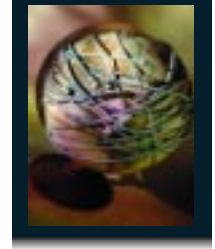# Google your Workforce!

*By Valdis E. Krebs*

We all know that the Internet has brought massive changes to the business world. It is obvious that the Net has affected how we use technology. What is not so obvious is that the Internet has changed our view of, and approach to, business processes and problems. We no longer view organizations as strict hierarchies with obvious borders and vertical information flows. We still see the hierarchy, but we also see the network (both human and computer) and information flowing vertically, horizontally and diagonally. The organization's borders have also become fuzzy with business processes spanning departments and divisions — and extending out to customers, suppliers, and occasionally to customers' customers and suppliers' suppliers. The network connections have become as important as the network nodes. In the networked economy, companies with the best connections — people and processes — have an immense advantage.

With the organization no longer divided into neat little boxes, the business of human resources (HR) has been significantly altered. In the old organization, HR had to manage the company's human capital. In the new project-based organization, not only does HR need to be concerned with the company's human resources but often with those of partners, suppliers and customers. It is no longer "How do we find the best people for the company?" — the new question is: "How do we staff this project and connect all of the required resources, no matter who owns them?"

This makes tracking knowledge and performance very difficult. It was hard enough when the assets managed were under one umbrella — yours. Now, HR needs to monitor process and performance over a diverse group of temporarily connected workers. Many project deadlines and deliverables leave no time or energy for formal performance management and knowledge retention programs. Yet teams soon figure out who is performing and who has expertise in what. This knowledge is used every day by the team to get things done.

## NETWORK OF ASSETS

The network in Figure 1 can be a model of any business system:

*It is no longer "How do we find the best people for the company?" — the new question is: "How do we staff this project and connect all of the required resources, no matter who owns them?"*

➤ Knowledge exchanges amongst research scientists,
➤ Information flow amongst product developers,
➤ Project status updates amongst product teams,
➤ Data flow between components of an HRIS/Benefits/Payroll system,
➤ Web sites hyperlinked to one another on the Internet or corporate intranet,
➤ A map of an industry's strategic alliances and partnerships, and
➤ A business supply Web.

In the networked economy we need to understand networks, their interconnections and the resultant dynamics. The best way to begin the understanding process is to:

1. Map the network, and
2. Measure the network.

When the World Wide Web (WWW) began to grow in 1994-95, some of the first "killer apps" were search engines. Search engines followed two approaches:

1. Use people to classify and judge each Web site submitted — the Yahoo approach, and



**Figure 1.** Any Business System Model.
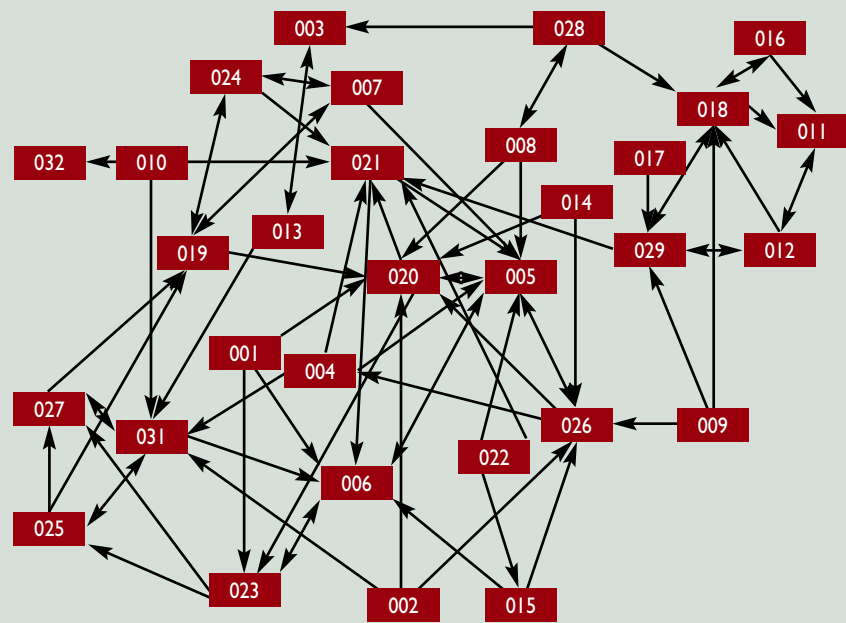
2. Use Web programs called "bots" and "spiders" to mine the content on each Web site — the AltaVista approach.

Initially, the Yahoo approach worked very well — people are the best judges of Web site content and quality. But, as the Web started to grow exponentially, the human editors could no longer keep up with the plethora of new sites being added to the Web each day. The AltaVista approach worked well in keeping up with the rapid expansion of the WWW. But, alas, it was not accurate in returning the pages the Web surfer wanted. Many pages were returned and the user would

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have to "human edit" them to find truly valuable and useful pages. If there was only a way to combine the speed and breadth of AltaVista with the human accuracy of Yahoo. Two Ph.D. students at Stanford, Sergei Brin and Larry Page, were pondering that exact question in 1997. They came up with a new search engine called Google[1] that used the best aspects of man and machine.

