

# Overcoming Tacit Knowledge Capture Barriers in Construction: A Storytelling Approach

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## **Abstract**

*Knowledge management (KM) is crucial for successful project completion in the construction industry, where tacit knowledge, embedded in individuals' experiences, plays a critical role. However, capturing and transferring this knowledge across projects is challenging due to the temporary nature of construction teams and the reluctance of individuals to share their expertise. Traditional KM methods, such as interviews and videos, often fail to capture tacit knowledge due to various barriers, including organisational culture, limitations of technology, and individual factors like knowledge hoarding. This study investigates a novel approach to overcome these barriers and effectively capture tacit knowledge in construction. This study proposes a storytelling-based approach for capturing tacit knowledge within a Knowledge Management System (KMS). Participants contributed their knowledge directly through stories within the KMS, unlike previous studies that relied on interviews or videos. This method aims to address the reluctance to share tacit knowledge by empowering individuals to share their experiences in a comfortable and engaging format. The study's validation methodology incorporates two elements: (1) extensive research was conducted on KM, storytelling, and existing methods for capturing tacit knowledge, and (2) issues concerning tacit knowledge capture were identified based on the research. This study contributes to the field of KM in construction by: (a) proposing a novel storytelling-based approach for capturing tacit knowledge, (b) addressing the limitations of traditional KM methods in construction, and (c) offering a framework for implementing storytelling-based KM within KMS. The proposed storytelling approach has the potential to overcome existing barriers and contribute to the effective capture and utilisation of tacit knowledge in construction projects. This can lead to improved project performance, reduced rework, and knowledge transfer across projects within the industry.*

**Keywords:** Tacit Knowledge, Knowledge Management, Construction Industry, Storytelling, Knowledge Management Systems (KMS).

## **1. INTRODUCTION**

Tacit knowledge, the intangible expertise deeply embedded in individual experiences, intuitions, and insights, has long been recognised as a critical factor in the success of complex endeavours like construction projects. The construction industry heavily relies on tacit knowledge—the uncoded expertise and experience held by skilled workers and professionals. This reliance presents a challenge due to the difficulty of transferring tacit knowledge, which is often learned through practice and observation rather than formal training. As a company experiences the retirement or departure of seasoned staff members, their valuable knowledge risks being lost, leading to decreased efficiency, increased errors, and project delays. Finding a solution for capturing and sharing this tacit knowledge is crucial for maintaining high standards, ensuring project success, and safeguarding the industry's future workforce. This knowledge is essential for navigating unforeseen challenges, making quick decisions, and ensuring efficient project execution. It is applied in various ways, from experienced foremen intuitively identifying potential hazards to seasoned carpenters instinctively adjusting techniques based on material variations. Recognising and leveraging tacit knowledge is key to fostering innovation, improving productivity, and maintaining high safety standards within the

construction sector. However, the very nature of tacit knowledge – its inherent subjectivity and resistance to formalisation – poses significant challenges for traditional Knowledge Management Systems (KMS) that rely primarily on codifying and storing explicit knowledge in structured formats (see Figure 1).

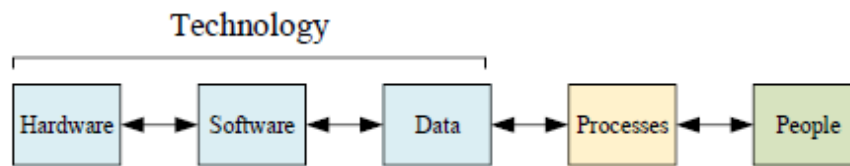


Figure 1. Elements of knowledge management systems (KMS)

Storytelling, as a fundamental mode of human communication and knowledge transmission, offers a promising avenue for unlocking the wealth of tacit knowledge (see Figure 2) residing within the minds of experienced construction professionals. Stories, with their narrative structure, emotional appeal, and contextual richness, provide a natural and engaging way to encapsulate and convey tacit knowledge in a manner that resonates with listeners. While other methods like interviews, surveys, and observations can also be used to capture tacit knowledge, storytelling offers a unique combination of engagement, contextualisation, and emotional connection that makes it particularly effective for preserving and sharing the valuable “know-how” that resides within individuals and organisations. This paper addresses several research gaps, including the limited focus on tacit knowledge in construction, inadequate methods for capturing tacit knowledge, and lack of engagement and participation from construction practitioners. The novelty of this paper lies in its use of storytelling as a knowledge capture tool for tacit knowledge, its focus on narrative structure in storytelling, and its provision of a practical framework for implementing storytelling-based knowledge capture initiatives in construction projects. This paper delves into the theoretical underpinnings and practical implications of a storytelling-based KMS tailored for the construction industry, with the overarching aim of improving project outcomes through enhanced knowledge transfer, sharing, and utilisation.



