Knowledge management, collaborative IS and group work technologies

MIS course, February 29, 2024

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Learning objectives of the lecture

- ❑ Learn about knowledge management and knowledge-based view of the firm, and GenAI's impact on KM
- ❑ What are Collaborative IS and groupware
- ❑ Know the benefits of Collaborative IS and barriers to their utilization
- ❑ Know how to start designing efficient e-collaboration processes with the Collaboration Engineering CE approach
- ❑ Learn about the development and trends in enterprise collaboration
- ❑ Learn how to motivate collaboration and knowledge sharing with gamification

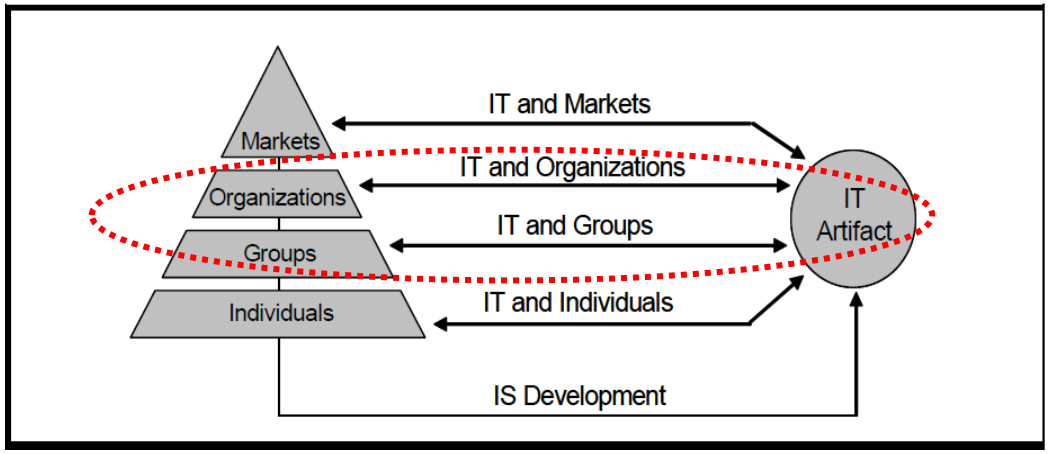


Figure source: Sidorova et al. (2008), "Uncovering the Intellectual Core of the IS Discipline", *MIS Quarterly*, 32(3), 467-482.

Prof. Pohjola on productivity, structural change and economic growth

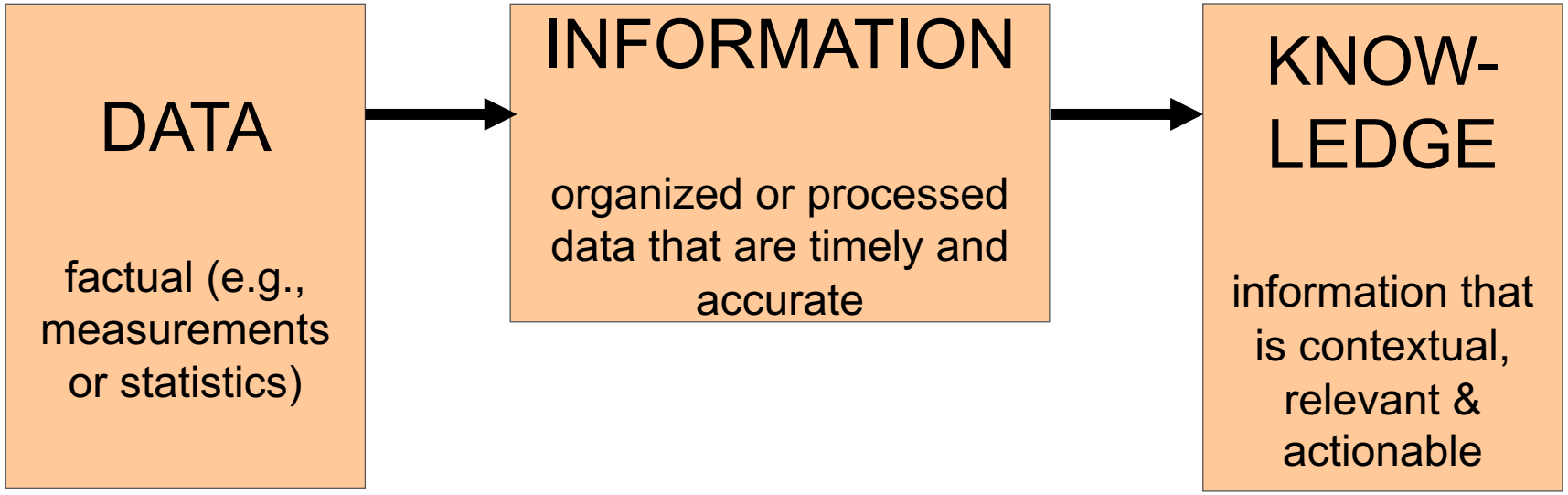
20 years ago, the **manufacturing industry** was still the largest sector of the national economy in Finland, Sweden and in Germany. However, its share of the value of total output in the economy has shrunk all the time.

The importance of **services**, especially **knowledge-intensive market services**, has grown correspondingly. **Information and communication, professional, scientific and technical activities, administration and support services, and finance and insurance** are classified as knowledge-intensive market services.
Their combined share of total output is growing and is already larger than that of the industry. In Finland, however, it is clearly smaller than in Sweden and only now at the same level as in Sweden 20 years ago.

Sweden's better economic growth compared to Finland and Germany has resulted from **faster growth in labor productivity, especially in knowledge-intensive market services. ICT's are used a lot in their production**.
Knowledge-intensive industries are therefore thought to be in the forefront of technological revolution that digitalisation has created.

Source: Pohjola (2021): Tuottavuus, rakennemuutos ja talouskasvu, 7.12.2021 https://www.talouspolitiikanarviointineuvosto.fi/wordpress/wp-content/uploads/2022/01/Pohjola-2022.pdf

Data, information and knowledge



Example: A map showing detailed driving directions from one location to another is **data**.
An up-to-the-minute traffic bulletin along the freeway that indicates traffic slowdown due to construction could be considered **information**.
Awareness of alternative, back-roads could be considered **knowledge**.

Turban & Volonino 2010, Information technology for Management, John Wiley & Sons, Inc.

Knowledge management (KM)

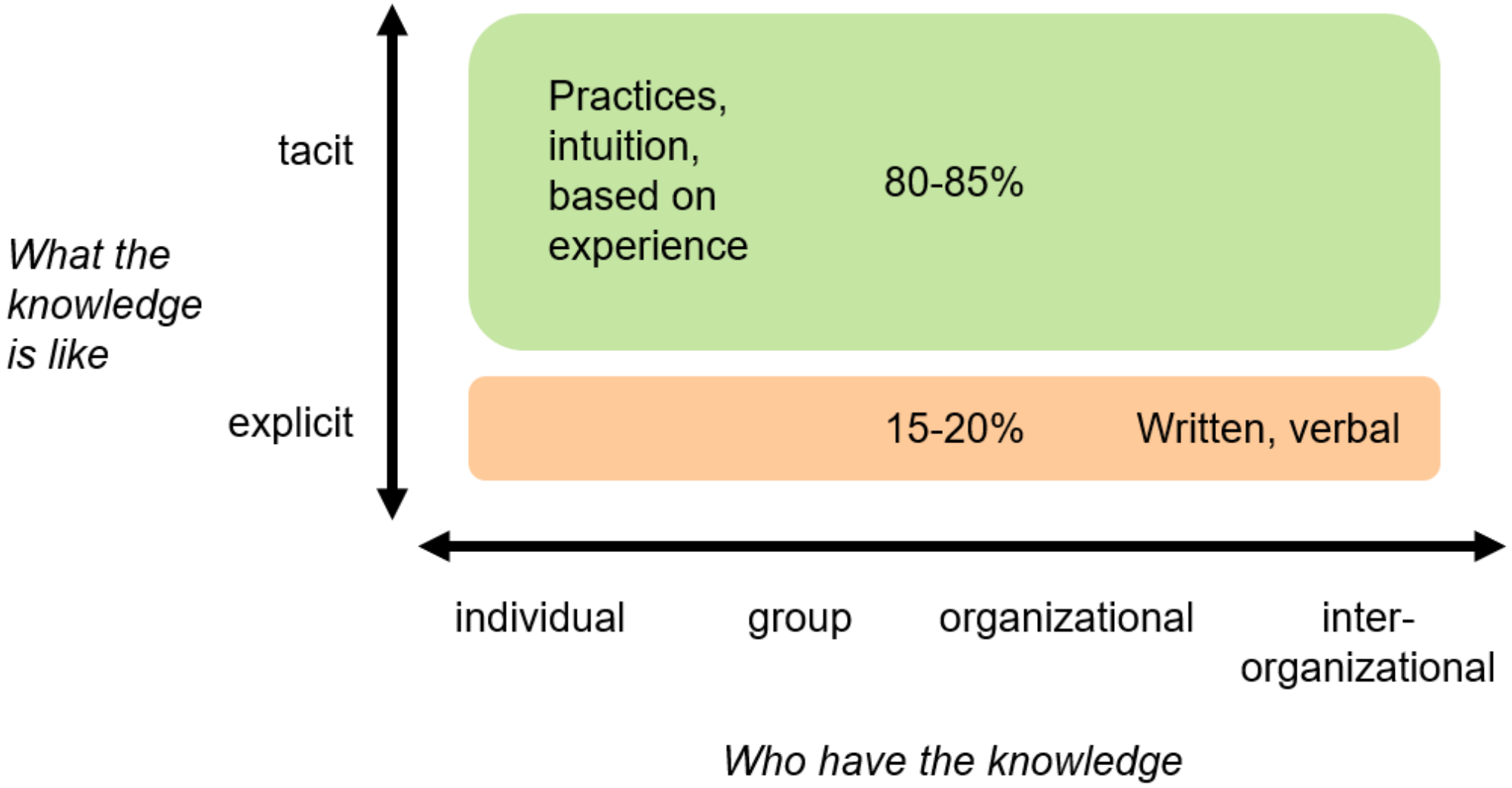
KM is a process that helps organizations **identify, select, organize, disseminate, and transfer important information and expertise** that are part of the organization's memory and that typically reside within the organization in an unstructured manner.

> KM enables effective and efficient **problem solving, expedited learning, strategic planning and decision making**

KM systems **identify, capture, store, maintain, and deliver useful knowledge** in a meaningful form to anyone who needs it, **anyplace and anytime**, within an organization.

> KMS support **knowledge sharing, decision making and collaborating** at the organization level regardless of location.

Types of knowledge

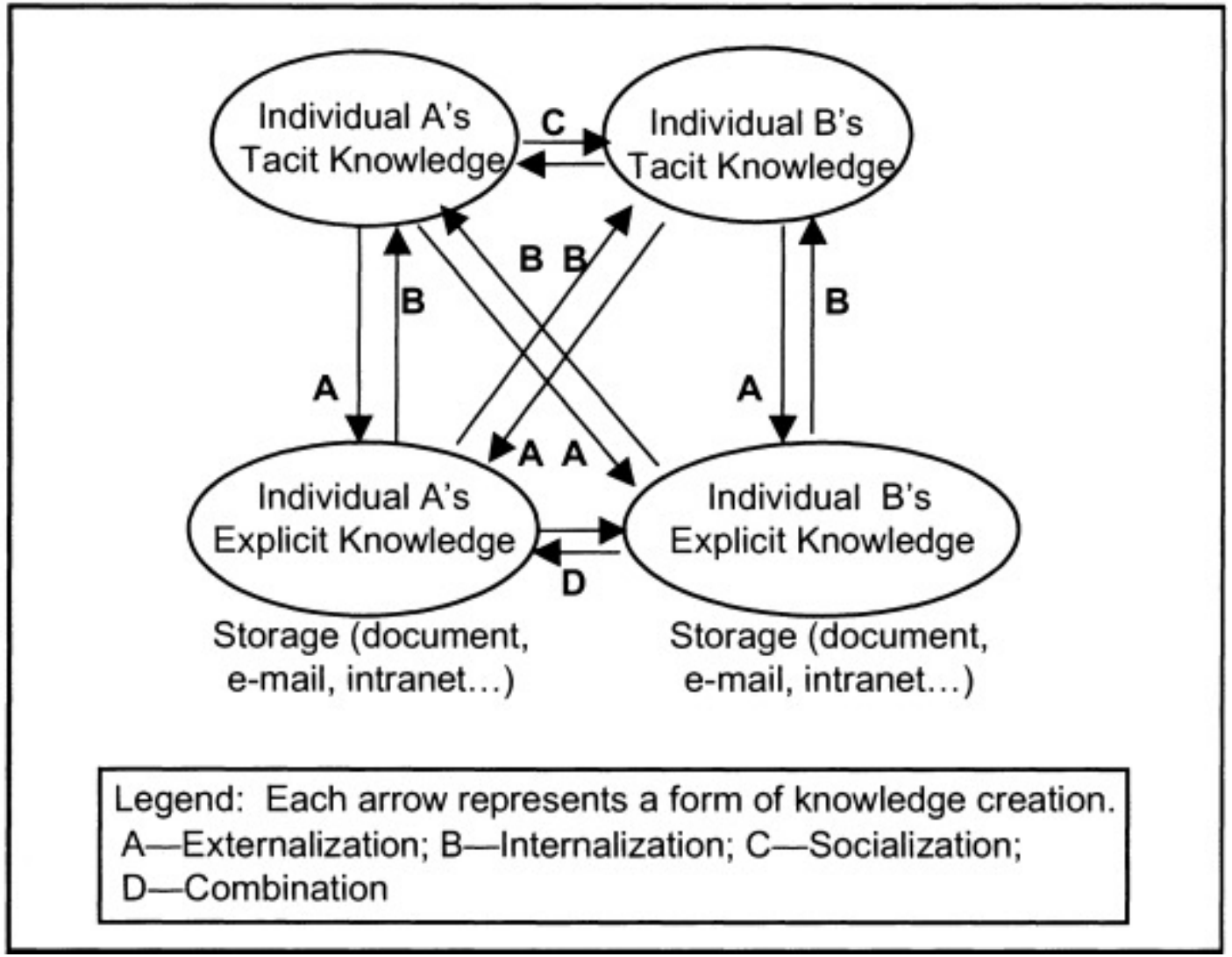


Tacit knowledge = hiljainen tieto in Finnish

Turban & Volonino (2010), Information technology for Management, John Wiley & Sons, Inc.
Botkin & Seeley (2011). The knowledge management manifesto. Knowledge Management Review, 3(6), 6–21.

Picture from Salovaara, A. (2023), MIS lecture on Knowledge management, 9.3.2023

Four knowledge creation modes (A-D)



Alavi, M., & Leidner, D. E. (2001). Knowledge management and knowledge management systems: conceptual foundations and research issues. *MIS Quarterly*, 25(1), 107-136. https://www.jstor.org/stable/3250961

Knowledge-based view of the firm

The knowledge-based view (KBV) of the firm emerged in mid 1990's as a new way of thinking about organizations.

It focuses on **understanding organizations as knowledge production and application systems**.

- Organizations regarded as entities that orchestrate knowledge resources and processes to create and apply knowledge, with products and services being the outcome of these processes.

Knowledge thus **became a central focus of organizational strategizing** in terms of firms' capacity to **generate, share,** and **leverage knowledge**—particularly proprietary knowledge—which was recognized crucial to the firm's ability to compete and offer innovative products and services.

Source: Alavi, M., Leidner, D. E., & Mousavi, R. (2024). A Knowledge Management Perspective of Generative Artificial Intelligence. *Journal of the Association for Information Systems*, *25*(1), Editorial, 1-12. https://aisel.aisnet.org/jais/vol25/iss1/15/

See also: https://is.theorizeit.org/wiki/Knowledge-based_theory_of_the_firm

Generative AI and KM

GenAI tools have launched a new, exciting, and complex era of organizational KM. Large firms in consulting and financial services are investing heavily in GenAI (e.g. McKinsey's Lilli) to support their knowledge workers and enhance their products, services, and customer support.

Traditional KM systems categorize "data" as basic facts, "information" as processed and contextualized data, and "knowledge" as insights drawn from human experience and judgment. ***In contrast, GenAI compresses the information layer and creates knowledge directly by processing very large volumes of data***. In a sense, while humans curate content in regular KMSs, GenAI uses algorithms for this task.

