# Module 2 Lesson 1 Digital Systems and the Design of Work

IS Strategy Management and Acquisition

#### **Learning Objectives**

At the end of the lesson, you will be able to:

- Explain the work design framework that is used to assess how emerging technologies may affect work.
- Differentiate the two collaboration technologies.
- Compare the ways of managing people in terms of supervision, evaluations, compensation, and hiring.
- Explain the driving factors of remote work and virtual teams
- Enumerate the advantages and disadvantages of remote work



### Digital Systems and the Design of Work

- □ New approaches to work such as workplace flexibility and remote work combined with newer collaboration and social technologies, mobile technologies, and cloud computing have drastically changed the way we work
- A Work Design Framework is used to explore how digital technology can be used effectively to support these changes and help make employees more effective.

### Digital Systems and the Design of Work

Employees are assigned to a type of work arrangement based on their role.

- ☐ Hub employees require a fixed desk because they work in the office every day.
- ☐ Club employees can share time bet ween the office and other locations because their roles involve both face-to-face and virtual meetings.
- $\square$  Home employees work from home at least three days a week.
- $\square$  Roam employees are on the road or at customer sites.

### **Work Design Framework**

- □ A simple framework is used to assess how emerging technologies may affect work. As is suggested by the Information Systems Strategy Triangle, this framework links the organizational strategy with IS decisions.
- ☐ This framework is useful in designing characteristics of work by asking key questions and helping identify where IS can affect how the work is done.

# Work Design Framework Consider the following Questions:

☐ What work will be performed?

Understanding what tasks are needed to complete the process being done by the employee requires an assessment of specific desired outcomes, inputs, and transformation needed to turn inputs into outcomes. Many types of work are based upon recurring operations such as those found in manufacturing plants or service industries. Each type of work has a unique set of characteristics and tasks that needs to be supported by information technology.

■ Who is going to do the work?

Sometimes the work can be automated. However, if a person is going to do the work, who should that person be? What skills are needed? From what part of the organization should that person come? If a team is going to do the work, many of these same questions need to be asked. However, they are asked within the context of the team: Who should be on the team? What skills do the team members need? What parts of the organization need to be represented by the team? Will the team members be dispersed?

# Work Design Framework Consider the following Questions:

lue Where will the work be performed?

With the increasing availability of networks, Web tools, apps, mobile devices, cloud-based computing, and the Internet in general, managers can now design work for employees who come to the office or who work remotely. Does the work need to be performed locally at a company

☐ When will the work be performed?

Traditionally, work was done during "normal business hours," which meant 9 a.m. to 5 p.m. In many parts of the world, a job between the hours of 9 and 5 is an anomaly. Technologies also make it easier to work whenever necessary. The reality of modern technologies is that they often tether employees to a schedule of 24 hours a day, seven days a week (24/7) when they are always accessible to calls or other communications through their mobile devices.

#### **Work Design Framework**

This shows how these questions can be used in a framework to incorporate technologies into the design of work.



### Work Design Framework Consider the following Questions:

 $lue{}$  How can the acceptance of IT-induced change be increased?

The overarching questions are how to leverage IT to help improve work and how to keep IT from inhibiting work. Sometimes this means automating certain tasks. For example, computers are much better at keeping track of inventory, calculating compensation, and many other repetitious tasks that are opportunities for human error. On the other hand, technologies provide increasing support for tasks at which humans excel, such as decision making, communication, and collaboration tasks among employees. Using a structured change management approach to manage IT-induced change will increase the probability of success.

#### How Information Technology Changes the Nature of Work

□ Advances in IT provide an expanding set of tools that make individual employees more productive and broaden their capabilities. They transform the way work is performed—and the nature of the work itself. Three ways in which new IT alters employee life: by creating new types of work, by enabling new ways to do traditional work, and by supporting new ways to manage people.

#### How Information Technology Changes the Nature of Work

☐ Creating New Types of Work

IT often leads to the creation of new jobs or redefines existing ones. The high-tech field has emerged in its entirety over the past 60 years and has created a wide range of positions in the IT sector, such as programmers, analysts, managers, hardware assemblers, Web site designers, software sales personnel, social media specialists, and consultants.

