

: *What are challenges of real-time decision support?*

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Pushing "real-time" information to decision makers is now realistic and practical. Real-time decision support is and will be a disruptive technology. Much public information is streamed to people by TV, radio, blogs with RSS feeds, text messages and twitter feeds 24x7x365. People can communicate from almost anywhere to anyone anywhere using voice, video, and messages. People can also "pull" extensive information as needed. A major need of the "real-time" enterprise is integrating public and proprietary company information in appropriate, "right-time" feeds that enhance decision making. Certainly there are challenges, some are obstacles that threaten success, others are minor impediments that are easily overcome. Technical challenges are perhaps the easiest obstacles to overcome. Organizational challenges are harder to deal with; and some social/psychological challenges may be major barriers. Let's examine the challenges.

The context of decision making and computerized decision support in most organizations is increasingly complex, interdependent and interrelated. The "real-time" challenges are demanding and stimulating change and innovation. Challenges are sometimes confused with problems, and if not confronted, challenges may become problems. At present the real-time decision support challenges are obstacles to overcome. Thierauf (1982) argued that "any system that processes and stores data or reports them as they are happening is considered to be an on-line real-time system". The frequency of information change and decision making, the timeliness requirement for information, the need for synchronicity, and the stresses of managing "in real-time" all magnify the challenges.

Marc Demarest noted (Power, 2002b), the "adjective 'real-time' means that informational inputs to decision-making processes are available as soon as there are state changes in the environment that alter those informational inputs. ... Real-time also means 'near-real-time' in practice because there is always some latency between (a) the actual state change, (b) the reflection of that state change in data in one or more systems of record and (c) the availability of the changed data to decision-makers." Without doubt real-time is not the same for every decision task. But, constraining factors like data latency are being reduced and technology provides new tools to receive and access real-time data.

Real-time data can be pushed to salespeople as they are meeting with a client or customer. Pricing can change as needed and be rapidly disseminated. Forecasts can be updated and impact production almost instantaneously. Managers can chat with colleagues in a synchronous group meeting from wherever participants happen to be. As laws change, tax planning knowledge-driven DSS can be quickly updated. New documents can be made quickly available and potential readers

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can be notified of the availability. Managers can be tracked and warned and notified. Decision makers will have more situational awareness of their surroundings and others will be more aware of what a specific decision maker is doing. WAP-enabled mobile phones will deliver data in real-time to managers, sales staff and emergency personnel, companies will have active datawarehouses, extensive event data will be recorded in real-time, and business analytics will be available in real-time or "near real-time" (cf., Power, 2008)

Technical challenges

Technology continues to change, improve and evolve every 18-24 months. Real-time involves diverse data sources in different formats, including spatial and nonspatial, dynamic, high resolution displays (cf., Batty), high speed wireless remote access, and automatic data collection, processing and distribution.

According to Masters and Welch, real-time systems must accommodate a wide variety of processing objectives. The systems are:

"driven by external world events, the external environments cannot be characterized accurately a priori, there is high volume throughput of continuously refreshed data, hard real-time deadlines, asynchronous, event-based low latency responses, soft real-time processing requirements, reaction time paths across multiple hardware and software components, a wide dynamic range of processing loads, operator display and control requirements, high availability and survivability requirements, and stringent certification and safety requirements." The Masters and Welch analysis was for a military computing environment, but the objectives and technical challenges seem applicable for any large, globally distributed organization.

Much of real-time decision support is or will involve peer-to-peer (P2P) computing. Currently this technology bypasses some security measures and creates the potential for serious security breach.

Organizational challenges

Organizations can become bureaucratic and the "real-time enterprise" is and must be agile and time aware. Bureaucratic organization will need to undergo extensive changes to become agile and responsive and hence able to exploit real-time decision support. Current organizations may have insufficient data, poor data gathering processes, overlapping responsibilities, poorly managed information assets, poorly defined key performance indicators and performance expectations, poor systems, processes, policies and procedures, and inadequate employee training and development. To overcome these challenges requires changes in process, leadership and employee development.

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Moving into real-time decision support involves uncertain consequences, coping with a lack of human resources, deciding priorities, and maintaining perspective on the needed organization changes.

Social/psychological challenges

Changing the attitudes of employees and the culture of the organization and relations with customers, stakeholders and especially suppliers may be the major set of challenges. Managers need to gain support for change, deal with increased work related stress, overcome resistance to change, understand training needs, provide rewards, develop incentive-based compensation, and recognize that real-time decision support may disrupt relationships. People have social expectations about how organizations can or must operate, like the chain of command and superior/subordinate relations that will be altered with real-time decision support. People, work groups and stakeholders will need positive coping behaviors to deal with the ambiguity, the changed interpersonal dynamics, the varied responses of family and coworkers, and the "work fast" cultural changes that will likely be needed.

One of the Baldrige criteria emphasizes the problem of being "unprepared for a disruptive technology that threatens your competitive position or your marketplace. Examples of such technologies include personal computers replacing typewriters; cell phones challenging traditional phones and pay phones; fax machines capturing business from overnight delivery services; and e-mail challenging all other means of correspondence." The recommendation: "Today, organizations need to be scanning the environment inside and outside their immediate industry to detect such challenges at the earliest possible point in time (cf., <http://www.baldrige21.com/>)." Real-time decision support will impact many industries.

Challenges exist. Workplaces will be disrupted by synchronous messages, information pushed to employees for action taking, and greater situational awareness while performing tasks. In my opinion, organizations need knowledgeable leadership to meet the technical, organizational and social/psychological challenges that must be overcome to survive well in an information-rich, real-time decision support environment.

We are seeing the "dawn of the real-time enterprise" (cf., Margulius, 2002). In general, organization activities will continue to speedup, time horizons and leadtimes will be shortened, products and services will change more frequently, customers will expect rapid responses and technology will hold complex organizational relationships together across time and space. For some managers, the stress will lead to burnout, for others change will create opportunities and invigorate and validate

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their visions.

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