In this project, you can suggest applications of Internet technology to help employees at real world company work more efficiently.

Dirt Bikes’s management is concerned about how much money is being spent communicating with people inside and outside the company and on obtaining information about developments in the motorcycle industry and the global economy. You have been asked to investigate how Internet tools and technology could be used to help Dirt Bikes employees communicate and obtain information more efficiently. Dirt Bikes provides Internet access to all its employees who use desktop computers.

1. How could the various Internet tools help employees at Dirt Bikes? Create a matrix showing what types of employees and business functions would benefit from using each type of tool and why.

2. How could Dirt Bikes benefit from intranets for its sales and marketing, human resources, and manufacturing and production departments? Select one of these departments and describe the kind of information that could be provided by an intranet for that department. How could this intranet increase efficiency and productivity for that department?
Running Case Solution Description: Question 1
How could the various Internet tools help employees at Dirt Bikes? Create a matrix showing what types of employees and business functions would benefit from using each type of tool and why.

The Internet is far easier and less expensive to use for much of telecommunications than more traditional technologies. In addition, the cost of installation and training for using the Net is very low. Cost for using the Net is low enough that many smaller companies that could not afford telecommunications earlier are now using it, which means they are able to relate to other companies with modern technology. Though DB is still a relatively small company Internet tools can reduce costs but not as much as the large-sized gains larger companies can achieve. Nonetheless, the Internet and its many tools should be of help to DB now and even more as it grows.
Running Case Solution Description: Question 1
How could the various Internet tools help employees at Dirt Bikes? Create a matrix showing what types of employees and business functions would benefit from using each type of tool and why.

Sample Matrix:

<table>
<thead>
<tr>
<th>Tool</th>
<th>Department</th>
<th>Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-mail</td>
<td>Sales</td>
<td>Communicate and share documents with customers and dealers</td>
</tr>
<tr>
<td></td>
<td>Accounting</td>
<td>Exchanging orders, invoices, and other necessary documents</td>
</tr>
<tr>
<td>Usenet</td>
<td>Customer relations</td>
<td>A bulletin board for customers to exchange information and ideas</td>
</tr>
<tr>
<td></td>
<td>Design</td>
<td>Discuss scientific issues with non-DB scientists, designers, producers</td>
</tr>
<tr>
<td>Chatting</td>
<td>Sales</td>
<td>Salespersons on road discuss problems with home staff</td>
</tr>
<tr>
<td></td>
<td>Management</td>
<td>Consult with management of DB’s suppliers</td>
</tr>
<tr>
<td>Web</td>
<td>Production</td>
<td>Facing production problems, researching the experiences of others</td>
</tr>
<tr>
<td></td>
<td>Finance</td>
<td>Following the markets, interest rates and own investments</td>
</tr>
<tr>
<td>Telnet</td>
<td>Sales</td>
<td>Using home computer, make presentations to potential customers</td>
</tr>
<tr>
<td></td>
<td>Supply chain</td>
<td>Suppliers obtaining DB production status to help plan deliveries</td>
</tr>
<tr>
<td>FTP</td>
<td>Design</td>
<td>Sharing large design files with distant colleagues</td>
</tr>
<tr>
<td></td>
<td>Supplies</td>
<td>Making large DB design documents available to suppliers</td>
</tr>
<tr>
<td>LISTSERV</td>
<td>Public relations</td>
<td>Discussing planning for races and dealing with race problems</td>
</tr>
<tr>
<td></td>
<td>Production</td>
<td>Subscribing to ongoing discussions of engine problems</td>
</tr>
</tbody>
</table>

Wireless devices such as Internet-enabled cell phones or Wi-Fi enabled PCs can be useful when employees need to be away from their home base and yet needing to use the Net. Instant messaging can be an excellent tool for communicating with other employees and with customers, suppliers and all the other non-employees the company will have to deal with.
Running Case Solution Description: Question 2
How could Dirt Bikes benefit from intranets for its sales and marketing, human resources, and manufacturing and production departments? Select one of these departments and describe the kind of information that could be provided by an intranet for that department. How could this intranet increase efficiency and productivity for that department?

Intranets are internal, and they inexpensively allow connectivity for all computers, a very valuable facility for sharing information within the company. An intranet can, for example, be used to make easily (and widely, where appropriate) available sales reports and reports on attendance at races, and even racing videos.