New Ways to Do Traditional Work Changing the Way Work Is Done IT has changed the way work is done. Many traditional jobs are now done by computers. For example, computers can check spelling in documents, whereas traditionally that was the job of an editor or writer. Jobs once done by art and skill are often greatly changed by the introduction of IT.

Technical support agents diagnose and resolve problems on remote client computers using the Internet. The cost and time required to access information has plummeted, increasing personal productivity and giving employees new tools. It is hard to imagine a job today that doesn't have a significant information systems component.

#### How Information Technology Changes the Nature of Work

☐ Changing Communication Patterns

All one has to do is observe people walking down a busy downtown street or a college campus to note changes in communication patterns over a period as short as the last decade.

Applications (Apps) such as iMessage, Skype, Twitter, and Sina Weibo (Chinese Twitter) have changed how people communicate. Traditionally, people found each other in person to have a conversation in the moment. With the telephone, people called each other and both parties had to participate at the same time to have a conversation.

#### **How Information Technology Changes the Nature of Work**

☐ Changing Organizational Decision Making and Information Processing

IT changes not only organizational decision-making processes but also the information used in making those decisions. Data processed to create more accurate and timely information are being captured earlier in a process. Analytics have made it possible to mine data stores and identify insights, make predictions,

and even suggest decisions.

IT can change the amount and type of information available to employees. For example, salespeople can use technology to get quick answers to customer questions. Modern devices with voice interfaces have assistants that further change decision-making processes. Apps such as Siri, Cortana, and Google-Now allow users to talk to their devices, often mobile ones, to access information from either their devices or the Internet. These types of interfaces are increasingly being built into enterprise systems to supplement ways employees gather information, increasing employee efficiency.

#### **How Information Technology Changes the Nature of Work**

Collaboration technologies matrix: Examples of key enabling technologies

	Team Works at the Same Time	Team Works at Different Time
Team Works in the Same Place	Face-to-face meetings	Electronic bulletin boards
	Meeting room technologies  Document sharing systems (wikis)	Document sharing systems (wikis)
Team Works in Different Places	Video conferencing Chat rooms	E-mail Microblogs (e.g., Twitter)
	Texting (SMS) and instant messaging (IM)  Document sharing systems (wikis)	Texting (SMS) and instant messaging (IM) Document sharing systems (wikis)

### **How Information Technology Changes the Nature of Work**

New Ways to Manage People

- □ New working arrangements create new challenges in how employees are supervised, evaluated, compensated, and even hired. When most work was performed individually in a central location, supervision and evaluation were relatively easy.
- ☐ A manager could directly observe the employee who spent much of his or her day in an office. It was fairly simple to determine whether or not the employee was present and productive.

#### **How Information Technology Changes the Nature of Work**

☐ Changing Collaboration

IT helps make work more team oriented and collaborative. Technologies such as texting (SMS), instant messaging (IM), Web logs (blogs), virtual worlds, groupware, wikis, social networking, and video teleconferencing are at the heart of collaboration today. Groups can form and share documents with less effort using these platforms. Group members can seek or provide information from or to each other much more easily than ever before. And groups can connect by voice or with voice and video using these platforms.

Collaboration takes place in one of four ways. Teams are collocated and work

together at the same time, they are collocated but work at different times, they are not located in the same place but work at the same time, or they work from different places at different times.

#### **How Information Technology Changes the Nature of Work**

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Probably one of the biggest changes that people are experiencing as a result of new technologies is that they are always connected. In fact, many feel tethered to their mobile phones, tablets, or laptops to such a large extent that they must be available at all times so that they can respond to requests from their supervisors, colleagues, or customers. As a result, the boundaries between work and play have become blurred, now causing people to struggle even more with work-life balance.

