Just-in-time approach to learning: Arguing the case for cost-effective Knowledge Dissemination

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Abstract

This chapter focuses on e-learning and its relationship with organizational knowledge dissemination. We argue this requires a holistic approach that involves business processes, people and systems to deliver knowledge required by organizations and its workforce in a timely and cost-effective manner.

Our motivation to approach online learning in a holistic manner was the challenge that organizations face to be adaptable and flexible in staying competitive. For this, they need to create and sustain an internal communication space to deal with a diverse and global workforce. To increase complexity, this global and diverse workforce typically performs process-based roles across different functions, priorities, contexts and cultures, whose content dynamically changes in accordance with business environment fluctuations. Investments in developing required key competencies to stay competitive is in order by optimizing speed in production of relevant business knowledge and its "*consumption*" or learning by target population. However, measuring profitability of this kind of initiatives is still an organizational challenge.

This contribution represents a first step towards developing a theoretical framework to approach the creation of such a communication space as related to virtual learning and knowledge dissemination. To achieve this, we argue for cost-effective organizational knowledge dissemination, as a main condition for just-in-time virtual learning. Furthermore, we raise some key issues to consider when developing proper measurement tools. We look at knowledge dissemination dynamics and their potential relationship to e-learning and its acceptance levels within organizations.

1. Introduction

Structuring organizations based on a functional-oriented approach to achieve business goals have created unclear or different interpretations for participants even when they share same job objectives, thus, affecting the pre-requisite conditions for communication and work-related performance. Communication, as a business process, plays a critical role in sharing operational knowledge and overcoming constraints put by "*experts' scalability problem*" to cost-effectively achieve business objectives. A current organizational challenge is searching for news ways to systematically sustain a common space for communication across organizational levels, locations, and culture and workforce skills. However, current organizational efforts dealing with internal knowledge dissemination are not delivering expected results [15]. At this regards, technology can assist organizations in facing this challenge and contribute cost-effectively to organizational learning by helping them: (a) create a structured conversation space, (b) frame interactions between people and systems. So, how can we create and sustain this conversation structure in operational terms framing interaction between humans and systems?

In this chapter, we explored, within a defined theoretical framework, the knowledge dissemination process within organizational settings associated to the concept of just-in-time learning and uniview. For the purpose of this chapter, just-in-time learning is strategic knowledge acquisition enmeshed in business activities to support employees in learning new skills when performing day-to-day tasks, while fostering the alignment between learning outcomes, technological and strategic business issues [23]. Regarding uniview concept, this concept forms itself as a consequence of the impact of group dynamics' stages on each member's perceptions, attitudes and behaviors. By building on literature [5, 20] and incorporating insights from Organizational Behaviors and Human Resources professionals, uniview is defined as a degree of shared understanding among team members on key issues of a problem, situation event or solution. The formation of uniview ("*unique view*") strongly depends on internal communication and training initiatives [20]. Organizational efforts in operationalizing these two concepts, we hope, would help out organizations to face current challenges, particularly expert scalability and cost-effective skill development. To meet this particular challenge, next production and consumption of information and knowledge is addressed.

Since useful organizational knowledge capturing, updating and dissemination to the proper targets are a costly task which involves diverse roles and resources, and are a base for performance and continuously source for knowledge generation and competitiveness, understanding the systemic nature of knowledge production and dissemination is important to define proper strategies to align organizational resources to achieve expected results.

Thus, our proposal goes through structured organizational knowledge dissemination and driven by an interaction paradigm based upon "*learning just what is*

priority for me to do better my work now" instead of having access to all available information suffering consequently from unproductive overloading. This searched key differentiator factor is knowledge disseminated to whom needed it to improve performance. In this sense, our objective is to show relevant issues in cost-effective organizational knowledge dissemination and the theoretical framework behind it.

We hope, the main contribution of this chapter would be to provide a holistic framework towards understanding how the knowledge dissemination dynamics would work, its potential relationship to e-learning and setting up the basis to manage communication spaces within teams fostering consistency and its acceptance levels within organizational settings. This is a starting journey, whose increasing understanding would allow focusing efforts cost-effectively to help both side of the equation: producer and consumers of disseminated knowledge.

This chapter includes five sections. Section I (Cost-effective knowledge dissemination in organizations) summarizes main related concepts to knowledge dissemination. Section II (Cost-Benefit Analysis) describes key cost issues arising from each component of proposed conceptual framework. Section III describes our theoretical framework based upon reviewed literature. Finally, we present a general conclusion and future trends.

2. Cost-effective knowledge dissemination in organizations

To ensure knowledge dissemination, organizations should create a strategic context for sharing knowledge. According to Rosenberg [24], this strategic context requires as a key tool "*…a system for capturing, organizing, and storing knowledge and experiences of individual workers and groups within an organization and making it available to others in the organization*".

Effective implementation of this tool is four-fold. First, organizational policies and goals should enhance, facilitate and reward, expected knowledge sharing from recognized internal or external human experts. Second, investments in technological infra-structure should support the capture of the distributed operational knowledge from any organizational location and identified knowledge workers and guarantee the proper management for that structured knowledge. Third, a knowledge-management process should be in place to: (a) periodically monitor results, (b) timely identify/update pool of knowledge producers (those who transform data into knowledge), (c) continuously guarantee quality content in accordance with defined criteria, and (d) administer system's profiles and privileges. A last aspect relates to knowledge dissemination to other people in the organization.