Figure 2. Explicit knowledge vs. tacit knowledge

Source: <https://slidemodel.com/templates/explicit-tacit-knowledge-iceberg-infographic/>

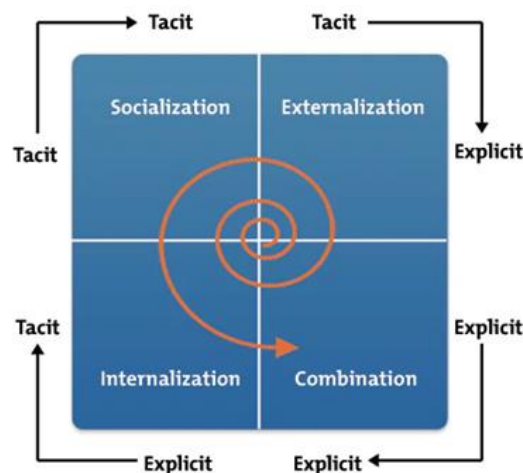
## 2. THEORETICAL BACKGROUND

Tacit knowledge is the lifeblood of the construction industry. It is the accumulated wisdom and experience that guides every aspect of construction, from planning and design to execution and completion. Recognising and leveraging this tacit knowledge is essential for ensuring the continued success and growth of the industry.

The theoretical foundations of a storytelling-based KMS draw upon multiple disciplines, including cognitive psychology, organisational learning, and narrative theory. Research in cognitive psychology suggests that stories are not merely entertaining anecdotes but powerful tools for organising and retaining information. Stories tap into our innate ability to make sense of the world through narratives, allowing us to connect disparate pieces of information into a coherent whole. This cognitive advantage makes storytelling particularly well-suited for capturing and transmitting the nuanced and context-dependent nature of tacit knowledge.

From an organisational learning perspective, storytelling acts as a catalyst for knowledge creation and sharing. The SECI model is a framework used to understand how knowledge is created and transferred within organisations (Nonaka & Toyama, 2003). The acronym SECI stands for: Socialisation (S), Externalisation (E), Combination (C), and Internalisation (I). Figure 3 illustrates how storytelling can be used to facilitate each of these four knowledge conversion processes within the context of the construction industry. For example, storytelling can be used to share tacit knowledge (socialisation), create narratives that capture explicit knowledge (externalisation), combine different stories to generate new insights (combination), and help individuals internalise knowledge through personal reflection and application (internalisation). The SECI model provides a valuable framework for understanding the complex dynamics of knowledge creation and transfer in the construction industry. By recognising the importance of both tacit and explicit knowledge, and by leveraging tools such as storytelling, organisations can foster a culture of continuous learning and innovation, ultimately leading to improved project outcomes and increased competitiveness.

When individuals share their experiences through stories, they not only convey information but also spark conversations, reflections, and insights among their peers. This process of collective sensemaking fosters a deeper understanding of the underlying tacit knowledge and facilitates its integration into the organisational knowledge base.



**Figure 3. SECI model of knowledge creation [adapted from Nonaka & Toyama, 2003]**

Narrative theory provides a framework for analysing the structure and function of stories. It highlights the importance of elements such as plot, characters, conflict, and resolution in creating compelling narratives that resonate with audiences. By understanding these narrative principles, construction professionals can craft stories that effectively convey their tacit knowledge and engage their listeners.

Tacit knowledge, as defined by Polanyi (1966), refers to the deeply ingrained, experiential knowledge that is difficult to articulate or codify. In the construction industry, this encompasses the nuanced understanding of project dynamics, risk assessment, and practical problem-solving honed through

years of experience. Research by Egbu (2004) highlights the critical role of tacit knowledge in successful project outcomes, influencing decision-making, communication, and innovation.