### **How Information Technology Changes the Nature of Work**

Modern organizations often face the challenge of managing a workforce that is spread across the world in isolation from direct supervision and working mostly in teams. Modern organizations must also choose among three types of formal controls to ensure that work is done

- ☐ Behavior controls involve direct monitoring and supervision of employee actions while the work is being done. Vivid depictions of behavior controls are provided in road construction projects that have one employee digging and another watching, motionless with arms
- □ outcome controls involve examining work outcomes rather than work
- personnel controls represent a proper fit between the person and the job, often involving picking the right person for the task.

#### **How Information Technology Changes the Nature of Work**

Changes to supervision, evaluations, compensation, and hiring

	Traditional Approach: Subjective Observation	Digital Approach: Objective Assessment
Supervision	It is personal and informal. Manager is usually present or relies on others to ensure that the employee is present and productive.	It is electronic or assessed by deliverables. As long as the employee is producing value, he or she does not need direct formal supervision.
Evaluation	Behavior controls are predominant. Focus is on process through direct observation. Manager sees how employee performs at work. Subjective (personal) factors are very important.	Outcome controls are predominant. Focus is on output by deliverable (e.g., produce a report by a certain date) or by target (e.g., meet a seles quota). Fewer subjective measures are used.
Compensation and Rewards	It is often individually based.	It is often team based or contractually spelled out.
Hiring	Hiring is done through meetings with HR personnel with little concern for computer skills.	It is often electronic with recruiting Web sites and electronic testing for more information-based work that requires a higher level of IT skills.

#### **Remote Work and Virtual Teams**

Remote Work and Virtual Teams

Flexible work arrangements, although not the norm for many organizations, have been gaining support as technologies enable employees to be "virtually present" for their employers. The terms telecommuting, mobile worker, and remote worker are often used to describe flexible work arrangements.

- □ Telecommuting, sometimes called *teleworking*, refers to employees working from home, at a customer site, or from other convenient locations instead of coming into the corporate office. The word *telecommute* is derived from combining "telecommunications" with "commuting," indicating that these employees use telecommunications instead of driving, or commuting, to the
- Mobile workers are those who work from wherever they are. They are outfitted with the technology necessary for access to co-workers, company computers, intranets, and other information sources. We use the term remote workers when we refer to both telecommuters and mobile workers.

#### Where Work Is Done and Who Does It: Mobile and Virtual

Work Arrangements

- ☐ An important effect of IT on work: the ability of some employees to work anywhere at any time.
- ☐ With WiFi virtually ubiquitous, individual employees can connect to the Web from almost anywhere. And with powerful technologies available in the consumer space, employees often find the tools and apps they have at home function as well as, or even better than, their workplace technologies.

Research also suggests that employees—especially those younger employees who have never known a world without ubiquitous access to personal smart devices and the Web—prefer to have the work-life flexibility that remote and mobile work arrangements provide.

At the group level, virtual teams have become standard operating mechanisms to bring the best individuals available to work together on a task.

#### **Remote Work and Virtual Teams**

☐ Key activities in the life cycle of teams

Phase	Preparation	Launch	Performance Management	Team Development	Disbanding
Key Activities	Mission statement Personnel selection Task design Rewards system Technology selection and installment	Kick-off meetings Getting acquainted Goal clarification Norm development	Leadership Communication Conflict resolution Task accomplishment Motivation Knowledge management Norm enforcement and shaping	Assessment of needs/deficits Individual and/or team training Evaluation of training effects Trust building	Recognition of achievements Re-integration of team members

#### **Remote Work and Virtual Teams**

- ☐ Such employees work not only on a remotely independent basis but also with remote members on virtual teams.

  Virtual teams are defined as two or more people who
- (1) work together interdependently with mutual accountability for achieving
- (2) do not work in either the same place and/or at the same time, and (3) must use electronic communication and other digital technologies to municate, coordinate their activities, and complete their team's tasks.
- ☐ Initially, virtual teams were seen as an alternative to conventional teams that meet face-to-face.

  ☐ Virtual team members may be in different locations, organizations, time zones,
- □ Virtual team members may be in different locations, organizations, time zones, or work shifts (day, evening, or overnight).
   □ Further, like most teams, virtual teams may have distinct, relatively permanent membership, or they may be relatively fluid as they evolve to respond to changing task requirements and as members leave and are replaced by new members. Virtual teams are thought to have a life cycle like most teams.