### EVALUATION STRATEGIES

Just like AltaVista, Google uses spiders and bots that index the text on Web pages. The big difference, and the secret of their success, is that Google utilizes the links between Web pages. One of the key abilities of the WWW is for any Web page to be linked to any other Web page. I can create a Web site and create pointers (hyperlinks) to any other Web site. In creating links to others, I am pointing out what I think is valuable on the WWW. I am making a quality judgment. I like this other content so much that I am risking losing the person from my Web site to this link elsewhere. Google realized that these pointers/links to others were the secret to finding the best and most relevant content on the Web. Brin and Page, the designers of Google, called their link analysis algorithm *PageRank*. It ranks Web pages by the number of links pointing in to the page. A link from one Web site to another, in effect, says, "Hey this is

good stuff!" Brin and Page explain their algorithm very simply:

> "...a page can have a high Page-Rank if there are many pages that point to it, or if there are some pages that point to it and have a high PageRank. Intu-itively, pages that are well cited from many places around the Web are worth looking at."[2]

What is interesting about the Page-Rank description is that it closely mirrors a measure that has long been used by so-cial network analysts. In the 1960s, social scientists were trying to understand the diffusion of innovations in a medical community. The questions they pon-dered: "Which doctors adopted new pre-scription drugs, and how did this adop-tion spread?" "Are opinion leaders the key nodes in diffusing the adoption?" To find the opinion leaders, the social network analysts developed a network measure called *Prestige*. Ron Burt and David Knoke, two prominent network scholars, explain that a node has high Prestige if it receives nominations from many others. That node's prestige increases even more if those nominating it are also of high pres-tige.[3] The above description of Brin and Page's PageRank sounds very similar.

Whether Brin and Page were aware of this knowledge embedded in the social network community 30 years prior is un-known. Yet, it is interesting how similar metrics can produce similar results in two diverse networks. To get better Web search results — follow the links. To find influential, trusted people — follow the links. In school we were taught that it is impolite to point. In the connected economy we hope that others have for-gotten this lesson and are pointing to us — especially those who are also being pointed to.

Let's take another look at Figure 1 and assume that all red nodes are Web sites, with arrows indicating which Web

site hyperlinks to another Web site. Some Web sites have reciprocal links — they point to each other (nodes 005 and 020 in the center of the diagram). Some relationships are asymmetric — one Web site points to another, but receives no reciprocal link (node 014 points to node 005, but 005 does not point to 014). If we just look at direct links we see that node 005 receives the most links — the most nominations. The top five nominated nodes, in declining order are:

1. 005
2. 020
3. 006
4. 021
5. 031

This rank listing is based upon their immediate network neighborhood — their direct ties. A more powerful metric is to include the indirect ties — the ex-tended network neighborhood. Are in-fluential Web sites pointing to our Web site? Looking at direct *and* indirect ties we see a slightly different list. Although node 005 is still the most prominent node, we see that several nodes with fewer direct links than those listed above have joined the new top five list. This reveals one of the counter-intuitive aspects of networks — quantity of con-nections does not always lead to a pow-erful network position. It is not just the number of direct ties you have, but how your indirect ties are connected several levels out. Using both direct and indirect links we get a more accurate list of which pages are prominent in the network:

1. 005
2. 006
3. 007
4. 021
5. 023

### I NOMINATE YOU

The network in Figure 1 is actually a network of physicians from Galesburg, Illinois. The nodes represent doctors and the links represent whom they talk to about patient cases and treatments. The arrows indicate who seeks out whom (Doctor 014 seeks out Doctor 005). Like the network of Web sites, the arrows in the human network show nominations of who is a trusted source of information or expert knowledge. What PageRank is to Web sites, Prestige is to colleagues and co-workers. It is a quick way to assess

who is trusted, useful and influential.

The Google approach works well in an uncontrolled environment — where Web pages come and go, move locations, and update content continuously. This describes the current work environment where people change projects, employers, and continuously update their knowledge and skill set. We no longer work in a controlled, predictable environment where a manager has visibility over all that affects his or her domain. It is very difficult for a manager to judge the performance of employees dispersed over many projects. 360-degree performance reviews have noticed this problem and have addressed it. Yet, their rigid approach cannot keep up with a fluid workforce embedded in constantly changing work flows and knowledge exchanges. We need an approach that effectively evaluates performance and contribution, and adapts as quickly as the workforce is changing; an approach that does not require the immense administrative structure found in many current performance management systems; an approach that can keep up with the speed of change and yet provide excellent results; and, an approach that self-organizes with the fluidity of changing work relationships.

How will we determine who is trusted, collaborative, expert, influential, and gets things done? How will we support employees nominating each other on various job skills? Some companies make this nomination process a part of project administration — fill out your time card and record who you interacted with to accomplish project goals:

➤ With whom did you work to get your job done?