Storytelling, as a form of narrative communication, has been recognised for its effectiveness in transferring knowledge across diverse fields (Snowden, 1999). Stories create a context for understanding complex information, making it more memorable and engaging (Denning, 2011). In knowledge management, storytelling allows for the embedding of tacit knowledge within narratives, making it more accessible and transferable (Gabriel, 2000).

KMS platforms are designed to facilitate the capture, organisation, and sharing of explicit knowledge within organisations. While they are valuable for storing documents, reports, and structured data, traditional KMS often struggle to capture the rich, context-dependent nature of tacit knowledge (Hansen et al., 1999). Integrating storytelling into KMS design offers a potential solution by providing a format for capturing and sharing the narratives that encapsulate tacit knowledge (Leung & Fong, 2011).

### 3. PROPOSED FRAMEWORK FOR STORYTELLING-BASED KMS IN CONSTRUCTION

This research has culminated in the development of a practical framework for a storytelling-based knowledge management system (KMS) in construction, with the potential to transform knowledge sharing and retention in the industry.

#### Phase 1: Knowledge Elicitation

This initial phase is all about gathering the raw material – the stories that hold valuable tacit knowledge.

- **Identify Key Knowledge Holders:** Look beyond job titles. Experienced project managers, site supervisors, skilled tradespeople, and even long-term administrative staff often possess deep insights gained through years of hands-on work.
- **Conduct Interviews and Workshops:** Create a safe and open environment where people feel comfortable sharing their stories. Use prompts and questions that encourage detailed narratives about specific projects, unexpected challenges, innovative solutions, and lessons learned the hard way.
- **Employ Narrative Techniques:** Instead of asking for simple facts, invite storytellers to describe the context, emotions, and decision-making processes involved in their experiences. This helps to capture the nuanced tacit knowledge that often lies beneath the surface.

#### Phase 2: Knowledge Capture and Transformation

This phase focuses on transforming stories into usable knowledge assets.

- **Record and Transcribe Stories:** Use audio or video recordings to capture the full richness of the narratives. Ensure you have consent from participants and follow ethical guidelines for handling sensitive information. Transcribe the recordings for easier analysis and storage.
- **Analyse Narratives:** Look for recurring themes, patterns, and key insights within the stories. What challenges are common across projects? What strategies have proven effective? What mistakes should be avoided in the future?
- **Transform Tacit Knowledge into Explicit Narratives:** Organise the raw story data into clear, concise narratives that capture the essential knowledge. Include context, emotions, and the “why” behind decisions to help others truly understand the lessons.

Here are some key principles or rules suggested for this process (see Figure 4):

- **Contextualisation:** Stories should be understood within their specific project, organisational, and cultural contexts. This helps to interpret the meaning and relevance of the story’s lessons.

- **Reflection and Analysis:** Stories need to be carefully reflected upon and analysed to extract the tacit knowledge embedded within them. This involves identifying key themes, patterns, and insights.
- **Translation:** The tacit knowledge gleaned from stories needs to be translated into explicit knowledge that can be easily communicated and shared. This may involve creating frameworks, models, or guidelines.
- **Application:** The explicit knowledge derived from stories should be applied to relevant situations and problems in construction projects. This helps to validate the knowledge and ensure its practical relevance.
- **Sharing and Dissemination:** The transformed knowledge should be shared and disseminated among relevant stakeholders in construction projects. This can be done through various channels, such as reports, presentations, workshops, or online platforms.

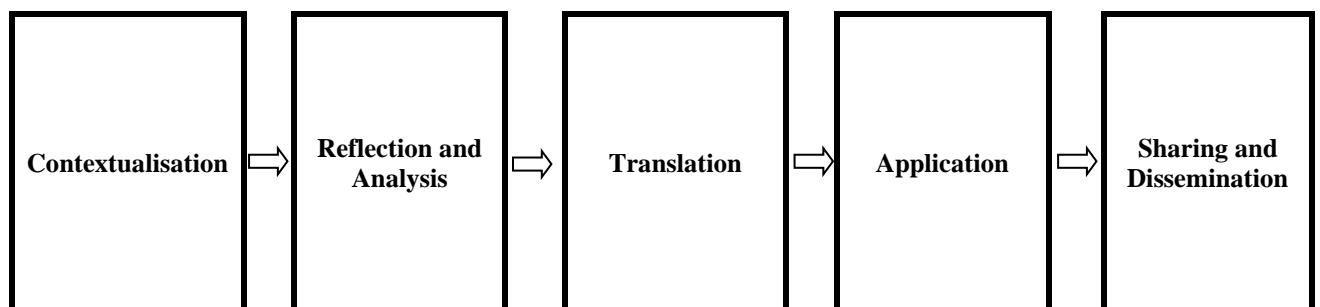


Figure 4. Transforming stories into actionable insights

### Phase 3: Knowledge Integration into KMS

This phase is about creating the digital home for your stories.