We believe cost-effectiveness of organizational knowledge dissemination comes from given the right and proper amount of information to who needs it to perform their duties. This strategic context would contribute not only to consistency in organizational learning but also to bottom-line results savings costs in both side of the equation: (a) knowledge generation and dissemination, (b) knowledge consumption or utilization. Basic assumptions at this point are the: (a) ade-

quacy of interaction paradigm, whose main symptom is information overloading and eventually network underperformance, and (b) technology role as an intermediary between people and business processes. The former gives life to the just-in-time learning concept, the latter relates to the increasingly possibilities to make smarter systems to support users' tasks in achieving their goals in contexts of use pervasively. Given the existence of this strategic and technological context for knowledge sharing to take place, we next focus on the dissemination of that business knowledge.

By definition, knowledge dissemination intends to distribute knowledge to many people or organizations. As Figure 1 shows, knowledge as an organizational asset is costly to produce and maintain facing operational demands and constraints regarding highly uncertain business environments. Therefore, dissemination must be a cost-effective process not only technologically but also in addressing the proper target interested in using or consuming that knowledge. This means that knowledge should be disseminated among process-based roles needing it and motivated to use it. In this sense, wasting organizational resources would diminish in both side of the equation: organizations do not spend resources to distribute information to everyone and individuals do not waste time in dealing with information overloading.

To achieve cost-effectiveness, on one hand, each role should be analyzed to explicitly identify incumbents' needs, goals and required resources to perform tasks regarding knowledge usage patters. On the other hand, required skill levels must be developed and people should be motivated and committed to use or re-use knowledge repositories.

Two common mechanisms could be through communities, formal or informal, collaborative work and monitoring. Behavior imitation, social pressure, relevant supervisor support, usable and useful systems could help to reinforce motivation to use disseminated knowledge. This way, knowledge dissemination could be cost-effectively distributed minimizing information overload among those roles' incumbents that do not need sharing of knowledge, saving costs in both side of the equation: production [15] and learning at operational levels. Key indicators could help identify impact, and potential improvement areas, on bottom-line results of: (a) opportunity and direct cost of allocated organizational experts' time in production and reviewing, (b) technology-related costs to knowledge capture, dissemination and monitoring, and (c) effectiveness of current human resources policies and strategies regarding business strategies [7].

3. Cost-Benefit Analysis

Traditionally, training programs are assessed at four levels, as Kirkpatrick's model indicates: (a) trainee reaction, (b) knowledge transfer; (c) behavioral change and (d) business results. However, current general results from e-learning efforts and related start-up investments have made decision-makers put closer attention to cost-benefits analysis of such initiatives. Main objective of an e-learning

cost-benefits analysis is to determine the economic feasibility of setting up an e-learning initiative to develop specific people competencies aligned with business strategies. Even though, this is a complex task, due to the nature of e-leaning, based upon reviewed literature [7, 16, 15, 20, 22, 24] and insights from IT and Human Resources professionals, Table 1 summarizes some aspects related to organization, technology, physical infrastructure and people and expected benefits in setting up organizational e-learning initiative taking into consideration organizational and technological layers, as shown in Figure 1.

Table 1. Associated costs and expected benefits

Organization-related	
1. Cost of recruiting new employees	Less turnover rate
2. Opportunity cots of experts or seniors during learning content production, re-packing materials, reviewing process and lecturing	(a) Maximizing work-related knowledge dissemination effort and consequently impact on reutilization of internal organizational operational knowledge; and (b) Strategic areas of performance, cultural values, operational methods and processes, among others, consistently disseminated (asynchronous and synchronous) by process-based roles contributing to a sustained organizational space for internal communication
3. Impact on team productivity level during initial learning phase (ex. work continuity, motivation issues, etc.)	(a) Easier time for new team members in caching up group dynamics and performance levels; (b) Best performers are trained too;, and (c) Loss of individual productivity during learning
4. Opportunity cost of trainees	(a) Individual performance improvement; (b) Speeding up learning curve; (c) Faster adaptation to job requirements, and (d) Improved efficacy of e-learning programs
5. Project management costs	Warranting delivery of agreed outputs on time and up to quality levels during e-learning program development cycle

Technology-related	
1. Equipment for Client/Server architecture involving key parts (instructors, authors or content producers and reviewers, transaction costs, etc.)	IT investment aligned with Business strategies
2. Development and maintenance of e-learning platform	(a) High business strategy, process and system fit; (b) definition and implementation of contingency plans
3. System administration and Helpdesk	(a) Operational efficiency and flexibility;

staff	(b) Change management, and (c) Monitorization of system performance and utilization patterns
4. Other equipments (ex. videoconference, air conditioning, reflectors, microphones, webcams, etc.)	(a) Standardize online training process, and (b) Continuous reutilization and fine-tuning according to e-learning program' results
5. Telecommunication costs	(a) Low costs, and (b) increased bandwidth and network performance

Physical infrastructure-related	
1. Setting up local and remote physical settings	(a) Standardize technical conditions across involved partners; (b) Development of adequate options in accordance with current, and evolving, system performance
2. Facilities and Maintenance costs	known fixed costs