➤ Whom did you seek out to discuss new ideas and innovations?

➤ Whom did you go to with thorny technical problems?

➤ Who coaches you on how to get things done?

➤ Who advises you on corporate politics and culture?

All questions are answered online using simple Web forms. The data is aggregated, and networks like Figure 1 are easily mapped and measured. We instantly see who the key players are. We can track everyone's performance over the life of the project. Frequently, differ-

ent leaders emerge in different phases of a project — the distribution of nominations will change as requirements for different skills appear in the project. Individuals with specific skills are now noticed — skills no one knew they had before this mapping process. This discovery of "hidden assets" has occurred very often in many firms. Employees who do good work without great fanfare are revealed for their true

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usefulness. Unfortunately, we also discover that those who are expected to be experts are not always utilized that way. Frequently, arrogant and uncommunicative experts are left alone, and so is their knowledge and experience. No one nominates them because no one can stand interacting with the "aloof genius." The process allows for emergence, change, fluidity and even chaos. HR now knows who the real experts are and how various members of the workforce are being utilized. They know who is seeking, and who is sought. Compensation, training, workforce planning, and retention strategies can all be adjusted from this new knowledge.

### WE ORGANIZE

Several startup firms have seen the power of self-organizing performance management and are starting to build software-based processes to support rapidly forming project teams. KNetMap was described in a previous issue of the IHRIM Journal.[4] Seattle-based Company-Way[5] is proposing another tool. CompanyWay is combining "googled" organization concepts with complexity science in a Web-based software package that allows workers to self organize and collaborate on innovation and new product design. Within the organization, companies will more fully realize the human capital potential of their employees, connecting the minds of the best performers without regard to title or department and provid-

ing a way for the resulting teams to marshal support for great ideas. The end result is a powerful tool for motivating workers, rewarding progressive thinking, lowering the total cost of new product development, and increasing the overall social capital of companies.

Similar to Google's PageRank, CompanyWay's software allows users to rate the success both of ideas and of the workers completing numerous tasks necessary to evolve an idea into a viable product. Quality ideas become more visible in the system, as do the workers with the best performance history. The visibility of ideas allows the company to make real-time decisions on new product development. The most visible workers can be automatically tapped for constantly forming and reforming teams on projects best suited for their talents. In addition, rather than relying on job titles, workers can create "respect" links with other workers. This reputation management system mirrors Google's weighted page ranking by increasing the influence of the high-respect workers in the system for decisions, as well as for team recruitment.

In traditional companies, employees have both formal organizational capital (such as job title and number of direct reports) and less formal social capital (such as cool projects and strong connections to co-workers around the company). CompanyWay bases its organizational system on automated methods for managing social capital. By providing a system for managing workers' social capital, CompanyWay expects organized group behavior to emerge from the system — perhaps in the form of winning business strategies the company has yet to identify.

### OTHER VIEWS

Not only is a map of information and knowledge exchange (like Figure 1) use-

ful for evaluation of performance and contribution, it has other uses. It is a more accurate picture of how an organization really works. It is closer to reality than any formal organization chart.

In showing us the critical nodes in the network, our map also reveals those their individual skill or their place on the organization chart. From our map in Figure 1, it is obvious that 005, 006 and 007 are very important in getting things done in this work group. Nodes 005, 006 and 007 may be critical points of failure for various processes and projects

> *We need self-organizing processes, and systems that change with the work. In the networked economy, we need to map and measure the network connections and determine what they reveal about the network nodes. Analysis of the network is an effective strategy for any complex adaptive system, whether composed of bits or biology.*

nodes we do not want to lose. The list of nodes, in order of prominence in the network, should also be the list of retention efforts. Removing a key node will have a greater negative ripple effect throughout the network than removing a peripheral node. Removing either node 005, 006, or 007 will devastate the organization much more than removing either node 009 or 012 — regardless of within the organization. Not only do these maps reveal our stars, but they also reveal our vulnerabilities — which we can then plan for.

As our external business environment becomes more fluid and chaotic, our internal processes and systems must respond and become more agile and adaptive. Command and control is too slow and too rigid for adaptation.

We need self-organizing processes, and systems that change with the work. In the networked economy, we need to map and measure the network connections and determine what they reveal about the network nodes. Analysis of the network is an effective strategy for any complex adaptive system, whether composed of bits or biology.

### ENDNOTES

**1** Brin, S. and Page, L. "The Anatomy of a Large-Scale Hypertextual Web Search Engine" Stanford University, 1998. http://www7.scu.edu.au/programme/fullpapers/1921/com1921.htm

**2** *Ibid.*

**3** Knoke, D., and Burt, R. S. "Prominence" in Burt, R. S., and M. Minor, *Applied Network Analysis: A Methodological Introduction*, Newbury Park: Sage, 1983: 195 - 222.

**4** Armstrong, C., and Krebs, V. "Knowledge Networks: We are our Artifacts" IHRIM *Journal*, Volume IV, Number 3, October 2000.

**5** http://www.CompanyWay.com.

*For author's biography, see page 161.*

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