Executive Brief

Digital Swarming

The Next Model for Distributed Collaboration and Decision Making

Author
J.D. Stanley

Public Sector Practice
Cisco Internet Business Solutions Group

August 2008

Based on material originally published from October 2007 to July 2008

Cisco Internet Business Solutions Group (IBSG)

Digital Swarming

The Next Model for Distributed Collaboration and Decision Making

This executive brief takes into account current trends, standards, ideas, and research, and is intended to promote further discussions about digital swarming.

The world has reached an inflection point where individuals and organizations are beginning to understand how collective awareness, collaboration, and intelligence have the potential to change the way we work, learn, contribute, and live. Several key trends have led us to this juncture:

- Virtual and physical worlds are merging, providing a more comprehensive experience than either could do alone.
- People, information, and technology are becoming more connected and pervasive: more nodes reside on an Internet-based network that comprises billions of connected endpoints, creating unique, new service offerings.
- Application-centric solutions and client/server architectures are becoming more distributed, and certain applications' logic is moving to distributed services in various nodes on the network.
- Social networking technologies are moving to the enterprise and will be approached and experienced differently than in the consumer space.

These factors are encouraging a new trend in private- and public-sector organizations: *digital swarming*. In its simplest form, digital swarming is a concept in which input—from machines, people, video streams, newsfeeds, sensors, and more—is digitized and placed onto the network. This input is then incorporated into a common fabric that connects people, processes, and knowledge to enable faster, better decision making.

Digital swarming is influenced largely by mass social networking principles, and represents the next model for collaboration and decision making in a distributed environment. The differences between social networking and digital swarming, however, are that (1) digital swarming applies these principles in novel ways, and (2) digital swarming networks encompass an elite, selective community of experts who share knowledge, collaborate, and make decisions in a trusted, open systems framework—one that provides the community with meaning and purpose far beyond those of consumer-based social networks such as MySpace and Facebook.

Collaboration and innovation are not a linear process in the digital swarming world; they are a distributed process where information and decision making occur throughout the network—not just at specific aggregation points. Digital swarming connects all nodes on the network—data, machines, objects, and people—in an intuitive environment that harnesses the power of the collective to achieve the desired effects of the organization.

It is important to understand that digital swarming is not an end state or an outcome; digital swarming *facilitates* the collective's journey toward achieving its goals.

This new business model requires a change in mindset among all stakeholders within an organization—and a clear understanding of the processes and technology that enable digital swarming.

Digital Swarming: Process

Eighty to 90 percent of all knowledge comes from human experiences and expertise, rather than from computer-based knowledge systems. Much of today's technology, however, is still application-centric, and the information that resides in these applications is stored in silos dispersed across many systems and networks. This old way of working inhibits our natural inclination to communicate and work together to solve problems. It also restricts our ability to harness the intelligence available throughout the enterprise to ensure decisions are made where and when they are likely to have the largest, most positive impact.

Digital swarming is a powerful tool that removes these barriers to communication and collaboration by using collective intelligence to break down information silos—returning the human context to the way we work within existing, data-only technology models. In the digital swarming environment, the collective can rapidly filter out bad information, which, in turn, mitigates the risk of misinformation.

At a higher level, digital swarming allows leaders to communicate intentions, make sure that intentions are aligned, and foster a cohesive environment for collaboration. Digital swarming ensures that individuals and the collective are aware of the tasks required to achieve the desired goals. Additionally, cohesion enables the collective not only to accomplish what is expected, but also to understand how it supports others. Cohesion, in turn, promotes collaboration, contribution, and iterative, experiential learning.

Furthermore, in a digital swarming environment, power becomes a shared process in which knowledge and services reside in a collaborative space that makes them available as needed. In this way, leaders become mentors who transfer their knowledge and experience to the collective; more people are called on to make decisions faster, and new jobs and roles are created. The more expertise (resources) they have, the more services (knowledge) they can provide; leaders are left to prioritize their efforts, rather than trying to manage the deluge of information before them.

Companies can increase profit and productivity because digital swarming improves collaboration, distributes intelligence, and aggregates collective experiences.

Digital Swarming: Framework and Technology

Digital swarming takes this level of interconnectedness to greater heights by moving away from the existing client/server, batch-processing (asynchronous) model toward a real-time, dynamic, and synchronous approach to how humans, objects, and all nodes on the network interact and collaborate—ultimately acting more like service providers than just consumers.

The architecture that enables digital swarming is comprised of distributed intelligence, collaborative communications, and immersive environments.

Distributed Intelligence—Digital swarming provides access to neutral applications and platforms to acquire distributed and collective intelligence and knowledge. In this way, content flows freely, unbundled from applications and source/destination approaches that have plagued organizations for decades. The distributed intelligence creates awareness of the needs and wants of individuals, organizations, and objects (sensors, machines, software, and so on) within the collective community.

Collaborative Communications—Digital swarming enables humans, humans and objects, and objects and objects to collaborate, communicate, and assemble content across existing and future communication and collaboration systems and applications. This process is based on preference, functionality, presence, status, and location.