Training process-related	
1. Hand-outs and others printed materials (ex. lectures scripts, syllabus, questionnaires, etc.)	Standardize methods of material and content delivery to manage adequately people's expectations
2. Orientation sessions for potential e-learners, Marketing events (online and offline) and promotional materials (ex. pamphlets)	(a) Better management of people's expectations, and (b) identify specific needs to drive re-packing efforts.
3. Quizzes and exams	(a) Flexibility (covering local and remote learners), (b) Adjustment to institutional requirements, (c) Timely feedback; (d) Change management
4. Assistant staff (ex. updating online material, publishing training related announcements, readings and results, moderating forum, etc.)	Timely learning content management
5. HR staff (ex. Identifying potential short- and long-term organizational key competencies; assuring learning outcomes aligned with strategies and IT architecture; managing organization's Human Resources' training and development processes)	Better people-system-context fit to improve performance
6. Internal trainers(ex. Identifying potential training needs within organizational context for each process-based roles, defining proper instructional methods to target's specificities and respective media, preparing and delivering e-lectures; re-packing learning modules according to learning objectives and potential audience; monitoring e-learning programs' results and coach-	Adequacy among learning needs, methods and media taking into account the specificities of user group in each process-based role and type of learning content

ing and supporting e-learners, among others)	
7. Training e-learning staff (Assistant, Administration system, Instructors or internal trainers, administrative staff, Helpdesk staff, etc.)	Framing change management process

People-related	
Individual resources invested in work-related priorities and goals according to personal pace of learning and convenience	(a) Learn as required by work-related activities and demands; (b) More effective transference of acquired knowledge; (c) Likely certification of acquired skills by educational institutions, and (d) improved employability

The main purpose of this summary is to contribute in analyzing main cost drivers associated to e-learning initiative taking into consideration the complexity and dimension of the e-learning initiative. This analysis includes operational costs required to establish operations, train staff, and implement appropriate information technology support when organizations decide to go from traditional to online learning environments, and also, involved some intangible costs, such as experts' and potential e-learners' opportunity costs (e.g. Cost of experts while being involved in e-learning activities, lost revenues or increased costs or delays in delivering services to clients during participation in an learning session) and potential impact on individual productivity and satisfaction.

To calculate the investment required to implement an e-learning environment and the savings resulting from changing from current to expected situation, implementation costs should be estimated taking into account the previously-mentioned aspects, differentiating fixed and variable costs in terms of e-learning strategic choice. Thus, a break-even point could be defined in terms of defined strategies to reach out process-based roles' incumbents' specific needs and characteristics and disseminate organizational knowledge assertively.

Thus, the profitability of an organizational e-learning program will depend on its initial scope, synergies and expected development taking into account improvement areas identified in accordance with: (a) e-learners' real needs, performance and satisfaction, and acceptance, and (b) business strategies and choices. These issues would justify investment on e-learning initiatives. Fully operational e-learning environment would allow gradual cost savings around 50%-70% to overset initial investments during 3-5 years with a consistent group of actively engaged online learners [16, 22].

For instance, initial phase might be to deliver, through Intranet, structured organizational content to specific group of learners to test the acceptance of learning online within organizational setting, or it maybe acquire an e-learning platform to manage content and training processes. In both case, organizational resources and readiness to embrace e-learning initiatives are key to define financial return. In order to frame theoretically the profitability analysis of an e-learning initiative,

next section focuses on theoretical framework emphasizing the business strategy, technology, process and people fit as a condition to effective organizational e-learning experiences.

4. Theoretical framework

Performance alignment is a major issue for organizational contexts to stay competitive. Productive communication, within increasingly borderless organizational settings, becomes a key issue for this alignment to happen, specifically optimizing resources to approach market-driven events. In particular, information resources as corporate asset are a relevant component to competitively act and perform. In order to understand the dynamic of knowledge production and consumption within organizational setting, we propose a theoretical just-in-time approach to learning addressing context-specifics and process-related aspects as well as the need to foster communication spaces that promote workgroup and expected performance level in solving complex business challenges.

The creation of a meaningful space for communication has become even more difficult due to the multidisciplinary approach demanded by increasing: (a) cross-cultural task complexity at tactical-strategic levels, (b) task simplicity at operational level, (c) existence of legacy systems supporting core activities or processes, (d) scarcity of human experts in critical operations, and (e) increasing difficulty in creating effective communication mechanisms that can make possible, rapid and cost-effective sharing or dissemination of operational business knowledge across organizational contexts, groups, units, levels or roles. Incomplete or poorly alignment between communication process, business goals and the proper target affects organizational performance and organizational climate in two ways. First, what individual perceive from their work environment impact their related behaviors and intentions to adopt new paradigms in the workplace [8, 14, 20].

Systems, being instrumental part of organizational settings as working tools and communication actors, may speed misunderstandings and confusion causing enormous damages to individuals and organizations if not ethically and securely managed affecting bottom-line results and related productivity levels. Second, development team's interpretation of users' reality and skills to specify system requirements is key to increase acceptance and usage [14]. In creating this expected communication space, it is required to define and promote a shared view on task, problem, solution or situation domain by people in order to synchronize expected business actions. In the following subsection, context-specific aspects of our theoretical framework are presented to support our approach in addressing these previously-mentioned challenges.