Source: Alavi, M., Leidner, D. E., & Mousavi, R. (2024). A Knowledge Management Perspective of Generative Artificial Intelligence. *Journal of the Association for Information Systems*, *25*(1), Editorial, 1-12. https://aisel.aisnet.org/jais/vol25/iss1/15/

McKinsey & Company (2023, August 16). Meet Lilli, our generative AI tool that's a researcher, a time saver, and an inspiration. (2023). McKinsey Blog. https://www.mckinsey.com/about-us/new-at-mckinsey-blog/meet-lilli-our-generative-ai-tool

Generative AI and KM

The focus on **IT's contribution to KM**, started by Alavi & Leidner's (2001) seminal article has paved the way for research and exploration in this domain.

"In shifting our focus to GenAI and its prospective influence on organizational knowledge management processes, it is apparent that we are standing at the precipice of a transformative period."

precipice = jyrkänne in Finnish

Source: Alavi, M., Leidner, D. E., & Mousavi, R. (2024). A Knowledge Management Perspective of Generative Artificial Intelligence. *Journal of the Association for Information Systems*, *25*(1), Editorial, 1-12. https://aisel.aisnet.org/jais/vol25/iss1/15/

Alavi, M., & Leidner, D. E. (2001). Knowledge management and knowledge management systems: conceptual foundations and research issues. *MIS Quarterly*, 25(1), 107-136. https://www.jstor.org/stable/3250961

Generative AI and KM

"Rather than just enabling traditional KM processes, GenAI will likely play a more profound role. For instance, by sifting through vast troves of data to identify patterns, offer insights, and predict outcomes, GenAI could effectively ***provide organizations with wisdom rather than just information****. This "wisdom," in turn, could translate to actionable insights, strategic foresight, and nuanced understanding that could be applied across various organizational functions to drive innovation, efficiency, and growth.*

Thus, in the long run, GenAI's impact is projected to be transformative, pushing the boundaries of IT's capabilities within organizational knowledge management."

Source: Alavi, M., Leidner, D. E., & Mousavi, R. (2024). A Knowledge Management Perspective of Generative Artificial Intelligence. *Journal of the Association for Information Systems*, *25*(1), Editorial, 1-12. https://aisel.aisnet.org/jais/vol25/iss1/15/

See also: Dell'Acqua, F., McFowland, E., Mollick, E. R., Lifshitz-Assaf, H., Kellogg, K., Rajendran, S., ... & Lakhani, K. R. (2023). Navigating the jagged technological frontier: Field experimental evidence of the effects of AI on knowledge worker productivity and quality. *Harvard Business School Technology & Operations Mgt. Unit Working Paper*, (24-013). https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4573321

Hogg (2024), "Klarna froze hiring because of AI. Now it says its chatbot does the work of 700 full-time staff", https://fortune.com/europe/2024/02/28/klarna-ai-altered-hiring-chatbot-700-full-time-staff-openai/ , February 28, 2024.

Knowledge Management Processes and the Potential Role of GenAI with examples of research questions for future research by Alavi et al. 2024 (1/4)

Divided into Knowledge creation, Storage & retrieval, Transfer, and Application areas

Potential role of GenAI in KNOWLEDGE CREATION	Research questions
GenAI is adept at synthesizing new knowledge by merging, categorizing, aggregating, and summarizing explicit knowledge from varied sources.	How does the integration of GenAI affect organizational culture, especially concerning knowledge sharing and collaboration among employees?
GenAI aids in the cognitive processes of individuals, like learning and reflection, by offering coaching, contextual examples, in-depth explanations, and actionable recommendations.	How does the pervasive use of GenAI affect the development and maintenance of social networks for knowledge creation within organizations?
Less-experienced knowledge workers can use GenAI to faster and perform tasks more efficiently.	How do employees judge the validity and relevance of knowledge?
GenAI can process tacit knowledge (e.g., employees' prompts and meeting notes) to create explicit knowledge.	To what extent does GenAI facilitate the internalization process of knowledge creation, and are there potential risks of employees relying too much on GenAI output without deeply understanding the knowledge?
GenAI can improve the productivity of knowledge workers.	How might GenAI impact the externalization of knowledge, and what strategies can be employed to ensure that knowledge management doesn't regress due to duplicated efforts?

Source: Alavi, M., Leidner, D. E., & Mousavi, R. (2024). A Knowledge Management Perspective of Generative Artificial Intelligence. *Journal of the Association for Information Systems*, *25*(1), Editorial, 1-12. https://aisel.aisnet.org/jais/vol25/iss1/15/

Knowledge Management Processes and the Potential Role of GenAI (2/4)

Potential role of GenAI in STORAGE & RETRIEVAL	Research questions
GenAI can retrieve and store knowledge from different sources, including individual minds (e.g., employees' prompts), group dynamics (e.g., meeting notes), documents, and computer files.	How does the integration of GenAI impact the intrinsic and extrinsic motivation of employees to share or codify their tacit knowledge?
The knowledge made available by GenAI is always readily and instantly available.	Can traditional knowledge vetting and rating systems (e.g., Davenport and Prusak, 1998) be repurposed to evaluate content stored and retrieved by GenAI to ensure quality?
GenAI enhances traditional knowledge management systems (KMS) by optimizing the storage and retrieval of unstructured data, such as text.	How can organizations integrate human-derived tacit knowledge and GenAI-generated explicit knowledge to optimize KMSs?
GenAI may democratize access to knowledge within organizations.	How can organizations use GenAI tools to reliably and independently rate and evaluate employee-generated knowledge?
GenAI can be used to sort and rank the collective knowledge within organizations.	How can organizations use employees' queries to GenAI tools (if controlled by the organization) to automatically capture and document employees' implicit knowledge?

Source: Alavi, M., Leidner, D. E., & Mousavi, R. (2024). A Knowledge Management Perspective of Generative Artificial Intelligence. *Journal of the Association for Information Systems*, *25*(1), Editorial, 1-12. https://aisel.aisnet.org/jais/vol25/iss1/15/

Knowledge Management Processes and the Potential Role of GenAI (3/4)

Potential role of GenAI in TRANSFER	Research questions
By eliminating the hurdles in traditional KMSs (e.g., difficulty in transferring tacit knowledge, complex navigation and querying, and challenges in locating necessary knowledge), GenAI can easily facilitate knowledge transfer within organizations.	To what extent can/should organizations use internal vs. external data to train GenAI and how might the balance of internal and external data sources impact the accuracy and relevance of GenAI outputs in knowledge transfer scenarios?
GenAI can be used to create customized/ interactive onboarding programs to facilitate knowledge transfer to new employees.	How does GenAI influence the overall rate and level of knowledge sharing in various industries?
GenAI can provide interactive tutorials and simulations, which are especially valuable for roles demanding practical learning and experience.	To what extent does GenAI's content curation improve the efficiency and relevance of knowledge transfer in organizations?
GenAI can foster a learning culture by eliminating employees' potential reluctance to ask questions from their superiors.	What are the potential risks of overreliance on GenAI for knowledge transfer with respect to disseminating sensitive and privileged information?
	To what extent does the excessive dependence on GenAI during employee onboarding or training hinder the effective assimilation of employees into the established organizational culture

Source: Alavi, M., Leidner, D. E., & Mousavi, R. (2024). A Knowledge Management Perspective of Generative Artificial Intelligence. *Journal of the Association for Information Systems*, *25*(1), Editorial, 1-12. https://aisel.aisnet.org/jais/vol25/iss1/15/

Knowledge Management Processes and the Potential Role of GenAI (4/4)

Potential role of GenAI in APPLICATION	Research questions
GenAI enhances speed, consistency, and efficiency in applying organizational knowledge.	What policies and safeguards need to be developed to guide the effective application of GenAI in organizational knowledge management while mitigating its risks?
GenAI aids in searching and accessing stored knowledge through natural language interactions, responding to context-specific user queries.	To what extent does GenAI-enhanced knowledge management impact the overall productivity and innovation of an organization??
GenAI can streamline the use of organizational knowledge to address business challenges, such as using chatbots to respond to customer inquiries based on company knowledge.	What are the best approaches to training knowledge workers to effectively apply GenAI in support of their activities?
GenAI can tailor knowledge based on specific employee preferences, needs, or historical interactions. This can enhance knowledge internalization and, subsequently, knowledge application.	How should knowledge work and knowledge flows be redesigned to harness GenAI capabilities?
GenAI can analyze complex challenges by accessing varied knowledge sources and establishing relevant connections.	Which domains and use cases benefit from the integration of GenAI and in which areas might its use be counterproductive?

Source: Alavi, M., Leidner, D. E., & Mousavi, R. (2024). A Knowledge Management Perspective of Generative Artificial Intelligence. *Journal of the Association for Information Systems*, *25*(1), Editorial, 1-12. https://aisel.aisnet.org/jais/vol25/iss1/15/

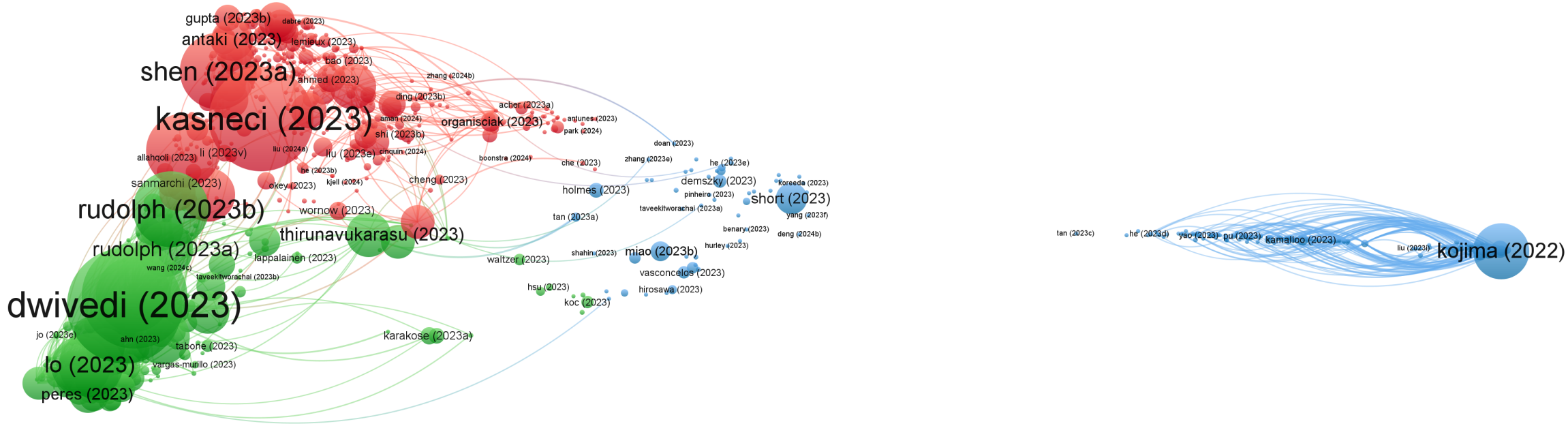
Key practical questions from Strategic Management researchers for using and scaling ChatGPT capabilities in knowledge work

Organizational transformation priorities	*Questions for individual knowledge workers*	*Questions for strategy and management*
Skills and capabilities	What tasks can I improve, automate or optimize with ChatGPT? What kinds of skills related to ChatGPT do I need to develop (e.g. prompting, data security, content curation)?	How can we leverage ChatGPT capabilities at scale across our organization? What kind of onboarding and training programs do we need to implement to fully benefit from ChatGPT?
Team structure and workflow coordination	How will my role on my teams and in the broader organization change once our organization adopts ChatGPT as part of the workflows? How will collaboration and communication processes in our organization change with the implementation of ChatGPT?	What are the tasks and roles that ChatGPT can replace or augment, and what roles and tasks will be completely new? How should we modify our team structures and workflows to incorporate relevant ChatGPT capabilities within them?
Culture and mindset	What level of support and guidance do I need to comfortably experiment and use ChatGPT in my daily work? How can I support my colleagues in adopting and using ChatGPT in ways that create value for them?	What steps can we take to ensure the ethical and responsible implementation of ChatGPT? How can we build a culture of trust and transparency around the implementation of ChatGPT?
Business model innovation	What types of experiments and pilots with ChatGPT can I undertake to create more value for our customers? Are there new ways to collaborate and communicate with our key stakeholders, given the new possibilities provided by ChatGPT?	How can we use ChatGPT to change or improve the key elements of our business model (value proposition, value creation, value capture)? Given that ChatGPT capabilities are widely available, what will our added value and strategic differentiators be in the eyes of our customers and partners?

Source: Ritala, P., Ruokonen, M., & Ramaul, L. (2023). Transforming boundaries: how does ChatGPT change knowledge work?. Table 2, *Journal of Business Strategy.* https://www.emerald.com/insight/content/doi/10.1108/JBS-05-2023-0094/full/html

Literature on GenAI, ChatGPT and Large language models has already exploded!

Search phrase: **“generative AI” OR ChatGPT or “large language model*”** in Scopus database on Feb 28, 2024 from the article titles resulted in 5278 articles. 1000 most relevant are presented on the Bibliographic coupling map below. The article nodes are the larger the more they have citations, and they are connected or close to each other if they share common references in their reference lists. Tool used: https://www.vosviewer.com/

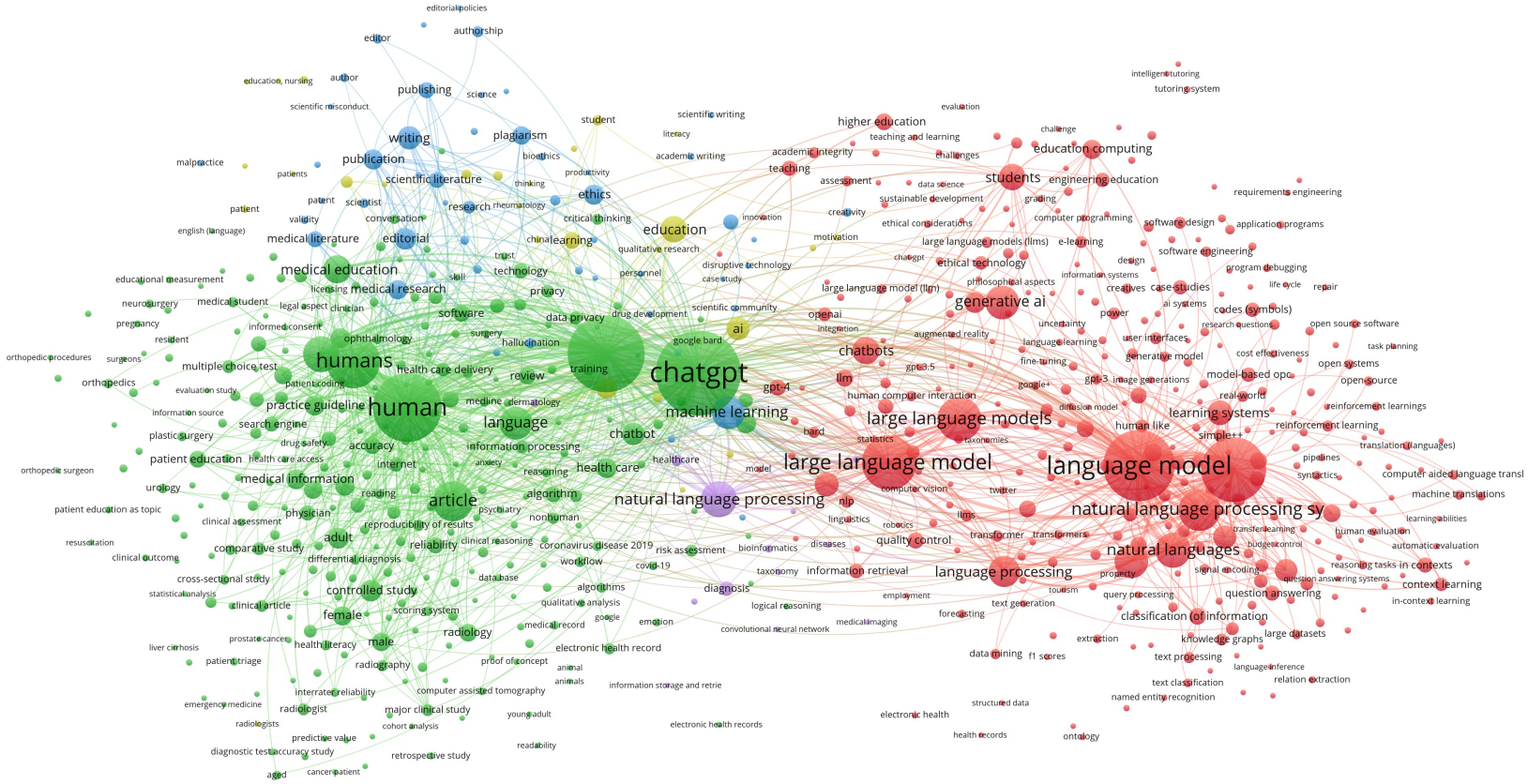


Explore the map and details of the articles online at https://app.vosviewer.com/?json=https%3A%2F%2Fdrive.google.com%2Fuc%3Fid%3D1guK28Q7f_1-hNASbNN-5pVYGnnEyJ1BA