- **Develop a User-Friendly KMS Platform:** The KMS should be easy to navigate and accessible to everyone on the team. Consider using a variety of formats (text, audio, video) to cater to different learning styles.
- **Categorise Stories:** Organise the stories by project phase, discipline (e.g., architecture, engineering, construction), or specific knowledge domains (e.g., safety, risk management, sustainability).
- **Implement Search and Retrieval Functionalities:** A good search tool is essential for finding relevant stories quickly. Consider using tags, keywords, or even AI-powered search to help users discover the knowledge they need.

### Phase 4: Knowledge Dissemination and Utilisation

This phase ensures the knowledge does not just sit on a shelf but is actively used to improve future projects.

- **Promote a Culture of Storytelling:** Encourage team members to share their experiences, both successes and failures. Create opportunities for informal storytelling during meetings or social gatherings.
- **Integrate Storytelling into Training:** Use stories to illustrate key concepts and make training sessions more engaging and memorable.
- **Facilitate Discussions and Reflections:** Encourage teams to discuss the stories they find in the KMS. What new insights have they gained? How can they apply this knowledge to their current work?

## 4. CASE STUDIES

### Case Study 1: The Bridge Construction Project

**Background:**

A major bridge construction project faced significant delays and cost overruns due to unforeseen challenges with soil conditions, complex engineering requirements, and coordination issues between various subcontractors. Traditional project documentation and post-project reports failed to capture the underlying reasons behind these problems, hindering the organisation's ability to learn from the experience and improve future projects.

**Storytelling Approach:**

To overcome these knowledge capture barriers, a storytelling approach was implemented. The project team, including engineers, project managers, and skilled tradespeople, were encouraged to share their experiences in the form of narratives. These stories were collected through informal interviews, group discussions, and written accounts.

**Key Stories:**

- **The Soil Saga:** An experienced geotechnical engineer recounted a compelling story about encountering unexpected soil instability during the early stages of the project. The story detailed the initial misjudgement of the soil conditions, the ensuing challenges in redesigning the foundation, and the creative solutions that were eventually implemented. The narrative highlighted the importance of thorough site investigation and the need for flexibility in adapting to unforeseen circumstances.
- **The Coordination Conundrum:** A project manager shared a humorous anecdote about the communication breakdowns and coordination challenges that arose between different subcontractor teams. The story emphasised the importance of establishing clear communication channels, fostering trust and collaboration among team members, and implementing robust project management systems to streamline workflows and prevent delays.
- **The Safety Savior:** A skilled carpenter recounted a gripping story about a near-miss incident on the construction site. The narrative detailed how a combination of quick thinking, adherence to safety protocols, and the timely intervention of a colleague prevented a potentially catastrophic accident. The story served as a powerful reminder of the importance of prioritising safety and maintaining vigilance throughout the project.

**Lessons Learned:**

By sharing these stories, the project team was able to:

- **Identify Root Causes:** The stories revealed the underlying causes of the project's challenges, which were often buried in technical reports and formal documentation. For example, the soil saga highlighted the need for more comprehensive site investigation procedures, while the coordination conundrum pointed to the need for improved communication protocols.
- **Share Tacit Knowledge:** The narratives captured the tacit knowledge and experience of the project team, including valuable insights into problem-solving, decision-making, and risk management. This knowledge was often difficult to articulate in formal reports but was easily conveyed through stories.
- **Foster Learning and Improvement:** The stories created a shared understanding of the project's challenges and successes, fostering a culture of learning and continuous improvement within the organisation. The lessons learned from the bridge project were incorporated into subsequent projects, leading to improved efficiency, reduced risks, and enhanced project outcomes.