4.1 Context-specific aspects

Figure 1 shows a high-level view of our theoretical approach to learning when people perform business enmeshed into their roles. Context-specific aspects are represented as Organization and Technology layers, at macro and micro-organizational levels.
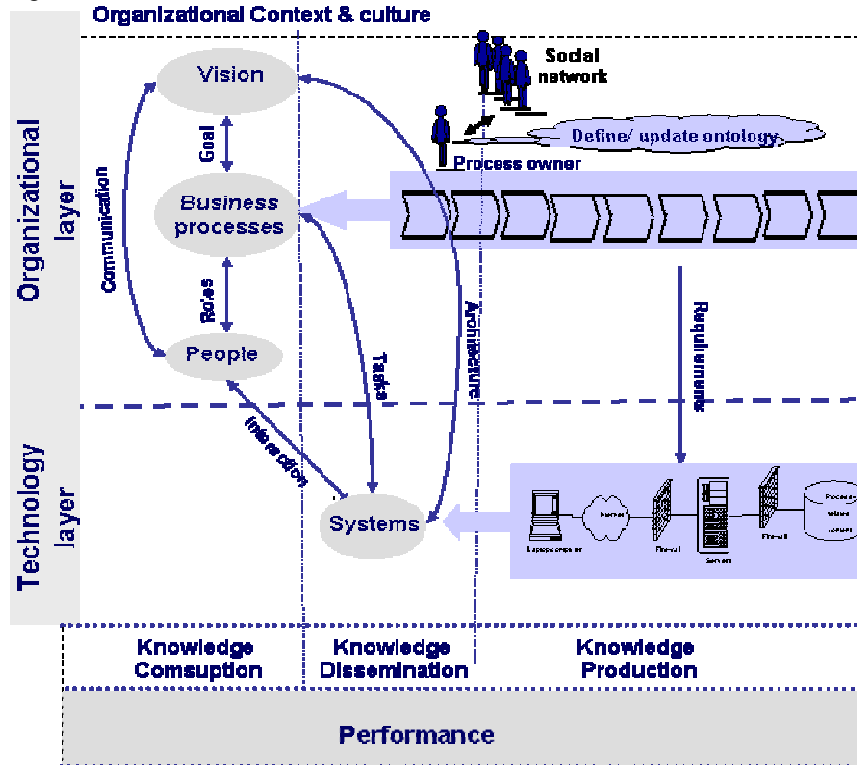

Figure 1: High-level view of our theoretical framework

At macro-organizational levels, vision drives architectural choices, process' goals, skill gaps and internal communication contents. Their articulation is expressed by an internal and external fit, which should be highly present to progressively establish a strategic context to synchronize processes' objectives, resources, goals of processes' main stakeholders and expected results. If organizations want high technology acceptance and usage, they have to harmonize work, skill and system development processes in order to create the necessary conditions to frame interactions between involved actors (humans or systems). At micro-organizational level, people and systems and its relationships (roles, requisites and tasks) define the required knowledge space to drive expected business performance levels. For the purpose of the remaining of this chapter, this is a so-called people-system fit.

Business processes act as mediators between vision and expected interactions at micro-organizational level, namely at immediate individual work context where individual and team performance take place. Business processes provide the business knowledge structure based upon process-related ontology which is represented by an internal fit. This fit means synchronization among all business processes within same work setting articulated with related business strategy. This fit: (a) guarantees harmonization of efforts among processes' goals and required key skills at organizational tactical and operational levels, and (b) addresses the internal communication efforts to manage organization's main stakeholders through different channels (offline and online) which gradually build mental models on expected individual and teams' contribution levels. That is, organization and coordination of work is made around strategic choices to get expected results at process-based roles aiming at structural performance alignment.

As seen in Figure 1, the previously-mentioned context-specifics aspects clearly influence the quality and quantity of interactions between people and systems through, for instance: (a) usability goals driving a major consideration to human factors when developing information systems, (b) Human Resources policies supporting the development of competencies through expert's informal network by encouraging, and rewarding, knowledge sharing and coaching programs, (c) IT investments being adequate to organizational vision and current situation, (d) consistent internal communication initiatives promoting alignment between individual and organizational performance among others, and (e) methodologies and tools aiming at higher maturity levels in software development. Two main issues arise at this point: quality of service and quality of relationships.

Quality of Service relates to technology layer. In this layer, systems reflect technology architectural choices, supported tasks, interaction types and patterns. Methodologically speaking, this layer comprises the different views within Zachman framework when developing information systems (Inmon et al., 1997). Levels of quality of service come out from value chain's operational efficiency, specifically due to processes optimization or re-design and issues of network performance, bandwidth and the like. Quality of relationship regards to social and cultural aspects of work settings, expressed by leadership styles, coaching and mentoring programs, helpdesk mechanisms, supporting learning or interest community development, values (e.g. equity, respect, ethical behaviors, etc.), effectiveness in internal communication, and the like.

At micro-organizational level, this people-system fit translates into: (a) the development of a shared understanding among team members on key issues of a problem, situation, event or solution framed by business process' knowledge domain, and (b) expected business performance setting up a conversation structure among key actors (humans or systems). This fit results from the degree of adequacy between system requisites and users' and tasks' needs dynamically affecting its acceptance and usage at operational levels [8, 13, 19, 20].