#### **Factors Driving Use of Remote Work and Virtual Teams**

- $\hfill \square$  The first factor is that work is increasingly knowledge based. Equipped with the right IT, employees can create, assimilate, and distribute knowledge as effectively from home as they can from an office.

  The shift to knowledge- based work thus tends to minimize the need for a particular locus of activity.
- ☐ The second factor is that remote workers and virtual team members often shift the time of their work to accommodate their lifestyles.

  For instance, parents modify their work schedules to allow time to take their children to school and attend extracurricular activities. Telecommuting provides an attractive alternative for parents who might otherwise decide to take leaves of absence from work for child rearing. Telecommuting also enables people who are housebound by illness, disability, or the lack of access to transportation to join the workforce.

### Factors Driving Use of Remote Work and Virtual Teams

Driving factors of remote work and virtual teams

Driver	Effect	
Shift to knowledge-based work	Eliminates requirement that certain work be performed in a specific place	
Changing demographics and lifestyle preferences	Provides workers geographic and time-shifting flexibility	
New technologies with enhanced bandwidth	Makes remotely performed work practical and cost effective	
Reliance on Web Provides employees the ability to stay connecte co-workers and customers and to access work-re even on a 24/7 basis		
Energy concerns	Reduces the cost of commuting (for telecommuters), energy costs associated with real estate (for companies) and travel costs (for companies and for people on virtual teams)	

### Factors Driving Use of Remote Work and Virtual Teams

□ A fourth driving factor is the increasing reliance on Web-based technologies by all generations, especially younger generations, such as Generation Y and the Millennials.

The younger generations are at ease with Web-based social relationships and are adept at using social networking tools to grow these relationships. Face-to-face work arrangements are not necessary for these employees to build productive connections. Web-based tools allow them to stay connected with their co-workers and customers. Further, as more and more organizations turn to flexible working hours in programs such as BlueWork implemented by American Express and as 24/7 becomes the norm in terms of service, the Web becomes the standard platform to allow employees to respond to work's increasing demands.

# Advantages and Disadvantages of Remote Work

- ☐ Employees have greater flexibility in where they work. They can work from home or from just about any location as long as they have a laptop and a Wi-Fi connection. Employees often find that they are more productive because they can work in the environment of their choosing without the distractions of the office.
- □ Employees also seem to have higher morale and lower absenteeism in part because they can work from wherever they are, wearing whatever clothes they want. A remote employee who has a cold may not want to go into the office and risk spreading the germs to others but can work from home.
- ☐ Remote employees sometimes report that work-life balance often suffers. Because work can be done anyplace and anytime, they sometimes find the option attractive because of the ability to work around the schedules of children or other family members.

#### Factors Driving Use of Remote Work and Virtual Teams

☐ The third driving factor is that the new technologies, which make work in remote locations viable, are becoming better, cheaper, and more widely available.

Telecommunication and PC speeds are increasing exponentially at the same time that their costs are plummeting. The oft-cited time frame involved in this progression is a doubling of computer capabilities (such as speed) every 18 months.

Virtual team members can use Skype, Webex, Zoom, or any number of video and audio-conferencing technologies to work together. Cloud computing also has contributed to this trend because applications are moved from computers housed in company data centers to Web-based hosts such as Amazon Web Services (AWS), Rackspace, and other service providers.

### Factors Driving Use of Remote Work and Virtual Teams

□ A fifth factor is the increasing emphasis on energy conservation.

As concerns about greenhouse gasses, carbon footprints, and even potential future gasoline price increases, employees are looking for ways to be more responsible and frugal at the same time. Telecommuting is quite appealing in such a scenario, especially when public transportation is not readily available.