VOSviewer

Literature on GenAI, ChatGPT and Large language models: keyword map

Search phrase: “generative AI” OR ChatGPT or “large language model*” in Scopus database on Feb 28, 2024 from the article titles resulted in 5278 articles. The map shows the co-occurrence of the articles’ keywords (appearing at least 10 times in the sample), resulting in 728 keywords (*uncleaned, synonyms not combined*!). The keyword nodes are the larger the more they appear in the sample, and they are connected or close to each other if they appear often together in the same articles. Tool used: https://www.vosviewer.com/

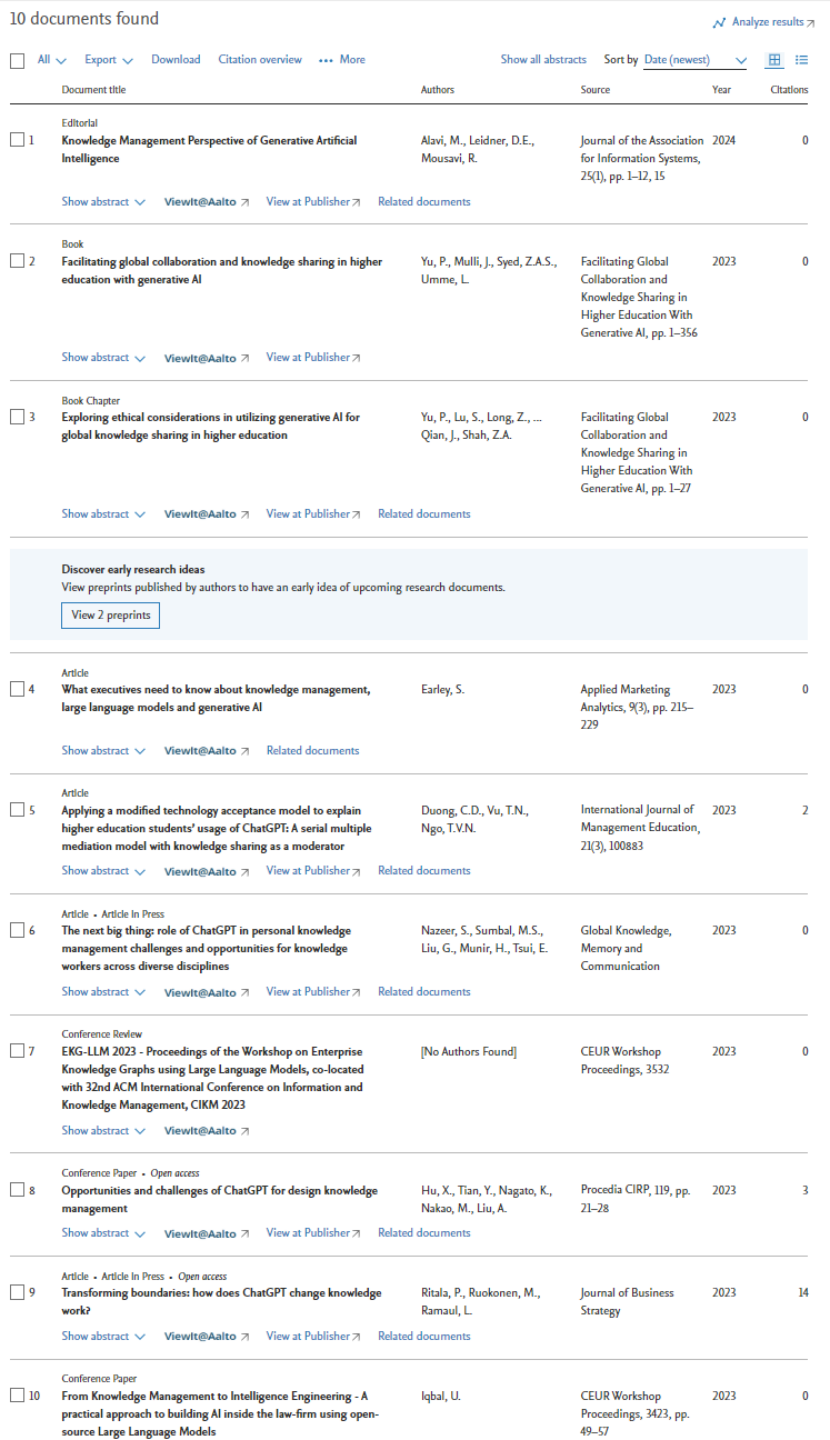


Explore the map in detail at:
https://app.vosviewer.com/?json=https%3A%2F%2Fdrive.google.com%2Fuc%3Fid%3D1-LNOPTaIJEN6UjXW82hWX1p4KUhbBC50

So far only 10 articles related to knowledge management or knowledge work with GenAI-related search words

Search phrase in Scopus from article titles: ((“generative AI” OR “generative artificial intelligence” OR ChatGPT or “large language model*”) AND (knowledge management” OR “knowledge sharing” OR “knowledge work”)) in Scopus database on Feb 28, 2024.

NOTE: More article results (151) if searching also from abstracts and keywords, in addition to article titles.



10 documents found

Analyze results

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	Document title	Authors	Source	Year	Citations
1	Editorial **Knowledge Management Perspective of Generative Artificial Intelligence**	Alavi, M., Leidner, D.E., Mousavi, R.	Journal of the Association for Information Systems, 25(1), pp. 1–12, 15	2024	0
2	Book **Facilitating global collaboration and knowledge sharing in higher education with generative AI**	Yu, P., Mulli, J., Syed, Z.A.S., Umme, L.	Facilitating Global Collaboration and Knowledge Sharing in Higher Education With Generative AI, pp. 1–356	2023	0
3	Book Chapter **Exploring ethical considerations in utilizing generative AI for global knowledge sharing in higher education**	Yu, P., Lu, S., Long, Z., ... Qian, J., Shah, Z.A.	Facilitating Global Collaboration and Knowledge Sharing in Higher Education With Generative AI, pp. 1–27	2023	0
4	Article **What executives need to know about knowledge management, large language models and generative AI**	Earley, S.	Applied Marketing Analytics, 9(3), pp. 215–229	2023	0
5	Article **Applying a modified technology acceptance model to explain higher education students' usage of ChatGPT: A serial multiple mediation model with knowledge sharing as a moderator**	Duong, C.D., Vu, T.N., Ngo, T.V.N.	International Journal of Management Education, 21(3), 100883	2023	2
6	Article · Article In Press **The next big thing: role of ChatGPT in personal knowledge management challenges and opportunities for knowledge workers across diverse disciplines**	Nazeer, S., Sumbal, M.S., Liu, G., Munir, H., Tsui, E.	Global Knowledge, Memory and Communication	2023	0
7	Conference Review **EKG-LLM 2023 - Proceedings of the Workshop on Enterprise Knowledge Graphs using Large Language Models, co-located with 32nd ACM International Conference on Information and Knowledge Management, CIKM 2023**	[No Authors Found]	CEUR Workshop Proceedings, 3532	2023	0
8	Conference Paper · *Open access* **Opportunities and challenges of ChatGPT for design knowledge management**	Hu, X., Tian, Y., Nagato, K., Nakao, M., Liu, A.	Procedia CIRP, 119, pp. 21–28	2023	3
9	Article · Article In Press · *Open access* **Transforming boundaries: how does ChatGPT change knowledge work?**	Ritala, P., Ruokonen, M., Ramaul, L.	Journal of Business Strategy	2023	14
10	Conference Paper **From Knowledge Management to Intelligence Engineering - A practical approach to building AI inside the law-firm using open-source Large Language Models**	Iqbal, U.	CEUR Workshop Proceedings, 3423, pp. 49–57	2023	0

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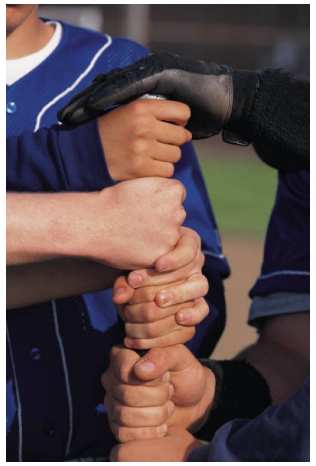
Collaboration and collaborative information systems (CIS)

Aalto University
School of Business

Definitions

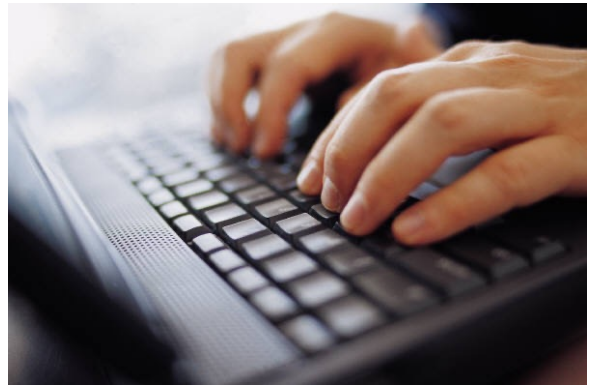
Collaboration



- deliberate efforts of 2 or more entities (individuals, groups or firms) who work together to accomplish certain tasks.
  – *Collaborate = com laborare - to work together*

Collaborative IS (CIS) and group work technologies ("groupware")

- **computer-based** systems
  that **support groups** of people
  engaged in a **common task** (or goal) and
  that provide an interface to a **shared environment**
  to empower **human interaction**
  irrespective of time and distance barriers.



Sources: Ellis et al. (1991), "Groupware: some issues and experiences. *Communications of the ACM*, 34(1), 38-58.

Cruz et al. (2012) "Towards an overarching classification model of CSCW and groupware: A socio-technical perspective", *Proceedings of CRIWG*, Springer.

Collaborative IS that support task-oriented collaboration

Example of an early categorization

Cisco's Telepresence room

- **E-mail** **(e.g. MS Outlook, Gmail)**
- **Teleconferencing** **(e.g. Skype Conference call)**
- **Videoconferencing** **(e.g. Click2Meet)**
- **Dataconferencing** **(e.g. WebEx)**
- **Web-based collaborative tools** **(e.g. Listservs, Yahoo Groups)**
- **Proprietary groupware tools** **(e.g. MS Teams, TeamWare)**
- **Group Support Systems a.k.a. Electronic Meeting Systems** **(e.g. FacilitatePro, GroupSystems ThinkTank)**

Conference is defined as "a meeting of two or more persons for discussing matters of common concern". When a conference is supported by electronic means the term ***conferencing*** is used.

Sources: Bajwa, D. S., Lewis, L. F. and Pervan, G. (2003) "Adoption of Collaboration Information Technologies in Australian and US Organizations: A Comparative Study", *Proceedings of HICSS Conference.*

Suduc, A. M., & Bizoi, M. (2022). AI shapes the future of web conferencing platforms. *Procedia Computer Science*, *214.*

The integration of technologies

There are no commonly accepted product categories related to collaborative IS!

E.g. Skype was first a simple teleconferencing service between 2 persons - now it contains possibilities for multi-party video conferencing with data / screen sharing, instant messaging options, etc.

The "bundles of capabilities" in various collaboration suites make it very difficult for practitioners to understand:

- **what capabilities they need**
- **what capabilities a given product offers**
- **and how to select an appropriate product!**

Useful review of several tools: http://blog.lucidmeetings.com/blog/25-tools-for-online-brainstorming-and-decision-making-in-meetings, originally published in 2015, updated 2020.

Collaborative integration factors

A collaborative technology is **integrated** if it combines support from **more than one of the 3** key factors:

MODE

- refers to the time and space of interaction, i.e. face-to-face vs. distributed (remote, virtual), and synchronous (same-time) vs. asynchronous (different-time)

MEDIUM

- is the media that the application provides for interaction, e.g. text, graphic, audio, video or shared whiteboard

STRUCTURE

- means the support provided by the application for group development and productive outcomes, such as cognitive mapping, anonymity, and consensus building.

Source: Munkvold, B. E. and Zigurs, I. (2007), ”Research challenges for integration of e-collaboration technologies”, in Kock, N. Emerging e-collaboration concepts and applications.

Useful classification of CIS based on their core capability / functionality

@ **Jointly authored pages**

- conversation tools, shared editors, polling tools and group dynamics tools.

@ **Streaming technologies**

- desktop/application sharing, video conferencing, audio conferencing

@ **Information access tools**

- shared file repositories, social tagging systems, search engines, and syndication tools

@ Aggregated systems

Source: Mittleman et al. (2008), ”Toward a Taxonomy of Groupware Technologies”, *Proceedings of CRIWG Conference on Collaboration and Technology*, available at https://www.researchgate.net/publication/221513282_Toward_a_Taxonomy_of_Groupware_Technologies,
Updated version in Mittleman et al. (2015), “Classification of collaboration technology”, in Nunamaker et al. (Eds.) *Collaboration Systems: Concept, Value, and Use*. Routledge.

Video conferencing & web conferencing

The terms **video conferencing** and **web conferencing** referred earlier to two different categories of online communication systems.

- *Videoconferencing systems only offered audio-video communication, while web conferencing systems also offered other facilities such as screen sharing, chat, or polling. Over time, the terms have become synonymous in the literature*. (Suduc and Bizoi, 2022)

Best video conferencing apps for teams according to Zapier (2024):

- **Zoom** is considered the best app for reliable, large video calls;
- **Google Meet** for Google Workspace users;
- **Microsoft Teams** is the best combination of team chat & video conferencing together;
- **Cisco's Webex Meeting** best for video quality.
- **Jitsi** is a free, lightweight option

Sources: Suduc, A. M., & Bizoi, M. (2022). AI shapes the future of web conferencing platforms. *Procedia Computer Science*, *214.*

The best video conferencing software for teams in 2024, https://zapier.com/blog/best-video-conferencing-apps/ , January 9, 2024

Comparison of most known video conferencing systems

	Zoom	Google Meet	Microsoft Teams
Performance and reliability	-reliable calls	-clear, consistent, and reliable video experience	-great video quality
Large video calls	-up to 1000 interactive participants via Zoom Large Meetings add-on	-up to 250 participants interactive participants, and up to 100,000 viewers via live streaming in the domain	-up to 1000 interactive participants
Integrations	-integrate with Learning Management Systems -dozens of integrations and add-ons	-integrate with Google apps	-integrate with various add-ons and apps -integrate with Microsoft apps -integrate with Learning Management Systems
Security	-two-factor authentication -End-to-end encryption -waiting-room	-two-factor authentication -eDiscovery	-two-factor authentication -Microsoft Advanced Threat Protection -Data Loss Protection -eDiscovery
Platforms	-macOS, Windows, iOS, Android, Web	-iOS, Android, Web	-web, macOS, Windows, iOS, Android, Linux
Best features	-screen sharing (multiple options) -breakout rooms -Participant Reporting feature	-live captioning for audio and video chats -screen sharing options and controls -dial-in for free with any of paid plans -clear and straightforward interface	-video quality -breakout rooms -Together Mode -best whiteboard -best track record of security and the most transparent privacy policy -all-in-one collaboration hub -automatic captioning
Best for...	-education -users who need only video conferencing	-Google Workspace users	-Microsoft 365 users -education -corporate settings

Sources: Suduc, A. M., & Bizoi, M. (2022). AI shapes the future of web conferencing platforms. *Procedia Computer Science*, *214.*
Suduc et al. (2023). Status, Challenges and Trends in Videoconferencing Platforms. *INTERNATIONAL JOURNAL OF COMPUTERS COMMUNICATIONS & CONTROL*, *18*(3).