Having briefly described relevant context-related aspects to just-in-time learning approach, next definitions, for the purpose of this work, of uniview and conversation structure are discussed before digging into how operational knowledge could be created and updated.

Building on theories from several disciplines (e.g. Human Resource Management, Organizational Behavior, Human-Computer Interaction, Learning and Social Psychology), we define uniview as a degree of understanding among team or organizations' view on key issues of a problem, situation, event or solution. It is a very operational term. This means a shared, and current, understanding of a group of people about a specific situation that demands an action (performance). Its development follows work group's dynamics and strongly influences interaction patterns among group's members. Therefore, its lifecycle is also similar: very light at the beginning of the interaction based just on individual background, skills, roles and points of view and varying over time according to the quality of interactions during workgroup lifetime [20]. As seen in Table 2, a critical second way, in which organizational performance could be affected, refers to competence development as a base to build uniview.

Table 2. Uniview stages and their relationships with Business processes, group Dynamics, Operational Knowledge and Potential Stakeholders

Business Processes	Group development stages	Uniview stage	Operational knowledge type of activities	Potential stakeholders
Monitoring, Lessons learnt, Optimization.	Adjourning	Dissemination	Consulting	Pre-defined process-based roles' incumbents. Communities of Practice, Interest or Learning. Workgroups
Data capturing and analysis	Performing	Sharing	Updating	Team members and key decision-makers
Norms, methodology and tools, expected behaviors and results, individual objectives and responsibilities and training	Norming	Knowledge structuration	Creating/ reviewing	Process owners and related expert network
Defining work structure and roles. Identification training needs	Storming	Task-related language for group communication	Ontology, meta-data	
First meeting, bounding, coaching and Orientation sessions	Forming			
Process objectives, scope, available resources and roles/required competency				

Background sharing (e.g. Previous work experience, interests, work commitments and demands, group context and other context-related specifics) defines the primary space for common understanding among actors. At this point, process-related language, meanings and expected actions are different as so are interpretations of same words or requirements across involved actors. When basic language, meaning and expected actions are understood by all parties involved, a communication space is created where progressively uniview on a specific topic would be developed. To effectively build this communication space, people should be informed and trained, or coached, to make easy engagements into the defined conversation structure. These engagements would support interactions to take place based on common a pre-understanding with minimum of words and conscious effort [20, 26].

This communication space should be based on a defined and shared ontology using high-usable systems. Experts' expected role is defining the process-related ontology within organizational context, and eventually acting as coaches in key process' competency areas. The process' owners would update defined ontology and reinforce a team-based approach to problem-solving or decision-making processes. This reinforcement would support the emergence of the communication space consolidating uniview on specific topics, and positively influence system's acceptance and later usage. This would support expected business actions/performance on specific situations.

The existence of such structured conversation protocol would minimize potential sources of misunderstandings among involved parties. This could contribute to the definition and reinforcement, as organizational values, of expected behaviors [20]. On the other hand, systems will support process-related knowledge distribution, and learning (defined by a network of specific acts or commitments, for instance communities of practice, forums, work groups, distance learning, etc.). This would progressively reinforce organizational discipline in dealing with these information resources [8, 13, 19, 24, 26].

This is the vision behind our proposed just-in-time approach to learning. In achieving this vision, main challenges are to set up the required conditions to build these communication spaces, timely develop required competencies and design usable, actable and intelligent systems in order to help people learn and continuously improve their performance when executing their roles. Next, three basic aspects for this framework are briefly described: (1) how communicative acts turn into performance acts , (2) how e-learning could develop required competencies, and (3) how usable and intelligent systems should be developed.

4.2 From communicative to performance acts

Communication is defined as a two-way conversation, normally among people (speakers and listeners) in a flexible and unstructured way reaching sometimes diverse and unrelated knowledge domains and diverse emotional states as conversations evolved [26]. Communication acts reflect speaker's intentions to act and may influence listeners' beliefs, attitudes and also intentions to behave or perform

in a dynamic way, especially when speakers are relevant to listeners [5]. Communication cycle stops when one of the involved parts leaves, gives up or "*disconnects*". Basic differences between face-to-face and online communication types are summarized into three categories: (a) high need of structuring conversational space; (b) low options to express emotions, (c) degree of credibility on communication source, and (d) confidence in systems as mediating instruments [8, 20,26]. Both communication types (face-to-face and online) share context-specificity as a commonality to gain meaning and be interpreted. Also, they must be dynamically consistent to minimize cognitive dissonances that may impair performance or expected work-related behaviors [20].

Consistency among communication types and channels is important for creating/sustaining the emergence of a communication space positively influencing system's acceptance and later usage supporting expected business actions/performance on specific situations [3, 14]. This communication space is defined by business words, or linguistic acts, related to business process' dynamics in context. This makes systems be communicator actors [4].

Linguistic acts generate different kinds of commitments depending on the participants' roles and involvement within the network of recurring conversations to which they belong. Speech Act theory [8, 26}, as shown in Table 3, defined three types of communicative acts.