# Advantages and Disadvantages of Remote Work

- □ Remote work challenges managers to address performance evaluation and compensation. Managers of remote workers must evaluate employee performance in terms of results or deliverables.
- ☐ Self-discipline is a key concern for many remote workers. Workers who go to an office or who must make appearances at customer locations have a structure that gets them up and out of their home.
- ☐ Working remotely can disconnect employees from their company's culture and make them feel isolated. The casual, face-to-face encounters that take place in offices transmit extensive cultural, political, and other organizational information
- Remote work also raises the specter of offshoring, or foreign outsourcing of jobs once performed internally in the organization. Once a company establishes an infrastructure for remote work, it often can be performed abroad as easily as domestically.

### Advantages and Disadvantages of Remote Work

- □ Security is another issue for remote workers who might bring to the office an infected computer and plug it into the network, posing a threat to other office computers.
- ☐ Organizational security mechanisms are continually increasing in effectiveness; however, it is impossible for organizations to make remote workers totally secure.
- ☐ General managers need to get involved in assessing the areas and severity of risk and take appropriate steps, via policies, education, and technology, to reduce the risks and make remote workers as secure as possible. IS leaders are aware that even with the best policies and tools available, breaches occur.

### Advantages and Disadvantages of Remote Work

Advantages of Remote Working	Potential Problems	
Reduced stress due to increased ability to meet schedules and to have fewer work-related distractions	Increased stress from inability to separate work life from home life	
Higher morale; lower absenteeism	Harder for managers to evaluate and communicate about performance	
Geographic flexibility for worker; capitalization on distant expertise for organization	Employee may become disconnected from company culture	
Higher personal productivity	Lack of suitability for all jobs or employees	
Inclusion of housebound individuals in the workforce	Telecommuters more easily replaced by offshore workers	
Very informal dress is acceptable	Harder to achieve high security	

#### Comparison of challenges facing virtual teams and traditional teams

Challenges	Virtual Teams (VT)	Traditional Teams
Communication	Difficulties in terms of scheduling meetings and interactions     Increased inefficiencies when passing work between time zones     Altered communication dynamics such as facial expressions, vocal inflections, verbal cues, and gestures	Collocated in same time zone. Scheduling is less difficult     Use of richer communication media, including face-to-face discussions
Technology	Need for proficiency across wide range of technologies     Automatic creation of electronic repository to build organizational memory     Need for ability to align group structure and technology with the task environment	Support for face-to-face interaction without replacing it     Electronic communication skills not needed by team members     Task technology fit less critical
Team Diversity	Harder to establish a group identity     Require better communication skills     More difficult to build trust, norms, and shared meanings about roles because team members have fewer cues about their teammates' performance     More likely to have different perceptions about time and deadlines	Group identity easier to create     Easier communication among members

# Advantages and Disadvantages of Remote Work

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#### Advantages and Disadvantages of Virtual Teams

- □ Virtual teams clearly offer advantages in terms of expanding the knowledge base through team membership. Thanks to new and ever-emerging communication and information technologies, managers can draw team members with needed skills or expertise from around the globe without having to commit to huge travel expenses. Further, virtual teams can benefit from following the sun. One classic example of this can be found in software development.
- ☐ There are some clear disadvantages to virtual teams. For example, different time zones, although helpful when following the sun, can work against virtual team members when they are forced to stay up late or work in the middle of the night to communicate with team members in other time zones. There also are a considerable number of challenges that if not correctly managed could turn into disadvantages.

# Managing Remote Workers and Virtual Teams

- ☐ Managers cannot manage remote workers or virtual teams in the same way that they manage in-office workers or traditional teams. The differences in management control activities are particularly pronounced because manager cannot observe the actual behavior of remote workers or virtual team members. Thus, monitoring behavior is likely to be more limited. As stated earlier, performance for both remote workers and virtual teams is more likely to be evaluated through outcomes controls rather than behavior controls.
- ☐ Compensation for virtual teams must be based heavily on the team's performance and ability to reach its goal rather than on individually measured performance. Compensating team members for individual performance may result in "hot-rodding" or lack of cooperation among team members. Organizational reward systems must be aligned with the accomplishment of desired team goals.
- Managers need to be aware of differences and discover ways to provide motivating rewards to all team members.