**Reflection:**

The storytelling approach proved to be an effective tool for overcoming the tacit knowledge capture barriers in the bridge construction project. By encouraging the sharing of personal experiences and insights through narratives, the organisation was able to glean valuable lessons, improve future projects, and ultimately enhance its overall performance in the construction industry.

## Case Study 2: Preserving Expertise of Retiring Engineers

### Background:

In a large engineering consulting firm, where expertise spans numerous specialised fields, a wave of retirements among senior engineers posed a significant threat to the company's accumulated knowledge and expertise. These seasoned professionals held a wealth of tacit knowledge, acquired over decades of experience, that was essential for the successful design, construction, and maintenance of complex construction projects. The firm recognised the need to capture and preserve this valuable knowledge before it was lost with the retiring workforce.

### Storytelling Approach:

To address this challenge, the company implemented a storytelling approach to tacit knowledge capture. They created a structured program that encouraged retiring engineers to share their experiences, insights, and lessons learned through storytelling. The program included:

1. **Storytelling Workshops:** Regular workshops were organised where retiring engineers were invited to share stories about their most challenging projects, innovative solutions, and critical decision-making moments. These workshops were designed to be informal and conversational, fostering a comfortable environment for knowledge sharing.
2. **Story Capture and Documentation:** Dedicated personnel were assigned to record and document the stories shared during the workshops. These stories were then transcribed, edited, and organised into a comprehensive knowledge repository.
3. **Storytelling Platform:** An online platform was developed to house the collected stories, making them easily accessible to current and future employees. The platform included features such as search functionality, categorisation, and discussion forums to facilitate knowledge sharing and collaboration.
4. **Mentorship Program:** A mentorship program was established to pair retiring engineers with younger colleagues. This allowed for the direct transfer of tacit knowledge through one-on-one interactions, where the retirees could share their experiences and insights in a personalised setting.

### Results:

The storytelling approach proved to be highly effective in capturing and preserving the tacit knowledge of the retiring engineers. The collected stories provided valuable insights into the firm's history, culture, and best practices. They served as a rich resource for training new employees, guiding decision-making, and fostering innovation. The mentorship program further enhanced the knowledge transfer process, creating a strong bond between generations of engineers.

### Specific Examples of Captured Knowledge:

- **Innovative Solutions:** Stories about how engineers overcame unexpected challenges during construction, such as dealing with unforeseen soil conditions or adapting designs to meet changing requirements, offered valuable lessons for future projects.
- **Lessons Learned:** Accounts of project failures and the subsequent analysis of root causes provided critical insights into risk management and decision-making.
- **Best Practices:** Stories detailing the successful implementation of specific construction techniques or project management strategies served as a guide for maintaining high standards of quality and efficiency.
- **Cultural Knowledge:** Stories about the company's values, traditions, and the importance of teamwork helped to instil a sense of identity and belonging among employees.

### Reflection:

By embracing a storytelling approach, the engineering consulting firm successfully captured and preserved the tacit knowledge of its retiring engineers. The collected stories became a valuable asset for the company, ensuring that the expertise and wisdom of the past would continue to guide and inspire future generations of engineers. This case study demonstrates the power of storytelling as a tool for overcoming the barriers to tacit knowledge capture in the construction industry.

## 5. DISCUSSION AND FUTURE DIRECTIONS

### Discussion

This study explored the potential of storytelling as a means to overcome the barriers to tacit knowledge capture in the construction industry. Our findings indicate that storytelling can indeed be an effective tool in eliciting and documenting tacit knowledge. The narratives collected from experienced construction workers or professionals not only provided valuable insights into their decision-making processes and problem-solving techniques but also revealed the underlying values, beliefs, and heuristics that guide their actions.

The construction industry is often characterised by a culture of individualism and competition. Encouraging workers or professionals to share personal experiences and lessons learned can be met with resistance. There may be concerns about admitting mistakes or fear of losing a competitive edge. Addressing these concerns requires fostering a culture of trust and psychological safety, where sharing is valued and not penalised. Additionally, robust confidentiality measures must be in place to protect sensitive information.

A storytelling KMS is not a “set it and forget it” solution. It requires ongoing maintenance to ensure stories are organised, accessible, and relevant to current projects. This involves curating content, moderating discussions, and updating the system with new technologies and features.

For a storytelling KMS to be effective, it needs to be seamlessly integrated into the daily workflows of construction professionals. This means making it easy to access and use the system, providing incentives for participation, and ensuring the stories are relevant and applicable to their work.