Gartner's Magic Quadrant for Unified Communications as a Service (UCaaS)

UCaaS providers develop and operate cloud UC services offering **business communication and collaboration capabilities**, including telephony, meetings, messaging, mobility and contact center.

You can read details of the market offerings from Gartner's UcaaS report.

Sources: Gartner, Magic Quadrant for Unified Communications as a Service, Worldwide, November 2023, https://www.gartner.com/document/4976431 available via https://gartner.aalto.fi

Videoconferencing - prospects

Video conferencing platforms are nowadays considered the **most important business communications tools**. The feature-rich solutions can empower the teams to be productive, making it easier for them to collaborate, solve problems, take decisions and hold effective meetings in real-time.

The emerging trend of **remote working**, **increased globalization and geographically scattered business operations** are the major factors for the global video conferencing market size to expand.

The global video conferencing market size was valued at USD 6.28 billion in 2021 and is **expected to expand at a compound annual growth rate (CAGR) of 12.5% from 2022 to 2030.**

Suduc, A. M., & Bizoi, M. (2022). AI shapes the future of web conferencing platforms. *Procedia Computer Science*, *214.*
Fortune Business Insights, https://www.fortunebusinessinsights.com/industry-reports/video-conferencing-market-100293

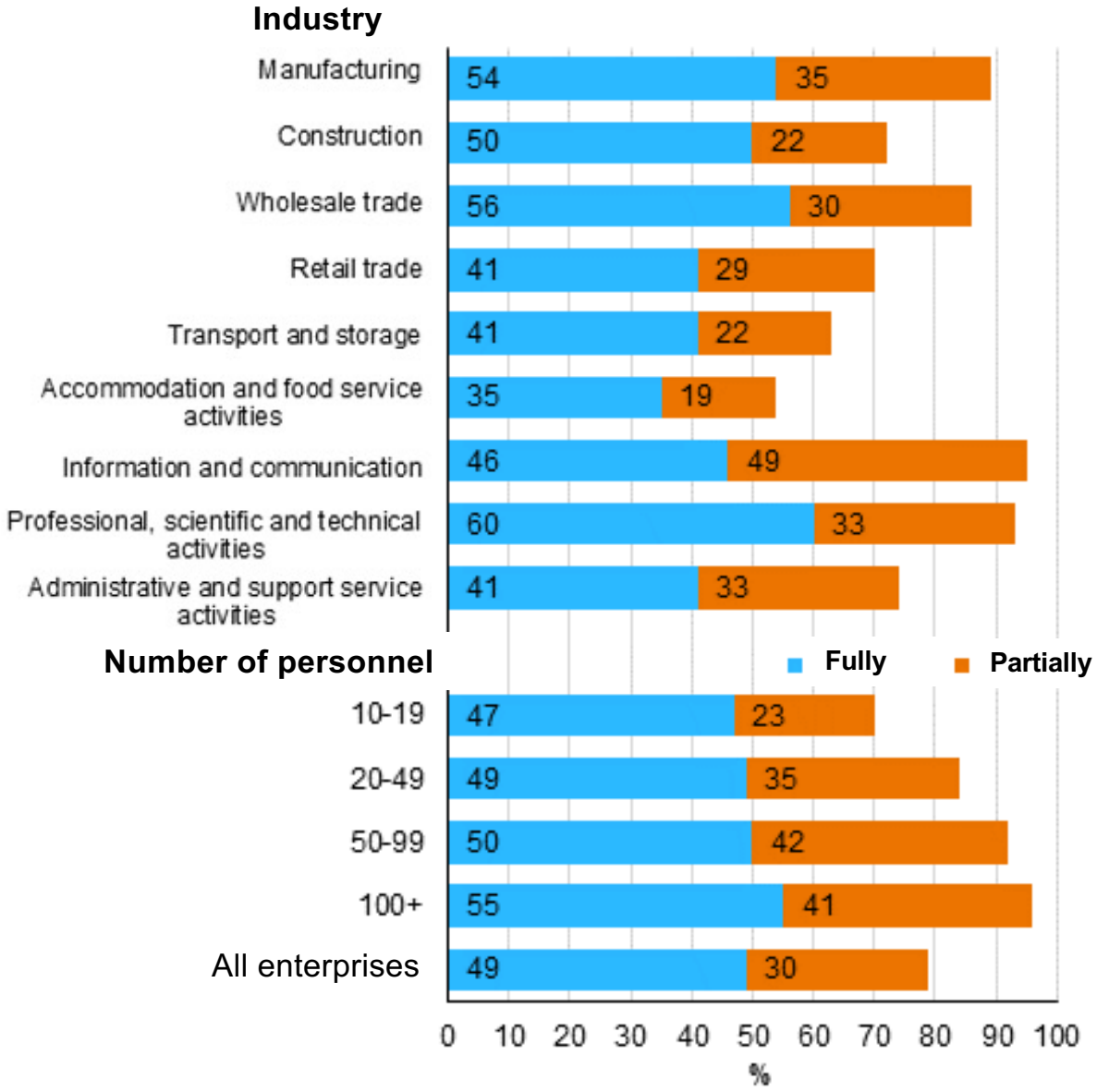
Photos by Christina@wocintechchat.com and Chris Montgomery / Unsplash

Use of Virtual meetings in Finnish companies

The first Covid year 2020 increased the use of virtual meetings in 79% of the enterprises (either fully due to Covid in 49%, or partially due to Covid, in 30% of all enterprises).

Largest increases were in **Information and communication industry** (95%) and in **large companies** (96%).

Companies that increased virtual meetings due to Covid, fully or partially (enterprises, min. 10 persons)



Source: https://tilastokeskus.fi/til/icte/2021/icte_2021_2021-12-03_tie_001_en.html
03.12.2021

How can (traditional) AI be used in videoconferencing systems?

1) **video classification** (sensitive/inappropriate content),
2) **audience counting** (face detection and counting the nr. of attendants),
3) **identity verification** (face recognition to verify the identity of participants and compare them with a previously authorized list),
4) **automatic layout** (object detection together with automatic zoom and replacement of objects, to give a better sense of continuity among different physical spaces (e.g. Together Mode in MS Teams that aims to improve the users' immersion experience),
5) **automatic accessibility** (audio description of video content for visually impaired people and recognition & translation of spoken text into appropriate sign language),
6) **participant anonymization** (use of image filters on the faces of those participants who do not want their image to appear in the meeting recording or even during the meeting),
7) **video summarization**,
8) **user attention/engagement detection** (sentiment analysis using users' face to help to classify the attention and engagement of users during the video conference),
9) **live comments sentiment analysis** (sentiment analysis done over users' information shared in a video conference to classify the interest in topics discussed),
10) **personalized content** (based on user identification and sentiment analysis),
11) **virtual conference assistant**.

Sources: Suduc, A. M., & Bizoi, M. (2022). AI shapes the future of web conferencing platforms. *Procedia Computer Science*, *214*
Mendes, P.R., E. S. Vieira, P. V. Almeida de Freitas, A. J. Busson, A. L. Guedes, C. Salles Soares Neto, and S. Colcher, "Shaping the Video Conferences of Tomorrow With AI," in Companion Proceedings of the 26th Brazilian Symposium on Multimedia and WebAt, São Luís, Brazil, 2020.

Portraying Group (Decision) Support Systems

Aalto University
School of Business

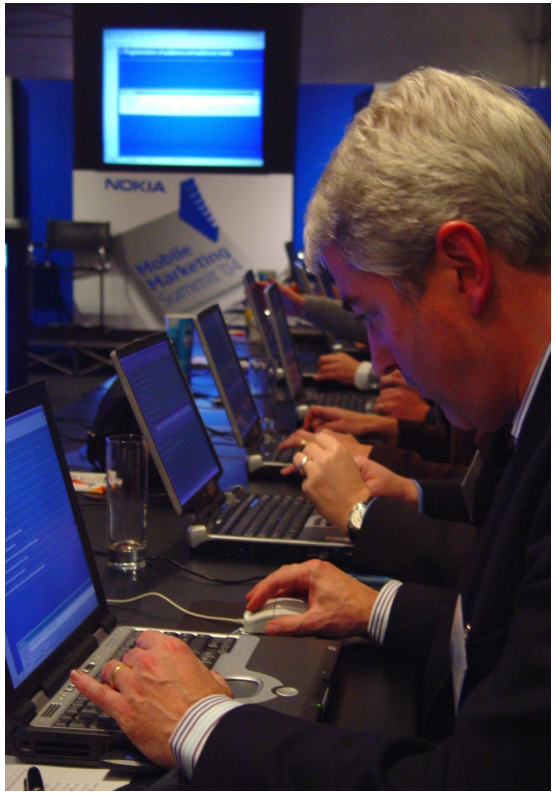
Common problems that all teams face

Source: Groupsystems.com

⇨ **Group Support Systems (GSS) were developed in late 1980's by ISS scholars (such as prof. Jay Nunamaker) in US universities to mitigate these common problems caused by group processes** (i.e. process losses, cf. Steiner, 1972, *Group process and productivity*).

Group Support Systems (GSS)
a.k.a. Electronic Meeting Systems

The meetings are lead by a **facilitator.**
Every participant has a computer or tablet.



Strengths of GSS:

@ **Structured process / predefined e-agenda**
@ **Anonymity (when wanted)**
@ **Simultaneous communication via computers**
@ **Various voting possibilities**
@ **Group memory (automatic meeting minutes)**

The current GSS systems are fully web-based, no installation is needed to client computers like in the previous Windows-based systems with LAN (Local Area Network).

See history of GSS in Florin et al. (2016), Collaborative activities and Methods, in CSCD-M https://link.springer.com/content/pdf/10.1007/978-3-319-47221-8_3.pdf or from https://en.wikipedia.org/wiki/Electronic_meeting_system

Photo from Nokia Mobile Marketing Summit 2004 (Bragge et al. (2011). Designing a repeatable collaboration method for setting up emerging value systems for new technology fields. *Journal of Information Technology Theory and Application*, *12*(3), 27. https://www.proquest.com/docview/940916197)

Traditional GSS setting: horse shoe shaped table with fixed computers

These types of **“decision rooms”** were built in the early days of GSS.

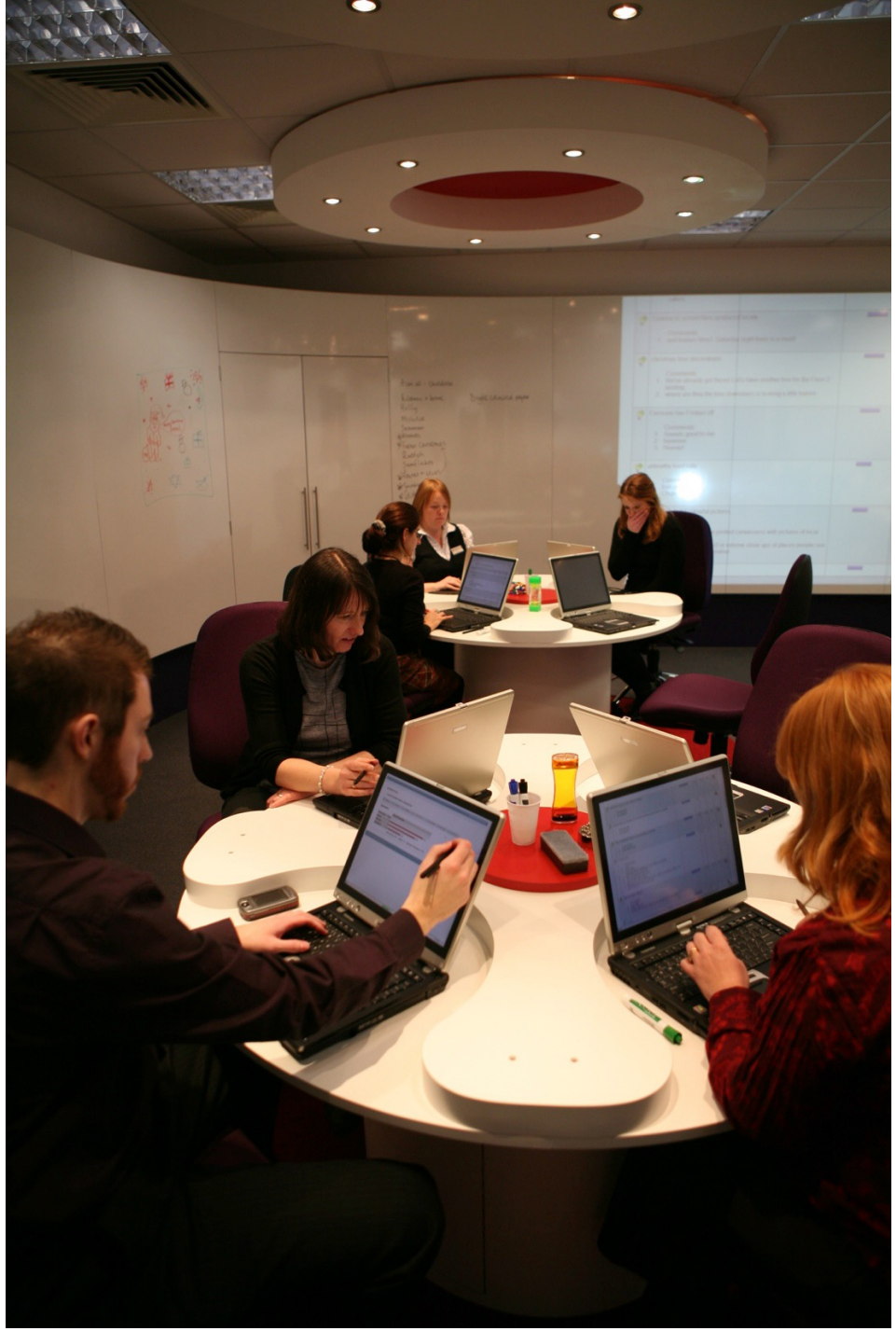
White screen(s) are also essential in the concept, besides computers.

Executive Meeting Room of
San Diego State University

Example of a modern GSS & innovation room setting

University of Essex iLab (Southend campus)

Tailored tables, laptops, rounded wall corners, walls act as white boards.



https://www.essex.ac.uk/business/facilities/creative-meeting-space
https://www.eventessex.co.uk/portfolio/ilab/

Designing e-Collaboration processes with Collaboration Engineering (CE)

Aalto University
School of Business

Reasons for need of Collaboration Engineering (CE)

"Collaborative work is essential to the success of modern organizations. ***Many organizations could benefit from the use of advanced collaboration technologies and collaboration professionals, such as facilitators****.*

However, these technologies are often ***too complex*** *for practitioners to use without professional support, and* ***collaboration professionals are too expensive*** *for many groups who could benefit from their help. To address this challenge, researchers developed and tested the* ***collaboration engineering (CE) approach****."*

De Vreede et al. (2021), Collaboration Engineering for Group Decision and Negotiation, *Handbook of Group Decision and Negotiation,* https://link.springer.com/referenceworkentry/10.1007/978-3-030-49629-6_21

Collaboration Engineering (CE): key concepts

CE is an approach to **designing collaborative work practices** for high-value **recurring tasks** and **deploying those designs for practitioners to execute themselves** - without the ongoing support from expert facilitators. The CE **engineers design collaborative work practices using a facilitation pattern language consisting of "thinkLets"**.

ThinkLets are facilitation best practices that create predictable and transferable patterns of collaboration.

- A thinkLet describes an elementary group process from a leader's point of view by providing explicit, scripted prompts for the group, and by guiding the practitioner through the decisions that must be made based on the group's behavior (see two examples on next slide).

Sources: De Vreede et al. (2021), Collaboration Engineering for Group Decision and Negotiation, https://link.springer.com/referenceworkentry/10.1007/978-3-030-49629-6_21
Winkler et al. (2019), "Towards a Technique for Modeling New Forms of Collaborative Work Practices – The Facilitation Process Model 2.0", HICSS https://scholarspace.manoa.hawaii.edu/bitstream/10125/59462/0022.pdf

Two ThinkLet examples – LeafHopper & FastFocus

LeafHopper

Choose this thinkLet…

… When you know in advance that the team must brainstorm on several topics at once.