1. Human resources can instantly update employee handbooks and benefits information, not only making this rapidly available but also saving on printing and distribution costs.
2. Finance and accounting can integrate its information online for management and to help sales and production monitor revenues and costs.
3. The marketing and sales staff can share their reports, leads, and insights with design about changing ideas on motorcycle design.
4. The supply chain staff can monitor production’s status while accounting can obtain all necessary information on the purchase of supplies.
Running Case Solution Description: Question 2
How could Dirt Bikes benefit from intranets for its sales and marketing, human resources, and manufacturing and production departments? Select one of these departments and describe the kind of information that could be provided by an intranet for that department. How could this intranet increase efficiency and productivity for that department?

One area where productivity can be increased and costs reduced through the use of an intranet by production. The production unit can monitor possible design changes and even offer input on ways to make the proposed changes that will be easier and cheaper to manufacture. Moreover, the whole design process can be significantly speeded up when proposals and changes to the design are instantly shared. Management can also use the design and production information on the intranet to monitor the whole process. While all of this is useful for large companies and small, it can make the whole company more efficient and effective.
Running Case Solution Description: Question 2
How could Dirt Bikes benefit from intranets for its sales and marketing, human resources, and manufacturing and production departments? Select one of these departments and describe the kind of information that could be provided by an intranet for that department. How could this intranet increase efficiency and productivity for that department?

Another example is for marketing to be successful, marketers need to both understand what is successful in stimulating sales and to communicate to sales the information they need (two-way communication). Manufacturing needs close contact with designers, those managing their supply chain, and even accounting. Sales must also communicate information that manufacturing needs so that it can plan for and execute its production. Even finance and accounting needs some information from these various departments, and you should identify the specific information needed by the department you select, where it comes from, and how communicating it on a timely basis can increase productivity and efficiency.

For just one example, the timely arrival of needed supplies can lower inventory costs while helping production to keep operating without delays. This obviously requires not only constant communications with suppliers—extranets can be helpful here—but also communications between the production department and those within DB responsible for the supply chain.
Discussion Questions

1. It has been said that within the next few years, smartphones will become the single most important digital device we own. Discuss the implications of this statement.

Cell phones and smartphones are morphing into portable computing platforms that allow users to perform some computing tasks that previously could only be accomplished on a desktop computer. Smartphones enable digital capabilities like e-mail, messaging, wireless access to the Internet, voice communication, and digital cameras. They also allow users to view short video clips, play music and games, surf the Web and transmit and receive corporate data. New generations of mobile processors and faster mobile networks enable these devices to function as digital computing platforms allowing users to perform many of the tasks of today’s PCs on smartphones. Storage and processing power continue to increase thereby rivaling those of the typical PC. That allows users to run key applications and access digital content through smartphone technologies.

Managers and employees will be able to break the tether to the desk and desktop computer because of smartphones. Users can more easily stay in touch with customers, suppliers, employees, and business partners and provide more flexible arrangements for organizing work.

On the downside, smartphones can potentially increase the amount of time workers spend “on the job” by making communication and computing possible anytime, anywhere. That may increase the amount of techno-stress employees and managers experience by not allowing them any free time or claim to their own personal space.
2. Should all major retailing and manufacturing companies switch to RFID? Why or why not?

RFID systems are complex and, in the past, expensive to implement. Now the cost of RFID tags is approaching 10 cents per passive tag in the United States. As the price decreases, RFID is starting to become cost-effective for some applications. Businesses that will most likely benefit from RFID technology are those that frequently track the movement of goods through supply chains. In inventory control and supply chain management, RFID systems capture and manage more detailed information about items in warehouses or in production than bar coding systems. Major retailing and manufacturing companies will no doubt switch to RFID technology as costs continue to fall and applications increase. Whether or not all major retailing and manufacturing companies should switch to RFID is a matter of choice. They will no doubt go this way in the near future. By doing so, they will increase their operational efficiencies thereby increasing profits or gaining a competitive advantage by lowering overall costs to consumers. Review the information in the following Web site: http://www.epic.org/privacy/rfid/ and develop some ideas from there.
Discussion Questions

3. Compare Wi-Fi and high-speed cellular systems for accessing the Internet. What are the advantages and disadvantages of each?

Wi-Fi allows users to access the Internet from numerous locations that could not be covered by traditional wired Internet services. The technology reduces costs for both personal users and businesses by providing a way to share peripheral devices like printers and servers among many computing devices. There’s no need for separate printers for each computer or hard-wiring each computer to peripheral devices. Bluetooth-enabled wireless technology provides an easy way to connect devices. Wi-Fi speeds and transmission capacity continue to improve and expand enabling users to access videos, audio files, Web sites, and even video-conferencing through hotspots located in public and private areas. Security continues to improve for Wi-Fi access points protecting users from unauthorized access although the technology still poses threats from intruders.