Table 3. Types of communicative acts

Locutionary acts	… relate to speaker's intentions and understandings of knowledge domain expressed through used words and prepositional content
Illocutionary acts	… relate to simultaneously actions done with locutionary acts (e.g. Promise, Acknowledging, Questioning, Accepting, Rejecting)
Perlocutionary acts	… are the communication effects (e.g. Response to received messages, changing knowledge, attitudes level in listeners).

One of main challenges in interaction is to set up a common understanding about a specific knowledge domain, whose sharing could serve as a basis for further actions (e.g. Knowledge acquisition and re-use, decision-making, data or information interpretations, etc.) within an ever-increasing interdependent work context, as illustrated in Figure 2.

This sharing is context-related and shapes individual interpretations, which are influenced by individual information gaps. If alignment between communication process (online and face-to-face), business goals and the proper target (e.g. role' incumbents) is incomplete or inadequate, it would affect organizational performance in two ways.

First, people interacting with a specific system normally do it because systems are expected to be useful in achieving their work objectives [8, 21]. To do so, people have to understand, not only be aware, but comprehend, from a specific point

of view, the basis of the process-knowledge domain, its objectives, its context, its stakeholders, involved resources (where systems are categorized), the meanings of the related business words and the expected business actions that should be performed, by them or through systems. This understanding is sustained by continuous interactions overtime, with content, experts, team members, process owners or other sources such as social network [6].
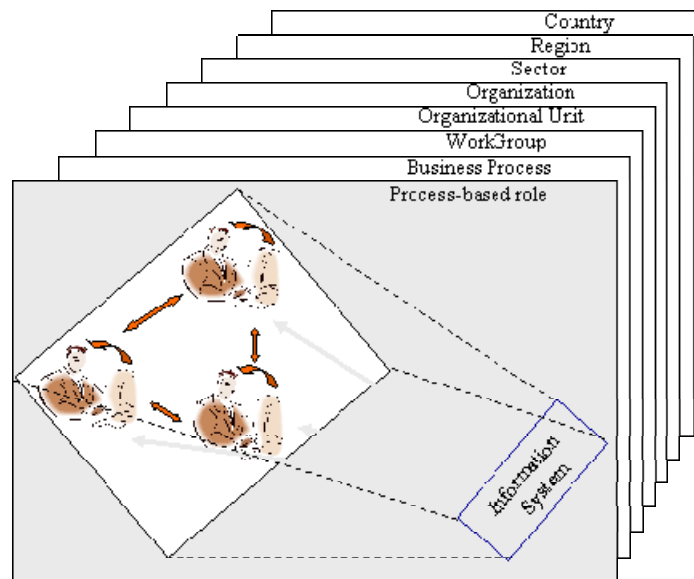

Figure 2: People-System fit in Context

However, organizations normally have "*expert scalability problems*" and because of which continuous interactions are difficult to implement. Hence, having people with a "*unique view*" on the process domain without continuous interactions with expert sources could be a competitive advantage. Systems can help to meet this challenge, as previously mentioned. They should be: (a) designed to capture structured data from operational key processes, (b) define a conversation structure to support online communication, and (c) reinforce, through words, meanings and related business actions the expected contribution levels.

Second, systems, if properly used as organizational change agents, could contribute to improve people's perceptions on organizational procedural justice when guaranteeing process' transparency and equitable accessibility. This has an impact on organizational climate and effectiveness of standards operative practices.

In short, key issues for influencing the relationship between communicative and performance acts are: (a) consistent conversation structure, (b) updated process-related ontology, (d) quality of content, and (b) teamwork approach to problem-solving or decision-making processes. The next subsection describes how the

previously mentioned aspects relates to systems within the business process-people fit

4.3 Business Process-People fit: e-learning and knowledge dissemination link?

As shown in Figure 1, Business Process, as structural factor, influences interactions between people and systems through process-based roles and system requisites. Process-based roles describe expected work-related behaviors and associated set of responsibilities for individuals to perform within business settings. System requisites are derived from task analysis and expected functionalities on key process issues. Interaction is: (a) defined by the relationships among roles within organizational business processes, (b) framed by formal and informal social network, (c) influenced by system's usability issues and (d) internal communication's consistency level. The interplay among these three relationships (Process-based role, System Requisite and Interaction) relates to the just-in-time learning concept: strategic learning immersed at micro-organizational level supporting individual learning when executing work-related tasks. This concept fosters gradual alignment among learning outcomes, the technological and organizational aspects of business contexts translating into performance alignment [23].

In addition, regarding business knowledge creation and distribution, four main characteristics are identified in this theoretical framework: (1) process-driven creation and updating, (2) formal existence of process-owner and its structured relationship with internal and external workgroups (formal or informal) with context-specific task-related knowledge, (3) dissemination based on process-based roles' incumbents with previously identified or forecasted needs, (4) task execution continuously updating related data while achieving task goals.

The essence of our just-in-time approach to learning is summarized in one side in the interplay among role, system requisite and interaction, and on the other side, in businesses actions performed at operational level as expected at strategic levels, by: (a) investing in adequate IT; (b) effective internal communication strategy and process, (c) assertively developing required competencies, and (d) building progressively mental models regarding desired situations. Specific ways of aligning skill and system development are: (a) monitoring and reinforcing organizational internal fit, and (b) consistently implementing a participatory-type system development methodology.