… When different participants will have different levels of interest or expertise in the different topics.

… When it is not important to assure that every participant contributes to every topic.

Overview

Participants start with an electronic list of several discussion topics. Each hops among the topics to contribute as dictated by interest and expertise.

Inputs

A list of topics that must be addressed by the team.

Outputs

A set of comments organized by discussion topic

How to use LeafHopper

Setup

1. Create a list of topics for discussion in the GroupSystems Topic Commenter or one of the other list building tools (or create an outline of topics in the GroupSystems Group Outliner).

Steps

1. Explain the topics to the group and verify their understanding
2. Explain the kinds of ideas that the group must contribute
3. Say this:
   a. Start working on the topics in which you have the most interest or the most expertise. Then, if you have time, move to each of the other topics to read and comment on the contributions of others.
   b. You may not have time to work on every topic, so work first on the topics that are most important to you.

FastFocus

Choose this thinkLet…

… to quickly extract a clean list of key issues at a useful level of abstraction from a brainstorming activity.

… when it is important to assure that group members agree on the meaning of the items on the resulting list.

Overview

The team browses through the brainstorming contributions. Each team member in turn proposes aloud a key issue. The team discusses the meaning and the wording of a proposed item. The moderator posts well-framed items on the public list.

Inputs

Comments from a brainstorming activity

Outputs

A clean, non-redundant list of the key issues raised during a brainstorming activity.

How To FastFocus

Setup

1. Participants view their comments in the Electronic Brainstorming tool
2. Moderator displays an empty public list.

Steps

1. Explain clearly the kind of items that belong on the public list. If you want problem statements, give examples of problem statements. If you want solutions, give examples of solutions.
2. **Say This:**
   a. Each of you is on a different electronic page. Each of you has a different part of our brainstorming conversation on the screen in front of you.
   b. Please read the screen in front of you, and tell me the single most important issue represented in the discussion on your screen that should be included on this public list.

Source: CE/ThinkLet manual, 2009: http://www.lulu.com/shop/robert-briggs-and-gert-jan-de-vreede/thinklets-building-blocks-for-concerted-collaboration/paperback/product-5119917.html

Designing work processes with Collaboration Engineering

Collaboration Engineering is a research-based but practical approach that can be used to design & implement effective collaboration processes (Briggs et al. 2003, *Journal of MIS*)

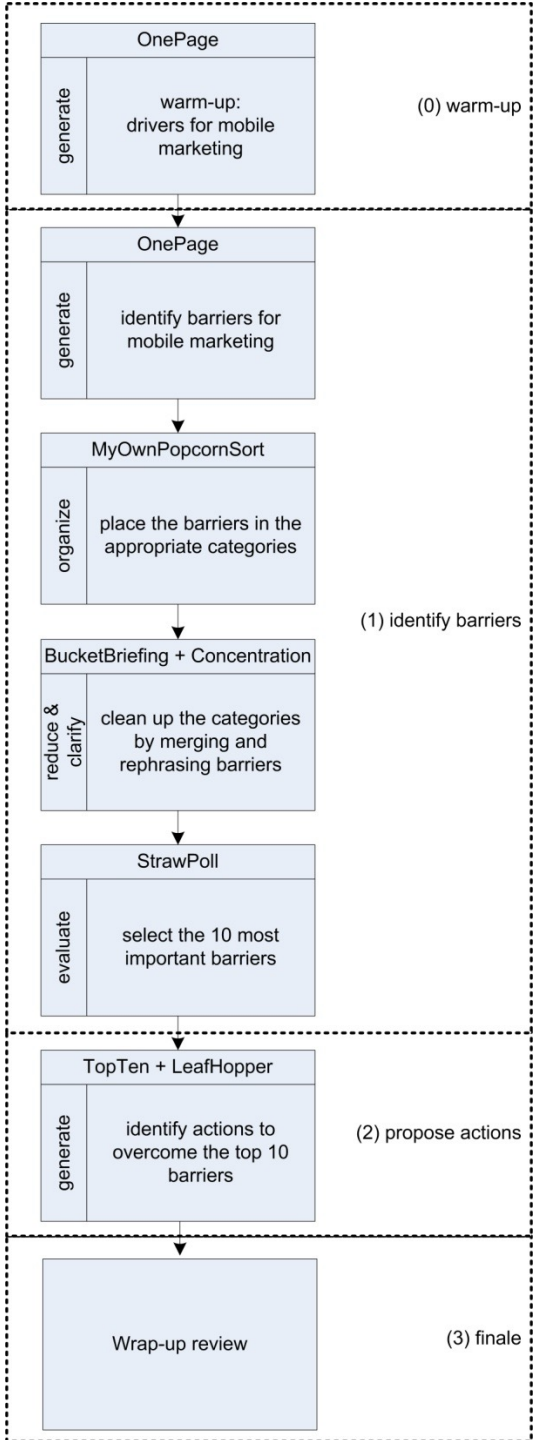
- Processes are composed of **generate, reduce, clarify, organize, evaluate** or **build consensus collaboration patterns**.

Facilitation process model figure from Nokia Mobile Marketing Summit

GSS used: *GroupSystems MeetingRoom*

Duration of collaboration process: 1,5 hrs

Participants: 25 brand / marketing managers.



Source: Bragge, J., Tuunanen, T., Virtanen, V. and Svahn, S. (2011) "Designing a Repeatable Collaboration Method for Setting Up Emerging Value Systems for New Technology Fields", *Journal of Information Technology Theory and Application*, 12(3), 27-47. https://www.proquest.com/docview/940916197

CE – 6 patterns of collaboration

Generate (diverge): Move from having fewer to having more concepts in the pool of concepts shared by the group

Gather, create, elaborate (decompose or expand).

Reduce (converge): Move from having many concepts to a focus on fewer concepts that the group deems worthy of further attention

Select, abstract, summarize

Clarify: Move from having less to having more shared understanding of concepts and of the words and phrases used to express them.

Describe

Organize: Move from less to more understanding of the relationships among concepts the group is considering

Classify, structure

Evaluate: Move from less to more understanding of the relative value of the concepts under consideration

Poll, rank, assess

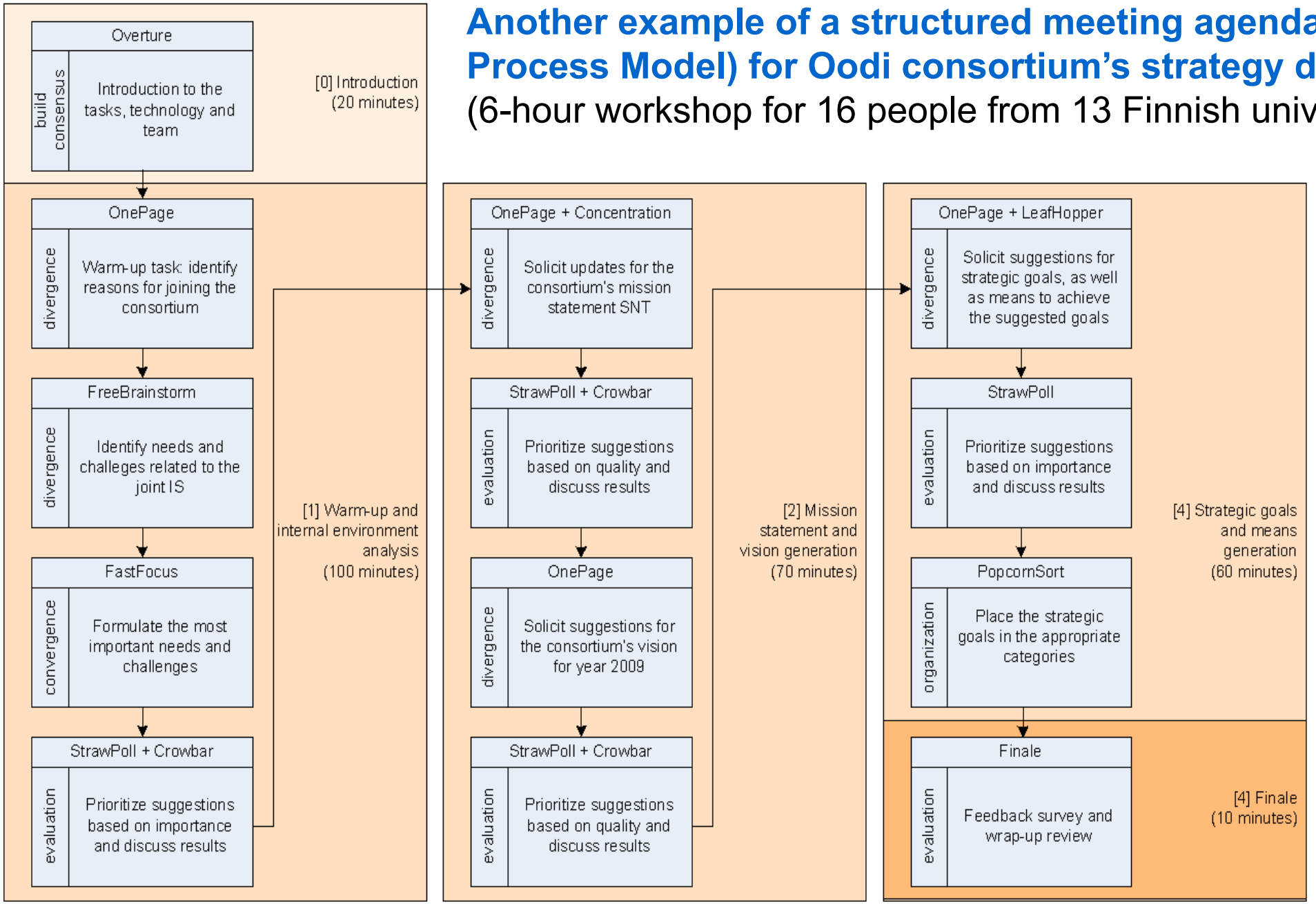
Build consensus: Move from having fewer to having more group members who are willing to commit to a proposal.

Measure, diagnose, advocate, resolve

Source: Briggs et al. 2006, “Defining key concepts for collaboration engineering” AMCIS proceedings, https://core.ac.uk/download/pdf/301386656.pdf

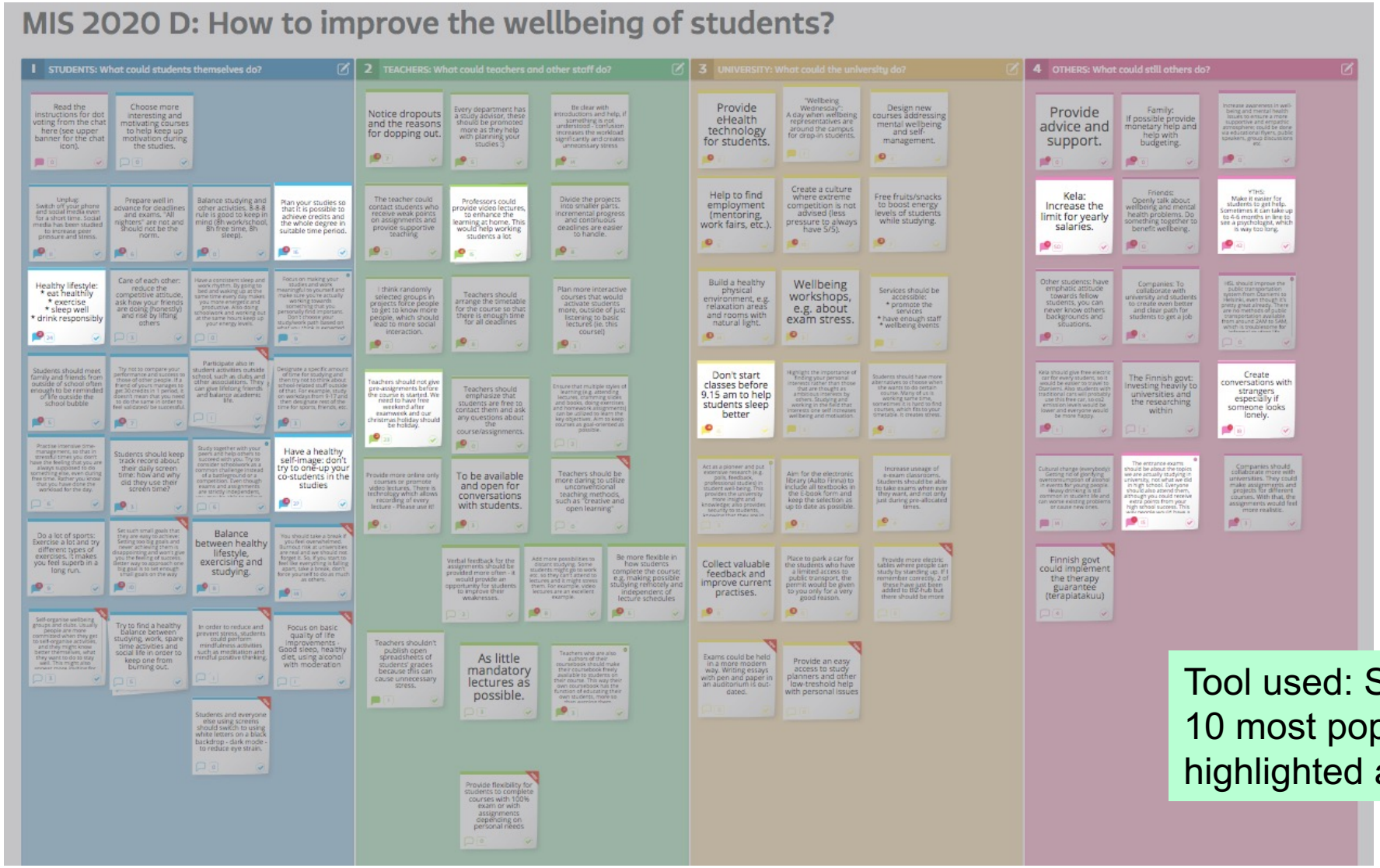
Another example of a structured meeting agenda (i.e. CE Facilitation Process Model) for Oodi consortium's strategy development

(6-hour workshop for 16 people from 13 Finnish universities)



Source: Bragge et al. (2007), "A Repeatable E-Collaboration Process Based on ThinkLets for Multi-Organization Strategy Development", *Group Decision and Negotiation, 16*, 363-379. https://link.springer.com/article/10.1007/s10726-006-9055-5

Example of a virtual & asynchronous brainstorming platform with anonymous ideation + named commenting & anonymous dot-voting (MIS 2020 course, duration was 1.5 weeks)



Tool used: StormBoard.com
10 most popular ideas highlighted after voting

Aalto University is testing ConceptBoard.com (visual workplace & collaboration platform) that might be taken into use later on, if the tests pass.