High-speed cellular systems provide a way for users to access the Internet from virtually anywhere at any time. More powerful cellular networks based on 3G, and now 4G, technology are expanding the amount and types of data users can access. The continued expansion of cellular systems enables a wider range of broadband Internet access. Voice, data, and high-quality streaming video open up a wider range of services for users. Cellular systems supporting smartphones, tablet computers, and mobile computing devices break the tether formerly holding users to desktop and laptop computers. Security issues exist for cellular systems similar to Wi-Fi systems.
Review Questions

1. What are the principal components of telecommunications networks and key networking technologies?

1.1 Describe the features of a simple network and the network infrastructure for a large company.

A simple network consists of two or more connected computers. Basic network components include computers, network interfaces, a connection medium, network operating system software, and either a hub or a switch. The networking infrastructure for a large company relies on both public and private infrastructures to support the movement of information across diverse technological platforms. It includes the traditional telephone system, mobile cellular communication, wireless local-area networks, videoconferencing systems, a corporate Web site, intranets, extranets, and an array of local and wide-area networks, including the Internet. This collection of networks evolved from two fundamentally different types of networks: Telephone networks and computer networks.
Review Questions

1.2 Name and describe the principal technologies and trends that have shaped contemporary telecommunications systems.

Client/Server computing, the use of packet switching, and the development of widely used communications standards such as TCP/IP are the three technologies that have shaped contemporary telecommunications systems.

Client/Server computing has extended to networking departments, workgroups, factory floors, and other parts of the business that could not be served by a centralized architecture. The Internet is based on client/server computing. Packet Switching technology allows nearly full use of almost all available lines and capacity. This was not possible with the traditional dedicated circuit-switching techniques that were used in the past. TCP/IP is a suite of protocols that has become the dominant standard of network communications. Having a set of protocols for connecting diverse hardware and software components has provided a universally agreed upon method for data transmission.
Review Questions

2. What are the main telecommunications transmission media and types of networks?

2.1 Name the different types of physical transmission media and compare them in terms of speed and cost.

Typical speeds and costs for several of the transmission media are provided below.

<table>
<thead>
<tr>
<th>Medium</th>
<th>Speed</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Twisted wire</td>
<td>up to 100 Mbps</td>
<td>Low</td>
</tr>
<tr>
<td>Microwave</td>
<td>up to 600+ Mbps</td>
<td></td>
</tr>
<tr>
<td>Satellite</td>
<td>up to 600+ Mbps</td>
<td></td>
</tr>
<tr>
<td>Coaxial cable</td>
<td>up to 1 Gbps</td>
<td></td>
</tr>
<tr>
<td>Fiber-optic cable</td>
<td>up to 6+ Tbps</td>
<td>High</td>
</tr>
</tbody>
</table>
2.2 Define a LAN, and describe its components and the functions of each component?

A LAN is a telecommunications network that is designed to connect personal computers and other digital devices within a half-mile or 500-meter radius. LANs typically connect a few computers in a small office, all the computers in one building, or all the computers in several buildings in close proximity. LANs require their own dedicated channels.

Components of a typical LAN consist of: Computers (dedicated server and clients), a network operating system (NOS) residing on a dedicated server computer, cable (wiring) connecting the devices, network interface cards (NIC), switches or a hub, and a router.

NIC each computer on the network contains a network interface device.

Connection medium – for linking network components; can be a telephone wire, coaxial cable, or radio signal in the case of cell phone and wireless local-area networks (Wi-Fi networks).

NOS routes and manages communications on the network and coordinates network resources.

Dedicated server provides users with access to shared computing resources in the network. The server determines who gets access to data and in what sequence.

Client computers are connected to one another.

Switches or hub act as a connection point between the computers. Hubs are very simple devices that connect network components and send data packets to other connected devices. A switch has more intelligence than a hub and can filter and forward data to a specified destination.

Router a special communications processor used to route data packets through different networks, ensuring messages are sent to the correct address.
2.3 Name and describe the principal network topologies.

The principal network topologies include:

**Star topology**: All devices on the network connect to a single hub and all network traffic flows through the hub.

**Bus topology**: One station transmits signals, which travel in both directions along a single transmission segment. All of the signals are broadcast in both directions to the entire network, with special software to identify which components receive each message.