Having briefly presented our theoretical framework, next subsection focuses on process-related ontology and its relationship to create and update operational knowledge.

4.4 Process-related ontology

As seen in Figure 1, data is created and updated when people perform tasks within their process-based roles. This way, operational data is captured by systems and feedback process. Process manager, by analyzing this information, would progres-

sively: (a) update existing ontology, (b) create a high-quality and credible space for communication with users, (c) promote business-oriented actions with process-related words across contexts and workgroups, and (d) manage process-related information and related context-specific work-related knowledge. On one hand, users would receive related words through the content of their roles, which is process-based and highly supported by systems. Required competencies would identify skill gaps. This meeting point, between what the system "*knows*" about the user tasks and what the user "*knows*" about the system when performing tasks, is two-looped.

First loop relates to the process ontology. Ontology gains special relevance to make easy and usable knowledge structures to support later re-utilization. As shown, process owner defines ontology, which is business-driven. Updating ontology may come from inclusion of others' perspective (from members' social network) within the work process' domain. If properly managed, these new information sources may relate to process improvement or innovations [6].

Second loop relates to the definition of process-based roles' content. This resulting knowledge structure goes into the definition of roles. Roles are key for knowledge dissemination making straightforward the relationship between "*what is required to be known by those who need it to better perform their duties*". Incumbents are informed and trained to acquire/update skills. The reutilization of those knowledge structures and the flow of communicative acts, and consequent actions, across actors and process-based roles would then gradually be consistent and transparent, because it is structurally reinforced by systems and business processes. For instance, this knowledge structure can input the implementation of e-learning strategies as a way to improve skill development. If this is the case, updating these knowledge structures could be made from any location by process experts (authors or reviewers) in a cost-effective manner.

An expect result is two-looped flow is that the interaction between people performing their roles in interaction with systems would reinforce the development of the uniview concept, which is becoming increasingly important for organizations facing a global and diverse workforce and skill requirements. Before digging into developmental issues, next usability and actability aspects are briefly described.

4.5 People-System fit

Technological advances let designers to increasingly "*mimic*" human acts (e.g. talk) representing reality into a linguistic structure of objects, properties and events (e.g. a person performs a process-based role within a specific organization and geographical location during a specific period of time interacting with designed systems in a multimodal way).

At this point, we need to be aware that systems could be tools for work, communication and action [3, 8, 9]. Two major concerns for system development are: usability and actability. Usability is the extent to which a computer system can be used to achieve specified goals with effectiveness, efficacy and satisfaction in a given context to complete a well-defined task [8]. Usability features gain special

relevance to develop unique views among team members on specific situations cost-effectively. For instance, as shown in Figure 1, users engaged in interactions with systems if they perceive systems to be usable in achieving their role's objectives.

Information system represents a structured knowledge domain where objects, properties and actions are designed accordingly to requisites. Their acceptance and usage level will vary upon system usability levels (easy-to-learn and use, useful for the task at hand, accessible to them) and also system's perceived quality of the data. Interaction exists, given connectivity and accessibility to data, if system supports users' tasks and also communication flows among them (physically or geographically dispersed). Users' tasks, commitments and also learning needs are defined within process-based role. This may imply, given all the possible events coming from user's context at any level, that a definition of a conversation structure within context is a must to standardize business responses or actions across individuals engaged in the same communication space [26]. This enhances the importance of uniview concept within the domain related to that process-based role. At this point, actability definition is in order.

Actability is mainly a performance of action concept supporting interactive actions within a specific context. These actions are instances of explicit intentions of generic business actions structured into business processes following generic business patterns [3]. This process structure supports the strategic alignment of the Organizational layer, shown in Figure 1. Also, they represent "…*knowledge about action intended for action.*" and are oriented to the behavior of others, which is usually purposeful and implicit [3]. Hence, an actable system is a system able to perform actions, permit, promote and facilitate the performance of actions by users, both through the system and based on information from the system, in some business context [4], is a high-usable system that could collaborate and act, if properly used, as a team member [21] to achieve workgroup's goals.

Actability comprises two types of knowledge that the system should have about the hierarchy of: (a) business actions starting in patterns and (b) individual's actions starting in user groups [3, 11, 17, 18, 24]. The goodness of fitness between these two hierarchies would allow two-way communication. This common space for communication is sustained by the existing level of: (a) shared meaning on the defined ontology or taxonomies of information and the existing rules of business processes and (b) trust among involved process-based roles' incumbents, and (c) existing mechanisms for communication offline and online. Next, some ideas on how can development teams gain the required understanding from work dynamics within roles.

Indeed, as shown in Figure 1, this conversation structure is defined as a relationship among business processes, systems and people defining the context for communication (messages or meanings) and performance (actions) at micro-organizational level. This context for communication changes over time because of: (a) systems' upgrades or technological architecture changes; (b) development of competence levels, (c) optimization of processes or tasks. Thus, systems should be usable and also can be actable in order to get a high people-system fit. Next,

system development methodology is briefly addressed regarding its role in our approach.