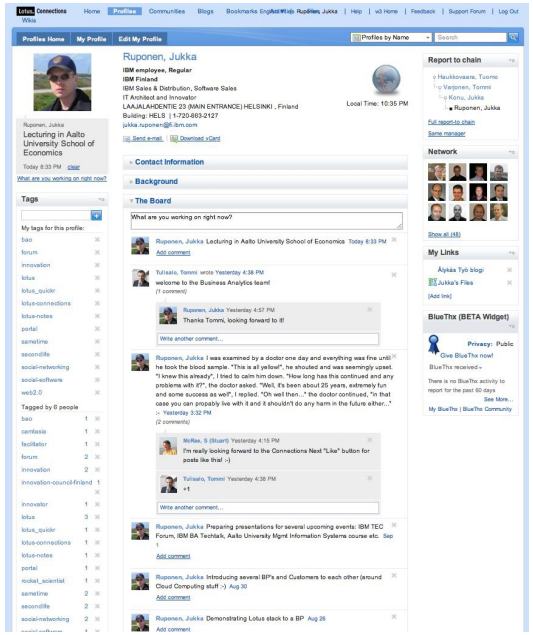
Development and trends in enterprise collaboration

Aalto University
School of Business

The promise of social tools to improve collaboration in tasks

Various enterprise social ("Enterprise 2.0") technologies offer valuable support for collaborative work:

- *Wikis, (micro)blogs, tagging, ideation jams etc.*



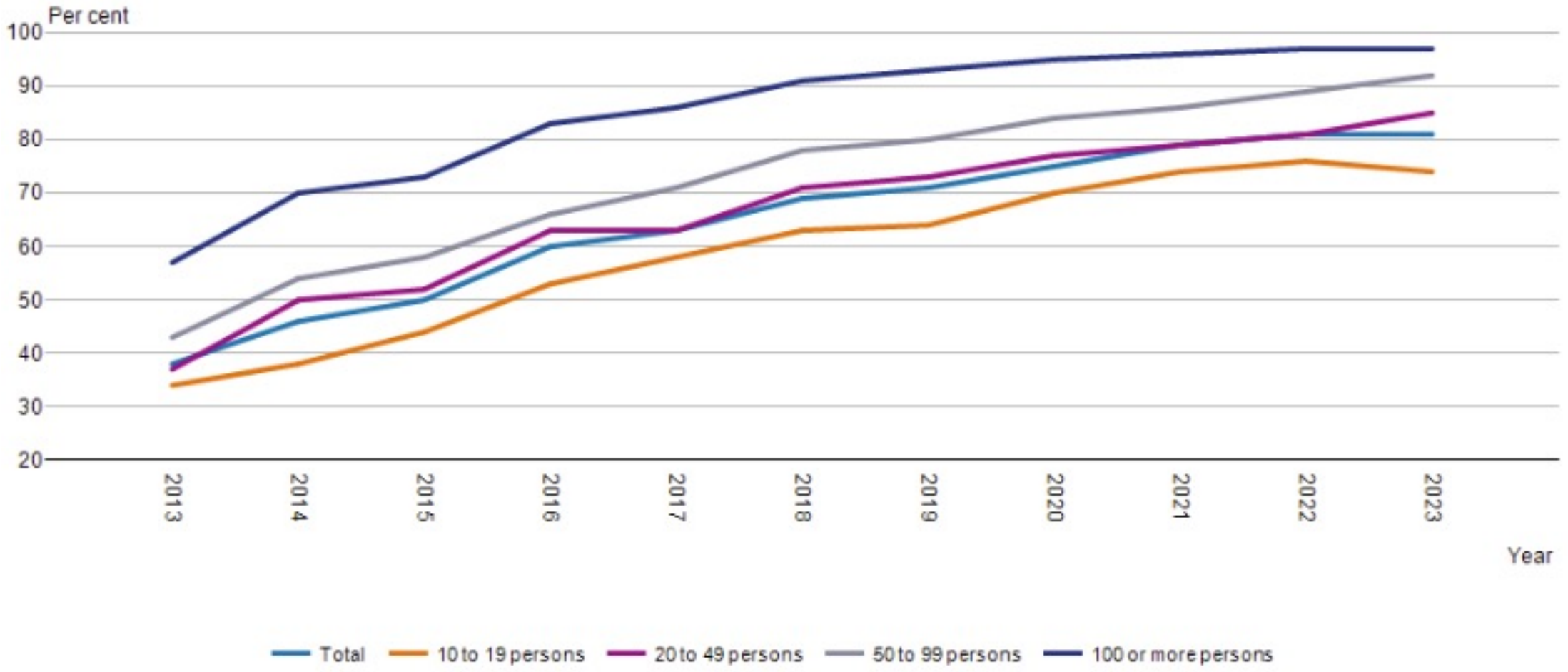
Advanced company intranets include capabilities that replicate directly the features of popular social tools such as Facebook and Twitter.

However,… "*We're in the very early stages of these collaborative suites transforming the nature of work*", claims Don Tapscott.

(in Kirkland, **2013**)

Jarrahi, H M. and Sawyer, S. (2013), "Social Technologies, Informal Knowledge Practices, and the Enterprise", *Journal of Organizational Computing and Electronic Commerce*, 23(1).
Kirkland, R. (2013), "Making internal collaboration work: An interview with Don Tapscott", *McKinsey Quarterly*, January.
Intranet screenshot example: IBM, © Jukka Ruponen, MIS lectures slides 2010

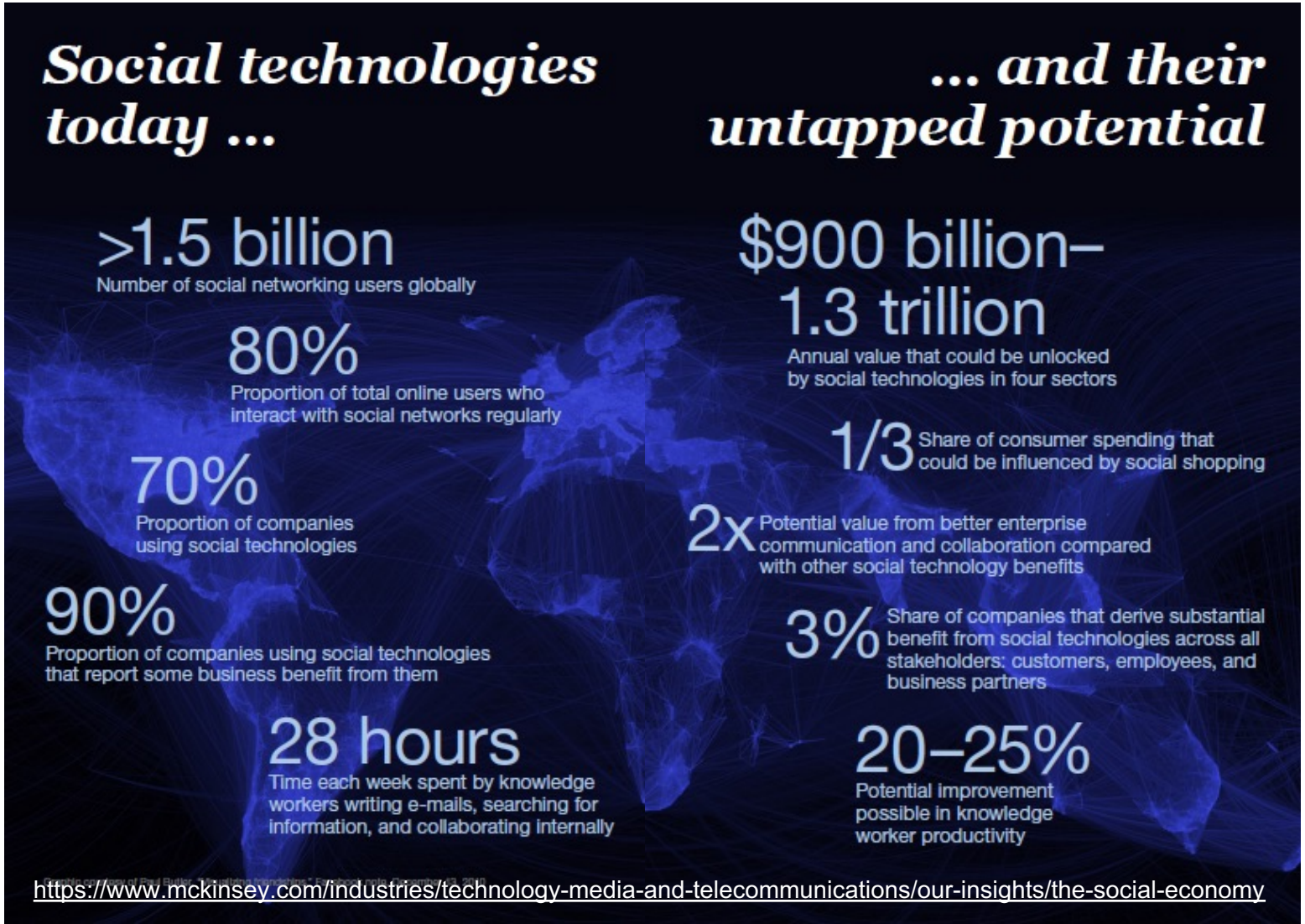
Development of the use of Social media in Finnish companies 2013-2023 (not the same as *internal social media use* though)



Source: Statistics Finland Use of information technology in enterprises by Size category of personnel and Year. Use social media, % of enterprises.. PxWeb (stat.fi)

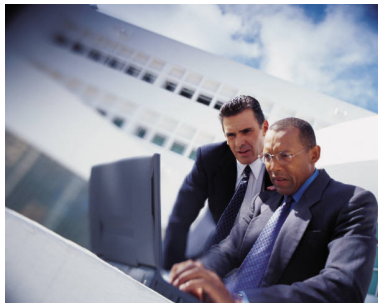
McKinsey's report on The social economy: Unlocking value and productivity through social technologies

*"Value can be reaped especially in **making meetings, document management** **and** **internal communications** more efficient and effective with proper social tool usage."*



https://www.mckinsey.com/industries/technology-media-and-telecommunications/our-insights/the-social-economy

Key challenges in Collaborative IS and social tool deployment



Despite their benefits, the **adoption and continued use** of collaborative and social technologies **is often challenging**:

① **Individuals are unwilling to give up their existing tools** and practices - even if they would be clearly inferior to the new ones (McAfee 2009).

Especially e-mail is a stubbornly persisting tool in group work, although it is originally designed for one-to-one communication.

② **Collaborative tools are not integrated into day-to-day work activities, projects and processes**
(Cortada et al. 2012; Briggs et al. 2003).

- Briggs, R.O., de Vreede, G.J., & Nunamaker, J.F. (2003). “Collaboration Engineering with ThinkLets to Pursue Sustained Success with Group Support Systems”. *Journal of Management Information Systems*, 19(4), 31-64
- Cortada, J. W, Lesser, E. and Korsten, P. J. (2012), The business of social business. What works and how it’s done. *IBM Global Business Services Executive Report*, IBM Institute for Business Value, November, 18 pp.
- McAfee, A. (2009), *Enterprise 2.0. New Collaborative Tools for Your Organization’s Toughest Challenges*, Harvard Business Press, 231 pp.

MIT Tech Review 2016: Slack in 10 breakthrough techs

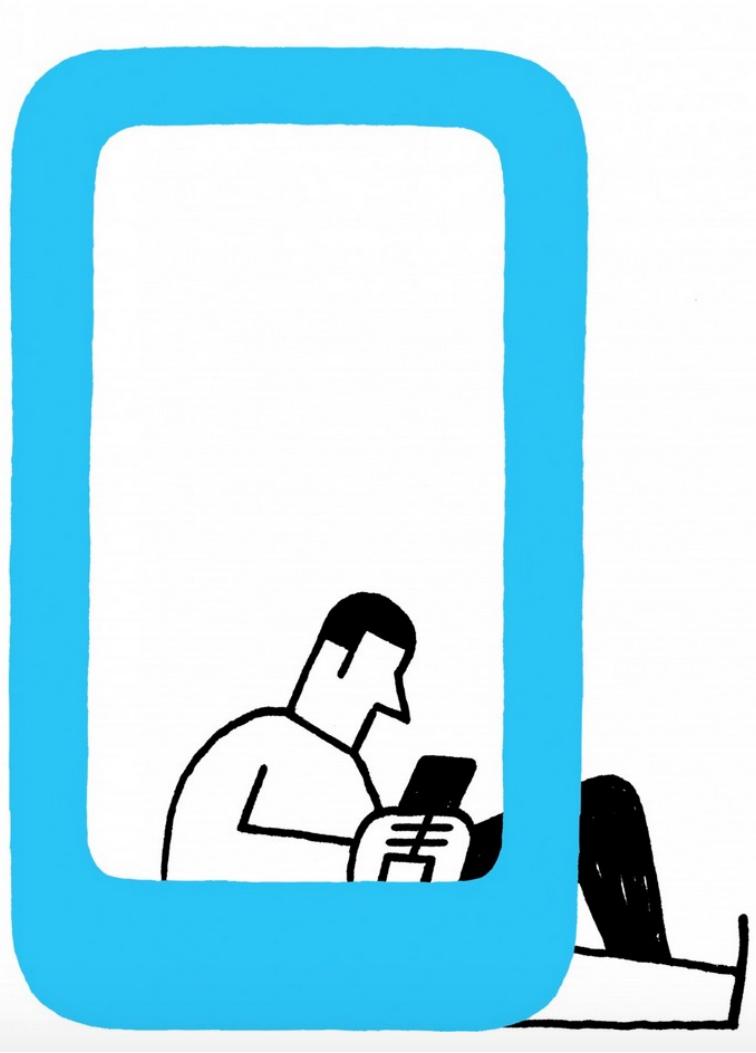
10 Breakthrough Technologies 2016

Which of today's emerging technologies have a chance at solving a big problem and opening up new opportunities? Here are our picks. The 10 on this list all had an impressive milestone in the past year or are on the verge of one. These are technologies you need to know about right now.

- Immune Engineering
- Precise Gene Editing in Plants
- Conversational Interfaces
- Reusable Rockets
- Robots That Teach Each Other
- DNA App Store
- SolarCity's Gigafactory
- Slack
- Tesla Autopilot
- Power from the Air

slack

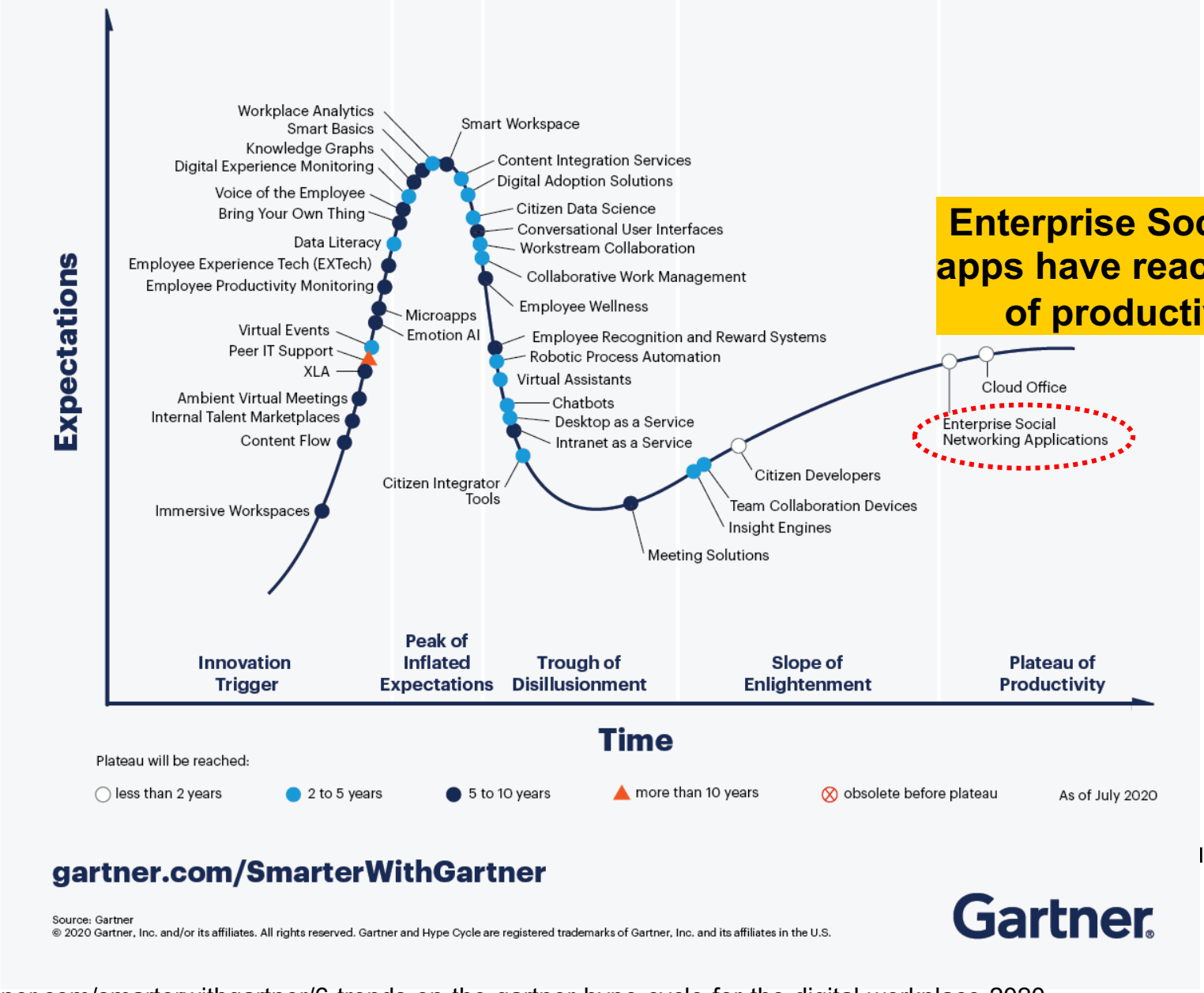
A service built for the era of mobile phones and short text messages is changing the workplace.