Immersive Environments—Digital swarming enables intelligent decision making using a highly sophisticated, homogenous portal (or interface) designed to aggregate communications, collaboration, and rich content from various sources—allowing more machines, objects, and people to work together.

In this environment, sensors, for example, may be used to measure light, temperature, and altitude; the data collected is fed back to the network in a mashup, where it is analyzed by the appropriate decision maker(s). The mashup takes advantage of the network platform, or fabric, where services are provisioned to every application in a consistent and common way. The way in which content is assembled and delivered sets a digital swarming interface apart from a standard web portal. By immersing decision makers in a "decision space"—whether physical, virtual, simulated, or a blending of all three—the speed, quality, reach, and auditability of the decision-making process is increased.

Within this immersive environment, the collective operates at cognitive speeds—speeds at which context, experience, knowledge, decisions, and coordination occur in near real time. The individuals within the collective, and the collective itself, both benefit from the combined effects of this distributed and pervasive social, cognitive platform.

Digital swarming is fueled by a platform that supports collaboration, communication, and data. This platform is a business-process architecture that emphasizes the creation of a virtual execution engine to provision services in a platform- and application-neutral way. Following are the key components of this platform:

- **Communication:** Voice, video, and data that interoperate across all platforms, nodes, and formats.
- **Information sharing:** Mashups that provide multiple sources of information from any source. Information is fused into a single portal customized to the needs of any user.
- **Collaboration:** Integrated in a consistent way into all workflows versus stand-alone, separate applications or services.
- **Decision support:** Portals and services to ensure that decisions can be made where and when they are needed throughout the organization, including decision-modeling and simulation services that increase quality decision making.
- **Data integration:** Translating all data sources into Internet standards.
- **Event management:** Automated administration, policy enforcement, and issue/event notification.

These elements are provisioned into any workflow or process by which network capabilities are delivered via an Internet-based platform, and are seamlessly integrated into the applications and data of the workflow.

Companies and organizations can facilitate the leap toward pervasive connectivity, rather than crawling toward incremental improvements by blending process and technology. All stakeholders, however, must be on board or the technology will not make a difference.

Who Is Embracing Digital Swarming?

The technology that enables digital swarming is here today. Much of the implementation involves using current IT assets in a different way; it is not about upgrading the network, but rather about modifying certain equipment and converting it to IP to enable digital swarming across the public or private enterprise.

The Personal Travel Assistant project is a current example of digital swarming. The project—an initiative involving Cisco, the Massachusetts Institute of Technology (MIT), and select cities—is helping cities connect their urban environments to enhance public services.

The Personal Travel Assistant is a social network service based on Web 2.0 technologies that puts the power of choice into citizens' hands, while at the same time allowing city agencies to manage their assets and services better. The service combines existing sources of information via a multichannel, unified communications-based platform that provides citizens with up-to-date information and services pertinent to their work and personal lives. For example, citizens using the city bus system can employ different devices—smartphones, PCs, kiosks—to access information on how to travel from point A to point B most efficiently. The service not only provides route information and real-time bus schedules, but also provides the most energy-efficient and rapid method of transportation.

On the other hand, if citizens choose to travel via car and there is an accident along their route, the system will present alternative methods for reaching their destination, or provide information about connected work centers within the city where citizens can use high-end collaboration solutions such as Cisco TelePresence to conduct virtual business meetings.

Conclusion

The swarm of people, data, objects, and machines is emerging as a new, open model for how organizations will work to solve their problems and meet their goals. The need for agility in the face of rapid and pervasive changes demands new organizational models that can deliver information and support decision making across—and at the edge—of the network or collective. At first glance, this notion seems chaotic compared with the way that organizations still tend to operate in silos today. It is not. MySpace and Facebook are clear examples of simple social networks that, while they appear to operate without regulations, do follow a clear set of parameters and rules.

The digital swarming network that combines the simpler attributes of consumer social networking with the complex attributes of an open, trusted, elite social network that connects people to people, people to machines, and machines to machines will create a major shift in the way that humans work and live. In turn, this human network will create a new way of conceiving organizations and the systems that support them. Getting to this point, however, requires a major shift in the way private- and public-sector leaders think, and in the way their organizations execute.

More Information

The Cisco Internet Business Solutions Group (IBSG), the global strategic consulting arm of Cisco, helps CXOs and public sector leaders transform their organizations—first by designing innovative business processes, and then by integrating advanced technologies into visionary roadmaps that address key CXO concerns.

For further information about IBSG, visit http://www.cisco.com/go/ibsg

Americas Headquarters
Cisco Systems, Inc.
San Jose, CA

Asia Pacific Headquarters
Cisco Systems (USA) Pte. Ltd.
Singapore

Europe Headquarters
Cisco Systems International BV
Amsterdam, The Netherlands

Cisco has more than 200 offices worldwide. Addresses, phone numbers, and fax numbers are listed on the Cisco Website at www.cisco.com/go/offices.

CB/LW15017 0808