4.6 System development methodology

Around 70% of large complex software projects fail to deliver expected results [13, 27]. Some development efforts fail to produce anything at all or produce products that people do not like and consequently will not use at all or if they do, they may use reluctantly and ineffectively. System development methodology and tools have evolved to better support system development. However, a more business and user-centered approach to technology development is required in establishing a systematic loop between user's needs and knowledge transference into the design of systems. This kind of forward-backward loop between users and development teams influence key dimensions of system's functioning and performance. Outcomes of this forward-backward loop would best match system performance to users' tasks, goals and needs, gradually improving the adequacy of defined system requisites [8, 10, 13, 14, 19, 27].

Towards this end, two relevant aspects are discussed in this subsection. First, building systems specifications should be process-driven reflecting its language as a basis to: (a) map current situation taking into account organizational and social aspects, and (b) identify related gaps. On the other hand, required skill levels to perform through the system within their process-based role should be properly and timely developed in order to improve acceptance and usage levels.

And second, within a work setting structured functionally, understanding the usefulness of systems for their intended users and anticipating their potential breakdowns, is not an easy task. Development teams should include system developers, process owners and user representatives in order to aim at improving people-system fit. That way, designed systems will help frame or update individuals' knowledge maps on a specific situation if interaction is properly adapted to user target.

However, this kind of fit requires a definition of structured knowledge domains where interaction would take place based on common pre-understanding with a minimum of words and conscious effort [26], namely a shared conversation structure. For this to happen, development team must understand user's language to: (a) represent how people understand and recognize patterns within their immediate work context's realities, and (b) design systems by interacting with users from the very beginning of the development cycle in order to contribute to a more effective, and less frustrating interaction. A solid understanding of the conversation structure by development teams would help translate user's language into requisites, allowing them to: (a) represent how people understand and recognize patterns within their immediate work context's realities, and (b) design systems by iterating with users since the very beginning of the development cycle. This participatory design approach will provide design with a more effective and less frustrating interaction.

For instance, development team's members, after interacting, gradually acquired uniview on problem and technology domains in accordance with their roles and respective objectives and interaction patterns.

5. Conclusions

The main contribution of this chapter was to provide a holistic framework to better understand the knowledge dissemination dynamics, their potential relationship to e-learning and its acceptance levels within organizational settings. As shown in our knowledge dissemination case, cost-effective knowledge dissemination anchor into the dynamic of business processes assuring consistency and minimizing waste of organizational resources. Work-related learning reviewed or produced by internal experts, available at process-based role and periodically updated, could aim at organizational learning in a cost-effective manner, though the initial high investment, and progressively becomes an organizational competitive advantage.

Even though, holistic approaches do not fully capture the whole dynamic and complexities of the organizational learning phenomenon at work settings, we hope to have contributed to identify some aspects of a business-oriented framework to approach the operational knowledge production, dissemination and consumption stages.

6. Future trends

Four main trends are identified. First, learning services are going to be experienced as work-related events (e.g. problem-based scenarios, case studies, projects, etc.) taking place within process-based roles in just-in-time modes and diverse modalities. As technology becomes increasingly pervasive and intelligent, instructional design, ethical, and security issues of using e-learning systems, such as personal assistant, coaches [1, 2, 25] or representatives or communication actors, are in order for further research. If something goes wrong, who is responsible for this technological persuasion?

For example, within learning environments, courseware, as a social and mediating tool between instructors and learners, could facilitate, within the boundaries of the structured conversation space, recognition of work problems and other context-specifics aspects, and closely relate to learners' goals and expectations. A potential effect of interaction will follow (e.g. issue awareness, changes in knowledge levels, specific work-related actions), thus fostering specific business actions and its quality levels. Thus, the governance model of e-learning should be carefully analyzed taking into consideration these still evolving open issues.

Second, and as a matter of reflection, we think that the higher uniview within the project team exists, the closest the system specifications to user's language and reality would be (given the proper approach and managerial support). A high

process-people-system fit could mean consistency among internal flow of communication and resources at organizational macro- and micro-level, and a team-based approach to problem-solving and decision-making within problem's or solution's knowledge specific domains. Project team's dynamics within context should be monitored in order to identify effective team behaviors and analyze its relationship with project' outcomes during project lifecycle in order to develop required competencies, methodologies and tools to assure higher acceptance and success rate.

Third, based on the theoretical proposition, that consistency in messages (online and offline) matters for performance, we believe that its level among messages across communication channels (humans and systems) should reinforce each other to minimize cognitive dissonance and consequently enhance motivation and productivity levels. In this way, business processes and systems fit would translate into correlations between business and individual role-related actions. In this sense, literally "*words have meaning*" that makes sense within a specific context for a particular user's profile. Managing properly this communication aspect – consistency - would act as an "*attraction*" anchor for people sharing similar profile (role position, personal and professional interests on defined ontology [12], objectives, background, confidence level in communication sources [5, 6], among others). The effectiveness of this type of anchor should be further explored within the context of virtual communities.

To end, we believe that physical social network influences organizational members' active participation and acceptance of work-related systems. At this point, trust is a key driver. In what conditions, do people trust systems as work-related communication actors? Perhaps, ethnographic studies are needed to better understand how well users accept actions made by systems and integrate them within their context of daily work. This way, the ever-present vision of HCI of making interactions between humans and computers positively and wholly humane would progressively be enmeshed into IS tools assuring users during their tasks' performance.

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