Slack differed considerably from the other breakthrough technologies in 2016, and some questioned it then..

Source: https://www.technologyreview.com/technology/slack/,
see also http://www.zdnet.com/article/the-enterprise-technologies-to-watch-in-2016/

Gartner's hype cycle for Digital workplace 2020

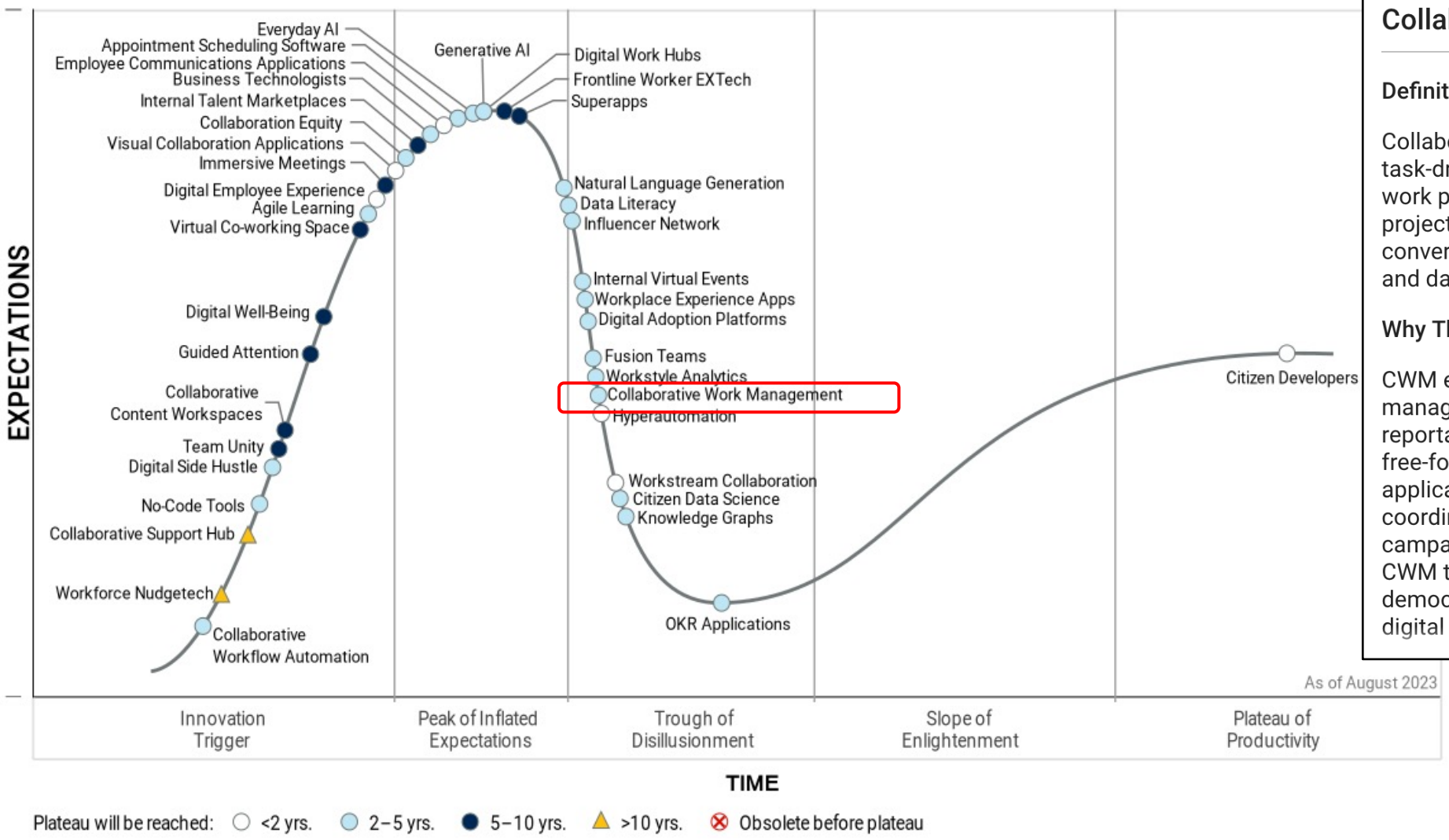


Enterprise Social Networking apps have reached the plateau of productivity in 2020!

ırce:

Source: https://www.gartner.com/smarterwithgartner/6-trends-on-the-gartner-hype-cycle-for-the-digital-workplace-2020

Gartner's hype cycle for Digital workplace apps 2023



Collaborative Work Management

Definition

Collaborative work management (CWM) tools provide task-driven workspaces that support business users in work planning and execution. They combine task, project, workflow and automation capabilities, with conversations, content publishing, reporting, analytics and dashboards.

Why This Is Important

CWM empowers business users to model, coordinate, manage, and optimize common repeatable and reportable work activities. CWM fills a gap between free-form collaboration and business/custom applications by supporting emergent structure and coordination, such as in organizing a marketing campaign, planning an event, or delivering a service. CWM tools play a role in accelerating business-led democratized delivery, which is a key ingredient of digital transformation.

https://www.gartner.com/en/information-technology/research/hype-cycle *NOTE: Gartner's research reports are available at http://gartner.aalto.fi*

Gartner's Market Guide for Collaborative Work Management

Sample Use Cases	Commonality
Business-led projects	
Executive dashboards	
Coordinating multiple business activities in parallel	
Resource allocation and tracking	
Strategic operations	
Product life cycle operations	
Marketing operations	
Service/support operations	
Events operations	
Agile practices in the business	
OKR setting and tracking	
IT operations	
Engineering operations	
Professional services management	
Case tracking and operations	
CRM operations	
HR operations	
Legal operations	

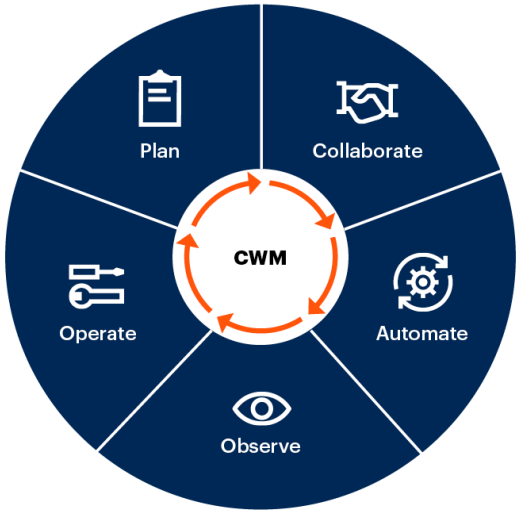
Color Scale

Least common — Most common

CWM Product Capabilities	Commonality Among CWM Products
Plan	
Tasks and business activity coordination	
Multiple business activities in parallel	
Resource allocation and tracking	
Collaborate	
Content collaboration and sharing	
In-context conversations	
Notifications	
Team workspaces	
Automate	
Work templates	
Automation rules and scripts	
E-forms	
Workflow modeling	
Building applications	
Observe	
Customizable reports	
Dynamic dashboards	
UI design	
Operate	
Batch operations for administrators	
Microsoft 365 integration	
Work graph	
Data management controls	
Google workspace integration	

Color Scale

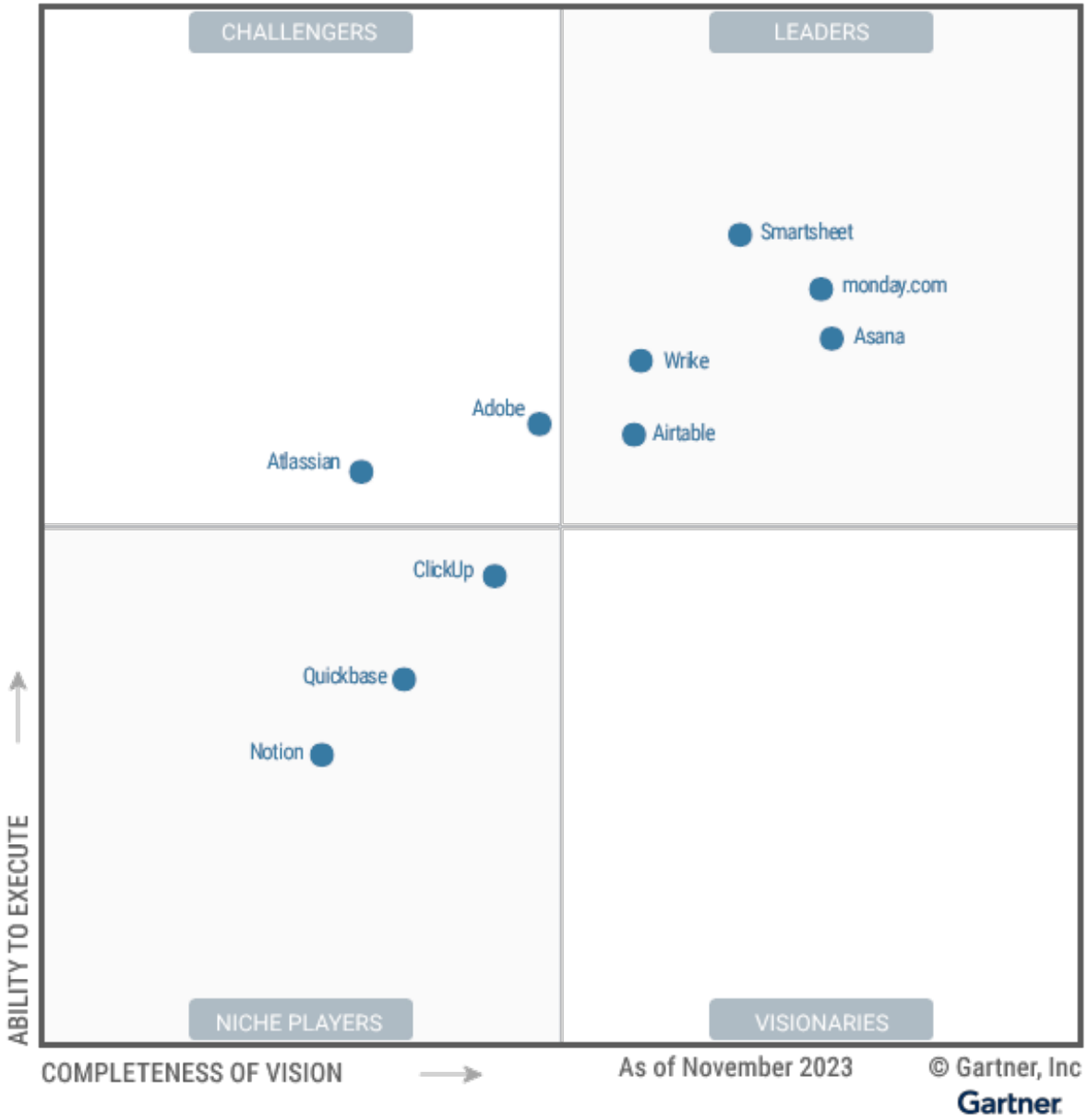
Least common — Most common



Asana, Atlassian Jira / Trello, Microsoft 365 Planner, Monday.com, Notion etc.

https://www.gartner.com/document/4022601 , January 2023. NOTE: Gartner's research reports are available at http://gartner.aalto.fi

Gartner's Magic Quadrant 2023 for Collaborative Work Management



The CWM market is evolving rapidly, driven by the following factors:

Remote and hybrid work:
Meetings and conversational channels lack structured context and are not enough to provide clarity and alignment.

Rising customer demand for a variety of work use cases:
Buyers are recognizing the relevance of CWM to work scenarios that are collaborative by nature but may not justify purchasing or building new applications

Interest from vendors in adjacent markets:
Vendors are entering this market from adjacent markets. These include project management, workstream collaboration, work hub/cloud office suites, no-/low-code tools, employee communications, frontline worker applications and biz applications.

Demand-generation tactics:
Several vendors are gaining market share with freemium products that target business users and small teams directly. They are also trying to tap into departmental budgets with prebuilt work templates such as for marketing work management, objectives and key results (OKR), or intake management.

Source: Gartner: https://www.gartner.com/document/5019731 , November 2023. NOTE: Gartner's research reports are available at http://gartner.aalto.fi

Example 1: tools used (pre-Covid era) by a knowledge worker in a large ICT company

1-to-1: Skype for business, Email, Signal (mobile), WhatsApp (mobile)

1-to-10: MS Teams, Skype for business, Email, Signal (mobile), WhatsApp

1-to-50: Viva Engage (previous name Yammer), Email, Pidgin

1-to >100: Viva Engage, Email (because it was encrypted, unlike instant messaging solutions)

Teleconferencing with shared screen: Skype for business

Shared documents/interface: MS Teams, OneDrive, SharePoint, + other document management systems

Collaboration, wiki: Atlassian Confluence, SharePoint

Example 2: tools currently used by a knowledge worker in a tech startup

1-to-1: MS Teams, Email, Slack, WhatsApp (mobile)

1-to-10: MS Teams, Email, Slack

Virtual meetings: MS Teams, Slack

Shared file storage: MS Teams, SharePoint, OneDrive

Collaboration, wiki: Atlassian Confluence, Jira, SharePoint, Salesforce

Marking of project work hours: Toggl, Salesforce

Academic research streams in collaboration

Table 1 Subfields in research about supporting collaboration

CSCW	CE	Social Computing
Small groups	Medium sized and large work groups	(Very large) (non-work) groups and communities
Collaborative work processes should emerge on the fly	Collaborative work processes can be designed to optimize desired outcomes	Work processes on this scale are not yet well understood
Learn about how people use available technology to support their collaborative work processes	Develop patterns, theories, and methodologies for designing technology-supported collaborative work practices	Learn about social processes that emerge in Social Computing, and how they are similar to or different from processes in other media
Focus on openness of work process – one must overcome structure by using/ designing collaborative technologies	Focus on structure of work process – one can work with practitioners to design effective, efficient, satisfying collaborative work processes and to design technology to support them	Focus on community – people find benefit in associations with friends, family, and affinity groups

CSCW = Computer-Supported Cooperative Work (from CHI or HCI field, Computer-Human Interaction)

CE = Collaboration Engineering (from ISS field)

Social computing from Computer Science field mostly

Koch, Schwabe and Briggs (2015), "CSCW and Social Computing. The Past and the Future", *Business & Information Systems Engineering,* 57(3), Editorial.
http://www.kooperationssysteme.de/wp-content/cache/mendeley-file-cache/a1ed7b06-855d-362b-a9a1-2b8b40210681.pdf

Potential research issues in adopting collaboration 2.0 tools

1. Technical
   - Integrating social software with existing platforms
   - Identifying different tools to support different phases of group decision
   - Reengineering group processes to allow easy use of 2.0 tools
   - Developing friendly user interface for ease of use
   - Assuring the quality of inputs, decision process, and decision outcome
2. Organizational
   - Reducing employee resistance to change
   - Assessing organizational impacts
   - Fostering collaboration 2.0 culture
   - Developing change management plans
   - Implementing group decisions made by virtual teams
   - Evaluating the role of leadership and senior management support
3. Managerial
   - Identifying critical success factors for using Collaboration 2.0 tools
   - Selecting useful tools for different activities in group decision making
   - Allocating resources for implementation
   - Providing incentives and building trusts in collaborative decision making
   - Developing policies for security and privacy protection
   - Assessing employee readiness for such a new technology
   - Managing the misuse of time and computing resources in virtual teams
4. Economical
   - Evaluating the cost/benefit of the technology and risk management
   - Assessing the value of using collaboration 2.0 tools in group decisions
   - Measuring the quality of decision outcomes

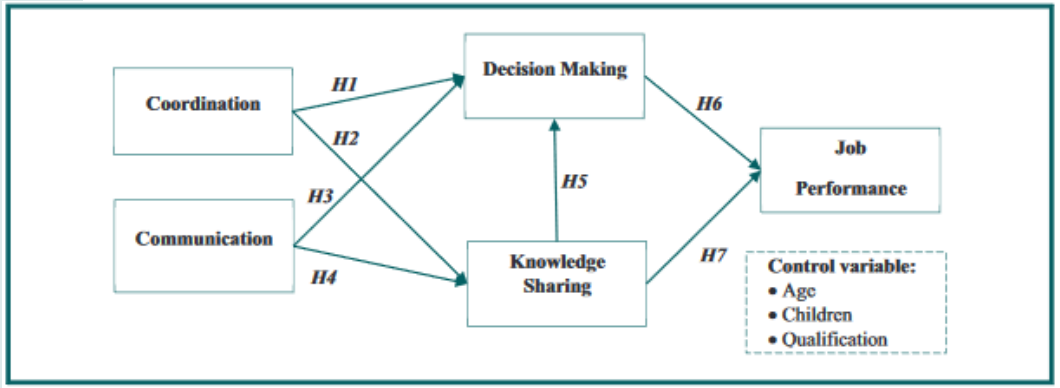
Turban, Liang and Wu (2011), "A Framework for Adopting Collaboration 2.0 Tools for Virtual Group Decision Making" *Group Decision and Negotiation,* Vol. 20, 137-154.