Previous research has investigated various methods for capturing tacit knowledge, including interviews, mentoring programs, and communities of practice. However, storytelling has received relatively limited attention in this context, particularly in the construction industry. Our study builds upon earlier work by exploring the specific benefits and challenges of using storytelling for tacit knowledge capture in construction projects.

Furthermore, our study goes beyond merely identifying the potential of storytelling. By employing the method detailed in the previous section, we provide a practical framework for eliciting and documenting tacit knowledge in a structured and systematic manner. This approach not only facilitates the collection of rich, detailed narratives but also enhances the usability of the captured knowledge by organising it into a format that is easily accessible and applicable to future projects.

This study makes several unique contributions to the field of knowledge management in construction. First, we highlight the importance of tacit knowledge in construction projects and the challenges associated with its capture. Second, we provide empirical evidence for the effectiveness of storytelling as a tool for eliciting and documenting tacit knowledge. Third, we propose a practical framework for applying storytelling in a structured and systematic manner. Finally, we discuss the implications of our findings for knowledge management practices in construction.

### Future Directions

The construction industry faces a critical knowledge gap as experienced professionals retire, taking invaluable tacit knowledge with them, while the influx of new talent remains insufficient. Future research could address this issue and accelerate learning in the following ways:

**Exploring Storytelling Formats:** While text-based stories are a common format, research should explore the effectiveness of other formats, such as audio recordings, videos, or even interactive

simulations. Different formats may resonate with different individuals and could capture nuances that text alone cannot.

**Impact on Project Outcomes:** Future research should investigate the impact of storytelling KMS on a variety of project outcomes, including cost overruns, schedule delays, safety incidents, and overall project success. This could involve quantitative studies analysing project data, as well as qualitative research gathering feedback from project teams.

**AI and NLP Integration:** The integration of artificial intelligence (AI) and natural language processing (NLP) technologies holds great promise for storytelling KMS. AI could be used to analyse vast amounts of story data, identifying patterns, trends, and key lessons learned. NLP could enable more sophisticated search capabilities, making it easier for users to find relevant stories based on keywords, themes, or even the emotional tone of the story.

**Scalability and Customisation:** As the use of storytelling KMS becomes more widespread, research should focus on developing scalable solutions that can accommodate large and diverse datasets. Additionally, the ability to customise the KMS to the specific needs of different construction companies and projects will be crucial for maximising its impact.

## 6. CONCLUSION

Storytelling-based KMS has the potential to revolutionise knowledge sharing and learning in the construction industry. By addressing challenges and embracing opportunities in new and emerging technologies, such as incorporating virtual and augmented reality for immersive storytelling experiences, we can unlock the full potential of this powerful tool. As the industry continues to evolve, storytelling-based KMS can play a crucial role in ensuring that valuable knowledge is not lost, but is instead passed down and enriched, contributing to a more efficient, innovative, and sustainable future for construction.

## 7. REFERENCES

- Denning, S., 2011. *The leader's guide to storytelling mastering the art and discipline of business narrative*. Revised and updated edition. San Francisco, CA: Jossey-Bass.
- Egbu, C.O., 2004. Managing knowledge and intellectual capital for improved organizational innovations in the construction industry: an examination of critical success factors. *Engineering, construction, and architectural management*, 11(5), pp.301-315.
- Gabriel, Y., 2000. *Storytelling in organizations: facts, fictions, and fantasies*. Oxford: Oxford University Press.
- Hansen, M.T., Nohria, N. and Tierney, T., 1999. *What's your strategy for managing knowledge?* Vol. 77. United States: Harvard Business School Press.
- Leung, J.K.L. and Fong, P.S.W., 2011. The power of stories in the construction industry: lessons from other domains. *VINE Journal of Information and Knowledge Management Systems*, 4(4), pp.466-482.
- Nonaka, I. & Toyama, R., 2003. The knowledge-creating theory revisited: knowledge creation as a synthesizing process. *Knowledge management research & practice*, 1 (1), pp.2-10.
- Polanyi, M., 1966. *The tacit dimension*. Gloucester, Mass: P. Smith.
- Snowden, D., 1999. Story telling: an old skill in a new context. *Business Information Review*, 16(1), pp.30-37.