#### **Managing Communication Challenges**

- ☐ Because virtual teams and remote workers communicate differently than workers in the office, managers must make sure the communications policies and practices support these work arrangements. For example, holding a team meeting in the office and expecting remote members to listen in requires the manager to prepare differently for the meeting.

  Any presentation slides to be used in the meeting must also be shared with the
- remote participants, either over a video conference with meeting software or
- beforehand.

  When most of the co-workers are in the office and only one or two are dialing in from other locations, the remote participants miss all the nonverbal communication that takes place in the meeting room.

  Soft-spoken individuals are often difficult to hear.

  Managers must make sure key messages are being conveyed to the remote participants or the results of the meeting are sub optimal.

### **Managing Diversity Challenges**

- ☐ Managers may also seek to provide technologies to support diverse team member characteristics. For example, team members from different parts of the globe may have different views of time.
- ☐ Team members from Anglo-American cultures (i.e., United States, United Kingdom, Canada, Australia, New Zealand) may view time as a continuum from past to present and future. For such team members, each unit of time is the same.
- $lue{}$  These team members are likely to be concerned with deadlines and often prefer to complete one task before starting another (i.e., are monochronic). For team members who are conscious of deadlines, planning and scheduling software may be especially useful.
- ☐ In contrast, team members from India often have a cyclical view of

### **Managing Change**

- ☐ To help avoid these resistance behaviors, John Kotter37 builds upon Kurt Lewin's 38 change model of unfreezing, changing, and refreezing. Kotter recommends eight specific steps to bring about change. Kotter's steps are related to Lewin's changes
- ☐Managers can keep these eight steps in mind as they introduce change into their workplaces. It is important for managers to make clear why the change is being made before it is implemented, and they must follow the change with reinforcement behaviors such as rewarding those employees who have successfully adopted new desired behaviors.

#### **Managing Technology Challenges**

- ☐ Information and communication technologies are at the heart of the success of remote work and virtual team accomplishments. However, managers must ensure that their remote colleagues have access to the technologies and support they need. All team members must have the ability to connect to the information sources and communications pathways used by the group.

  Well-designed Web-based conferencing applications make this easier because
- any device connected to the Internet can access them. Managers must make sure meetings over video or audio conference tools are well coordinated and all attendees have the right access codes and meeting times
- ☐ Time zone differences often confuse this issue, so it is critical to make sure everyone knows the right time for a meeting.
   ☐ Managers must also provide the framework for using the technology. Policies
- and norms or unwritten rules about how all employees should use the technology to work with one another must be established. These include norms about telephone, e-mail, and videoconferencing etiquette (i.e., how often to check for messages, the maximum time to wait to return e-mails, and alerting team members about absences or national holidays), work to be performed, and

#### Gaining Acceptance for IT-Induced Change

- ☐ Employees may resist the changes if they view the changes as negatively affecting them. In the case of a new information system that they do not fully understand or are not prepared to operate, they may resist in several ways:
  - $lue{}$  They may deny that the system is up and running.
  - They may sabotage the system by distorting or otherwise altering inputs.
  - ☐ They may try to convince themselves, and others, that the new system really will not change the status quo.
  - ☐ They may refuse to use the new system when its usage is voluntary.

#### **Managing Change** Stages and steps in change management

Lewin's Stage	Unfreezing	Changing	Refreezing
Definition	Creating motivation to change	Providing stakeholders with new information, systems, products, or services	Reinforcing change by integrating stakeholders' changed behaviors and attitudes into new operations resulting from change
Kotter's Steps	Establish a sense of urgency. Create a compelling reason why change is needed. Create the guiding coalition: Select a team with enough expertise and power to lead the change. Develop a vision and strategic plan to guide the change process. Communicate the change vision. Devise and implement a communication strategy to consistently convey the vision.	Empower broad-based action: Encourage risk-taking and creative problem solving to overcome barriers to change.     Generate short-term wins: Celebrate short-term improvements and reward contributions to change effort.     Consolidate gains and produce more change: Use credibility from short-term wins to promote more change so that change cascades throughout the organization.	Anchor new approaches in the culture Reinforce change by highlighting areas in which new behaviors and processes are linked to success.