**Ring topology**: Connects network components in a closed loop. Messages pass from computer to computer in only one direction around the loop and only one station at a time may transmit.
3. How do the Internet and Internet technology work and how do they support communication and e-business?

3.1 Define the Internet, describe how it works and explain how it provides business value.

The Internet is a vast network of computers that connects millions of people all over the world. The Internet uses the client/server model of computing and the TCP/IP network reference model. Every computer on the Internet is assigned a unique numeric IP address. No one owns the Internet, and it has no formal management organization. However, worldwide Internet policies are established by organizations and government bodies, such as the Internet Architecture Board and the World Wide Web Consortium. The Internet must also conform to the laws of the sovereign nation-states in which it operates, as well as the technical infrastructure that exist within the nation-state.

The Internet enables employees to gain remote access to the company’s internal systems through its Web site. They are able to better service customers and suppliers, improve operational efficiency, increase productivity, lower operational costs, have a broader market base, and reach more individual customers on a global scale by establishing a Web presence. The cost of e-mail and other Internet services tend to be far lower than equivalent voice, postal, or over night delivery costs, making the Internet a very inexpensive communication medium. It is also a very fast method of communication, with messages arriving anywhere in the world in a matter of seconds or minutes.
Review Questions

3.2 Explain how the Domain Name System (DNS) and IP addressing system work.

The Internet is based on the TCP/IP networking protocol suite. Every computer on the Internet is assigned a unique Internet Protocol (IP) address, which currently is a 32-bit number represented by four strings of numbers ranging from 0 to 255 separated by periods.

A domain name is the English-like name that corresponds to the unique 32-bit numeric IP address for each computer connected to the Internet. The Domain Name System (DNS) converts IP addresses to domain names so that users only need to specify a domain name to access a computer on the Internet instead of typing the numeric IP address. DNS servers maintain a database containing IP addresses mapped to their corresponding domain names.

When a user sends a message to another user on the Internet, the message is first decomposed into packets using the TCP protocol. Each packet contains its destination address. The packets are then sent from the client to the network server and from there on to as many other servers as necessary to arrive at a specific computer with a known address. At the destination address, the packets are reassembled into the original message.
3.2 List and describe the principal Internet services.

**E-mail** person-to-person messaging; document sharing.

**Newsgroups** discussion groups on electronic bulletin boards.

**Chatting and instant messaging** interactive conversations.

**Telnet** logging on to one computer system and doing work on another.

**File Transfer Protocol (FTP)** transferring files from computer to computer.

**World Wide Web** retrieving, formatting, and displaying information (including text, audio, graphics, and video) using hypertext links.
3.3 Define and describe VoIP and virtual private networks and explain how they provide value to businesses.

Voice over Internet Protocol (VoIP) enables Internet technology to be used for telephone voice transmission over the Internet or private networks. VoIP offers the advantage of avoiding tolls charged by local and long-distance telephone networks. VoIP provides businesses an opportunity to reduce costs because they no longer have to maintain separate networks or provide support services and personnel for each different type of network. It gives organizations flexibility because phones can be added or moved to different offices without rewiring or reconfiguring networks.

Virtual private networks are secure, encrypted, private networks that have been configured within a public network to take advantage of the economies of scale and management facilities of large networks, such as the Internet. VPNs are low-cost alternatives to private WANs. VPNs give businesses a more efficient network infrastructure for combining voice and data networks.
3.4 List and describe alternative ways of locating information on the Web.

Search engines are a facility on the Web that helps you find sites with the information and/or services you want. Examples: Google, Yahoo!, and MSN. Intelligent agent shopping bots use intelligent agent software for searching the Internet for shopping information. Examples: MySimon and Froogle. Blogs are informal yet structured Web sites where subscribing individuals can publish stories, opinions, and links to other Web sites of interest. Rich Site Summary or Really Simple Syndication (RSS) is a simple way for people to have content they want pulled from Web sites and fed automatically to their computers, where it can be stored for later viewing. It’s commonly used with blogs. Wikis are collaborative Web sites where visitors can add, delete, or modify content on the site, including the work of previous authors. Web 2.0 provides second-generation interactive Internet-based services that enable people to collaborate, share information, and create new services online. Web 2.0 software applications run on the Web itself instead of the desktop and bring the vision of Web-based computing closer to realization. Web 3.0 (Semantic Web) reduces the amount of human involvement in searching for and processing Web information. It’s still in its infancy but promises to establish specific meanings for data on the Web, categories for classifying the data, and relationships between classification categories.
3.5 Compare Web 2.0 and Web 3.0.

