access to a variety of computers? Do they use the latest mobile devices? Do they access the network from a variety of locations?

Enrollment and training: Plan how you'll enroll all your users, a process that must take

Biometric Usability

Biometric Technique	Ease Of Enrollment	Ease Of Use	Accuracy
DNA	1	1	4
Ear lobe	2	3	2
Face	3	4	3
Fingerprint	4	4	3
Gait	2	2	1
Iris/retina	3	3	3/4
Keyboard or mouse	3	4	1
Palm	3	4	3
Signature	4	4	2
Voice	3	4	2

Ease of enrollment and ease of use: 1 difficult to 4 easy; accuracy: 1 low to 4 high
Data: Based on author's knowledge and experience

and mouse movements all can be used to create a unique template that distinguishes one person's typing from another's. These characteristics can be continuously validated against a stored template as a person works in a system. This additional form of authentication will likely become the norm with infrastructures that support large numbers of users, such as customer support desks that regularly access sensitive data.   —*Michael Cobb*

capture more than just faces. This technology is suitable for organizations that must be kept highly secure on a 24/7 basis.

Typing and mouse recognition: Keystroke length, typing speed, error patterns,

place in a trusted environment. Users will need training and, in some instances, assurance about the use of their biometric information. If possible, go for a gradual rollout—get initial users up to speed and solve their problems before proceeding with a mass deployment.

Cost and maintenance: Guided by your risk assessment, minimize cost and support by enrolling only those employees who need access to sensitive data and areas. If you issue scanners to everyone, the support and replacement costs add up quickly. In addition, a smaller user group is easier to train and manage.

Vendor lock-in is a potential risk. Be wary if you have to buy an entire suite of products—client-side applications, middleware, and back-end authentication systems—from one vendor. Wherever possible, choose a system that supports standards-based authentication protocols, such as the Initiative for Open Authentication.

Scalability and flexibility: To avoid surprises, know at what point an increase in the user base will require a change in your license or an upgrade to your authentication server. Avoid products that aren't running successfully at a similar-sized organization. Find out

what other companies and government agencies are doing with similar technology.

Security: Any form of hardware-based authentication will improve your overall security, but how far you need to raise the bar will be determined by your risk assessment. You may need the additional protection of out-of-band or bidirectional authentication. Run extensive trials with a variety of users to see how the authentication process works in daily use.

You must include your authentication infrastructure in your security audits, particularly those used for physical access control.

Many readers and scanners have built-in storage for user information and fingerprint data, often with a USB port for uploading fingerprints and accessing log data. Unlike authentication servers, which reside in protected areas, these devices are positioned at building entries and other generally accessible locations.

Biometric technology is improving all the time. New ways of measuring the body also are being developed. Facial thermography, for instance, detects highly distinctive heat patterns emitted by the skin. It works much like facial recognition, but an infrared camera captures the images,

so it works even in darkness. Researchers also are looking at measuring skin composition, nail bed structure, and body odor.

As biometric systems become more com-

As biometric systems become more common, setup costs will fall, making the technology an option for a wider range of situations.

mon, setup costs will fall, making the technology an option for a wider range of situations. Still, the privacy issue must be resolved. What we see today as outlandish and unacceptable may well change in the years ahead—who would have thought 15 years ago that laptops would come with built-in fingerprint readers? Given the ever-increasing number of threats to our personal and corporate data, people may become more accepting of new and better ways of controlling access to it.

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