Web 2.0 refers to second-generation interactive Internet-based services that enable people to collaborate, share information, and create new services online. Web 2.0 is distinguished by technologies and services like cloud computing, software mashups and widgets, blogs, RSS, and wikis. These software applications run on the Web itself instead of the desktop and bring the vision of Web-based computing closer to realization. Web 2.0 tools and services have fueled the creation of social networks and other online communities where people can interact with one another in the manner of their choosing.

Web 3.0 focuses on developing techniques to make searching Web pages more productive and meaningful for ordinary people. Web 3.0 is the promise of a future Web where all digital information and all contacts can be woven together into a single meaningful experience. Sometimes referred to as the semantic Web, Web 3.0 intends to add a layer of meaning atop the existing Web to reduce the amount of human involvement in searching for and processing Web information. It also focuses on ways to make the Web more “intelligent,” with machine-facilitated understanding of information promoting a more intuitive and effective user experience. Web 3.0 will use cloud computing, software-as-a-service, ubiquitous connectivity among mobile platforms and Internet access devices, and transformation of the Web into a more seamless and interoperable whole.
Review Questions

4. What are the principal technologies and standards for wireless networking, communications, and Internet access?

4.1 Define Bluetooth, WiFi, WiMax, and 3G and 4G networks.

Standards for wireless computer networks include Bluetooth (802.15) for small personal-area networks (PANs), Wi-Fi (802.11) for local-area networks (LANs), and WiMax (802.16) for metropolitan-area networks (MANs). Bluetooth can link up to eight devices within a 10-meter area using low-power, radio-based communication and can transmit up to 722 Kbps in the 2.4 GHz band. Wireless phones, keyboards, computers, printers, and PDAs using Bluetooth can communicate with each other and even operate each other without direct user intervention.

Wi-Fi is useful for creating wireless LANs and for providing wireless Internet access. Its access range is limited to anywhere between 300 feet and three miles. Hotspots are public access points individuals use to obtain high speed Internet access.

WiMax has a wireless access range of up to 31 miles and a data transfer rate of up to 75 Mbps, making it suitable for providing broadband Internet access in areas lacking DSL and cable lines. The 802.16 specification also has robust security and quality-of-service features to support voice and video.

3G is a short term for third-generation wireless technology, especially mobile communications. Cellular networks have evolved from slow-speed (1G) analog networks to high-speed, high-bandwidth, digital packet-switched, third-generation (3G) networks with speeds ranging from 144 Kbps to more than 2 Mbps for data transmission.

4G is short term for fourth-generation wireless technology. It is entirely packet switched and capable of 100 Mbps transmission speed (which can reach 1 Gbps under optimal conditions), with premium quality and high security. Voice, data, and high-quality streaming video will be available to users anywhere, anytime.
4.2 Describe the capabilities of each and for which types of applications each is best suited.

Bluetooth: Access very limited; useful for creating small personal-area networks.

Wi-Fi: Access is limited to 30 to 50 meters; useful for creating small local area networks.

WiMax: Access is limited to a range up to 31 miles; useful for creating wide area networks.

3G networks: Access is available on major cellular telephone carriers that have configured their networks for 3G services.

4G networks: It provides premium quality for voice, data, and streaming video from cellular telephone carriers.
5. Why are RFID and wireless sensor networks (WSNs) valuable for business?

5.1 Define RFID, explain how it works and describe how it provides value to businesses.

Mobile wireless technology facilitates supply chain management by capturing data on the movement of goods as these events take place and by providing detailed, immediate information as goods move among supply chain partners. Radio frequency identification (RFID) systems provide a microchip that contains data about an item and its location. The tags transmit radio signals over a short distance to special RFID readers. The RFID readers then pass the data over a network to a computer for processing.

RFID gives businesses an opportunity to further automate their supply chain networks. The technology allows more data on an RFID chip than typical barcodes. RFID systems track each pallet, lot, or unit item in a shipment. The technology helps companies improve receiving and storage operations by improving their ability to “see” exactly what stock is stored in warehouses or on retail store shelves.
5.2 Define WSNs, explain how they work and describe the kinds of applications that use them.

Wireless sensor networks (WSNs) are networks of interconnected wireless devices with some processing and radio-transmitting capability that are embedded into the physical environment to provide measurements of many points over large spaces.

Wireless sensor networks are valuable for monitoring environmental changes, traffic patterns, security incidents, or supply chain events. Wireless sensor networks can be placed in the field for years without any maintenance or human intervention. That reduces costs to businesses using them.
END