Recent survey study on how digital technologies enhance knowledge sharing and decision-making for better job performance

Multi-item constructs / questions used in the survey

Construct	*Item*
Coordination (CR)	CR1. work activities are harmonized by digital technologies CR2. work activities are coordinated by digital technologies CR3. work activities are supported by digital technologies CR4. help express concerns and issues using digital technologies
Communication (CM)	CM1. frequent communication through digital technologies CM2. communicate in spontaneous meetings, phone conversations CM3. communicate directly and personally using digital technologies CM4. ideas and information shared openly using digital technologies CM5. little concern with the openness of the information flow
Knowledge sharing (KS)	KS1. routinely share knowledge using digital technologies KS2. routinely seek out knowledge using digital technologies KS3. routinely share ideas openly using digital technologies KS4. the team is good at using team members' knowledge KS5. colleagues are willing to help others through digital technologies KS6. colleagues keep their best ideas
Decision-making (DM)	DM1. provide relevant information using digital technologies DM2. provide timely information using digital technologies DM3. provide accurate information using digital technologies DM4. improve communication using digital technologies DM5. provide better interactions between stakeholders using digital technologies DM6. deal with the complexity using digital technologies
Job performance (JP)	JP1 complete the specified duties JP2. meet formal performance requirements JP3. fulfill all required responsibilities JP4. never neglect the obligated aspects of the job JP5. always perform essential duties

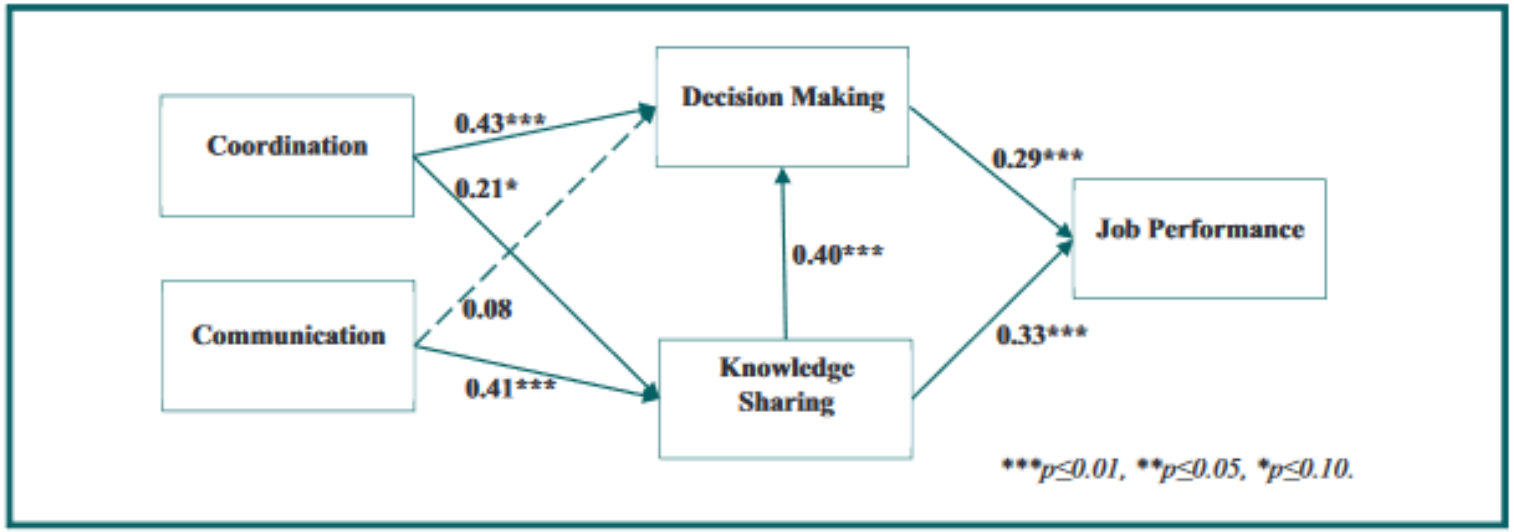
Conceptual model with hypotheses



199 valid responses from Australian respondents 18-64 of age who are working full-time or part-time. Structural Equation Modeling (SEM) was used to test the hypotheses.

Deng, H., Duan, S. X., & Wibowo, S. (2023). Digital technology driven knowledge sharing for job performance. *Journal of Knowledge Management*, *27*(2), 404-425. https://www.emerald.com/insight/content/doi/10.1108/JKM-08-2021-0637/full/html

Survey study results: Digi-tech-driven knowledge sharing improves job performance significantly!



The study explored how **digital technologies** (such as enterprise social media) can be used **for facilitating knowledge sharing and decision-making through enhanced coordination and communication** that **leads to better job performance**.

Digi-tech-facilitated coordination and communication has significant and positive impact on knowledge sharing.
Digi-tech-driven coordination significantly influences decision-making, and knowledge sharing significantly influences decision-making.

Enhanced decision-making and knowledge sharing can lead to better job performance.
Age and qualification as control variables have significant impacts on job performance (older and more educated employees improved their job performance more).

Discussion boards and collaborative tools include many of the features that support dialogic practices for facilitating knowledge sharing.
The **enhanced knowledge sharing helps to produce better job performance**.

Deng, H., Duan, S. X., & Wibowo, S. (2023). Digital technology driven knowledge sharing for job performance. *Journal of Knowledge Management*, *27*(2), 404-425.
https://www.emerald.com/insight/content/doi/10.1108/JKM-08-2021-0637/full/html

“Leaky pipe” of tacit knowledge

“Social media may be useful for knowledge sharing because they are leaky pipes for communication” (Leonardi, 2017)

"The expansion of the discussions to the internal social media of the organization opens up the content of the messages to a larger number of people in the organization. In connection with the spread of information, **social media within an organization has been compared to a leaky pipe** (Leonardi et al., 2013; Leonardi, 2017). The central idea of a leaky pipe is that **the content of the messages is visible even to those who only follow the conversations of others and can learn from these conversations**. Thus, information leaks, and it has been argued that information is more leaky than ever (Kane, 2015) and the importance of informal information is increasing.

Social media within the organization is here to stay, and it has been argued that it is at the **center of the organizations' operations** (Leonardi & Vaast, 2017). The development of social media within an organization **has had many stages during its short existence**; information sharing first moved to cloud services, then to mobile applications, and it has been suggested that in the next step, organizations will start analyzing content created by users, which can be used to optimize collaboration (Kane, 2017)."

Leonardi, P. M. (2017). The social media revolution: Sharing and learning in the age of leaky knowledge. *Information and Organization*, 27(1), 47-59
Kane, G. C. (2015). Enterprise Social Media: Current Capabilities and Future Possibilities. MIS Quarterly Executive, 14(1), 1-16.
Kane, G. C. (2017). The evolutionary implications of social media for organizational knowledge management. Information and organization, 27(1), 37-46

Translated from: Kupiainen & Leppälä (2017), Organisaation sisäinen sosiaalinen media – ammatillista Instagram- poseerausta vai aitoa yhteistyötä, *Työn tuuli*, https://www.henry.fi/media/ajankohtaista/tyon-tuuli/tyontuuli_022017-002.pdf#page=17

Will gamification help spur collaboration at work?

Gamification in collaborative work:
Applying game-like features in non-game contexts to increase employee motivation and spur collaboration

http://sometek.fi/pelillistaminen-ja-tyo-voiko-ihminen-muuttua/

Early example: improving the finding of documents

Dokumenttien löydettävyyden parantaminen (esimerkki)

Esimerkkinä yhteen dokumenttiin liittyvät tapahtumat.

MITATTAVAT ASIAT:

Tallentaa yhteise	Saves to joint workspace	10 pts
Lisää kaksi asiasa	Adds 2 tags	10 pts
78 eri lukijaa	78 unique readers	8 pts
11 tykkäystä	11 likes	6 pts
8 tagiä lisätty	8 tags added by others	4 pts
		yht. 38 pts

1. Omat toimet
1. Own actions
2. Muiden reaktiot
2. Others' reactions

Käyttäjä "Salla Suomela" ansaitsi 38 pistettä ko. dokumentilla.

http://www.sulava.com/palvelut/tietotyon-tuottavuuden-mittaaminen/tyon-pelillistamisen-pilotti/

Examples of game mechanics at work

Game Technique	Description	Use When ...
Points	A visible metric that associates value with an action	Rewarding an action that supports a business goal; providing immediate feedback; measuring progress
Levels and achievements	A cohesive series of positions, milestones or point thresholds; badges	Encouraging participation and continued mastery/learning; creating process visibility
Challenges and competitions	Events or tasks one must complete to reach individual or group goals	Driving participants to achieve a specific outcome while improving efficiency/ effectiveness
Leaderboards	List how participants rank against each other	Promoting continuous improvement opportunities; sharing best practices

Source: Gartner (August 2012)

Searle, S. et al. (2015), “Use Gamification to Improve Sales Performance by Motivating Middle Performers”, Gartner Research Report, September 30, 2015.

Drivers and obstacles of gamification

User engagement is at the heart of today's "always connected" culture. Incorporating **game mechanics encourages desirable behaviors** that — with the help of carefully planned scenarios and product strategies — can **increase user participation, improve product and brand loyalty, advance learning and understanding of a complex process, accelerate change adoption, and build lasting and valuable relationships** with target audiences.

Broad interest in gamification is coalescing around a much narrower set of **use cases**. These include **online learning** and **employee training, employee performance** (mainly in sales and customer service organizations) and **engaging employees in innovation**. Other use cases for gamification include **customer engagement, collaboration, change management and wellness.**

Organizations must recognize that **simply including game mechanics is not enough to realize the core benefits of gamification**. Making gamified solutions sufficiently rewarding **requires careful planning, design and implementation**, with ongoing adjustments to keep users engaged.

Designing gamified solutions is unlike designing any other IT solution, and **requires a different design approach**. **Few people have gamification design skills**, which remains a huge barrier to success in gamified solutions.

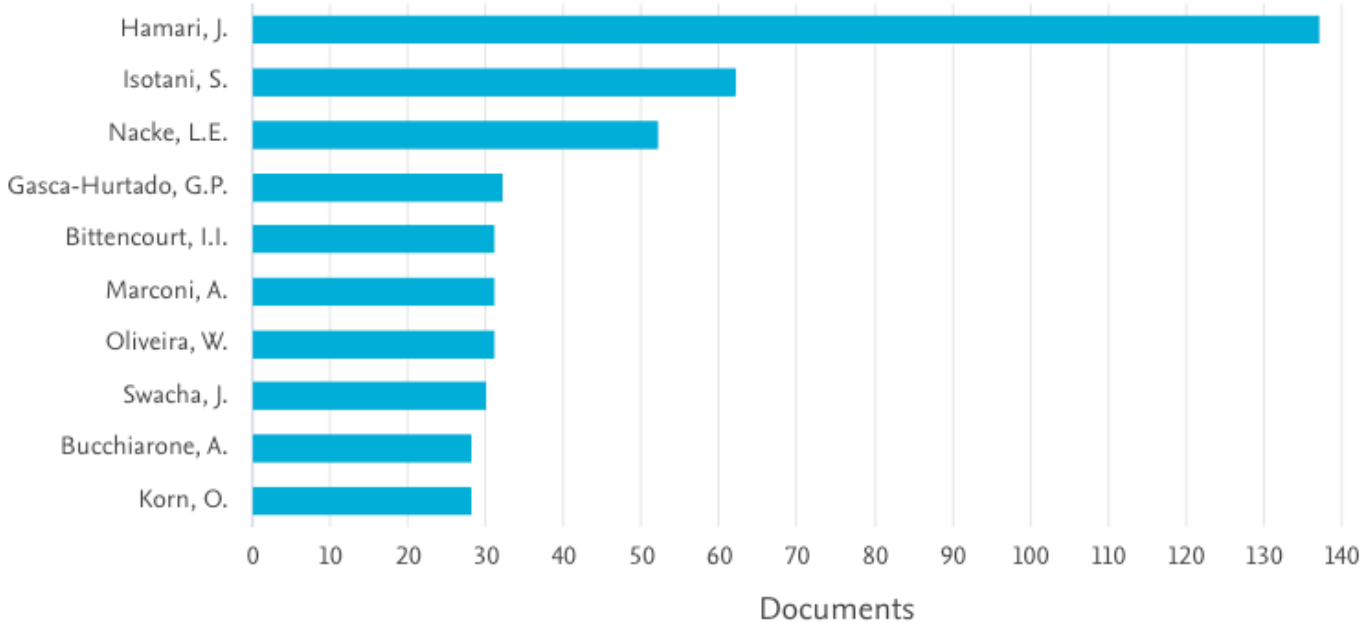
Organizations often lack the skills to develop gamified solutions, and instead choose to work with digital agencies that **employ behavioral scientists** and have experience designing solutions **focused on digital engagement**.

Source: Gartner (2022), Hype Cycle for Digital Government Services, 2022, available at http://gartner.aalto.fi
See also ISM BSc thesis by W. Koenkytö (2023): Gamification in education: effects and implications of gamified learning approaches in education (aalto.fi)

Academic articles on gamification

http://juhohamari.com

*Juho Hamari holds a PhD from ISS at Aalto BIZ, and is **Nr. 1** researcher worldwide on gamification with 137 publications*
(source: Scopus database, February 29, 2024)




Gamification of cooperation: A framework, literature review and future research agenda

Marc Riar [a], Benedikt Morschheuser [b], Rüdiger Zarnekow [a], Juho Hamari [c]

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Highlights

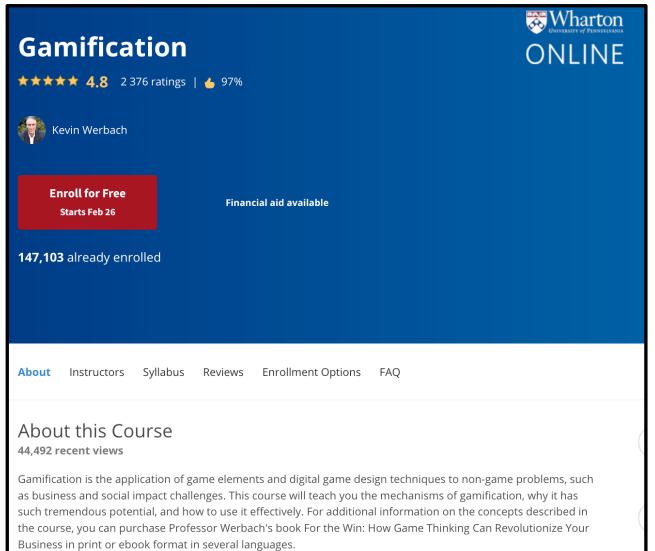
- The present study conceptualizes a framework for gamifying cooperative activity.
- A literature review (n=51) of gamification in cooperative settings is performed.
- A synthesis of design features and the effectiveness of gamification is presented.
- Three different approaches to motivate cooperation by gamification are formulated.
- Eleven thematic, theoretical and methodological future agenda points are proposed.

Recommended MOOC at Coursera

By Wharton professor Kevin Werbach

https://www.coursera.org/learn/gamification

http://werbach.com



Gamification of cooperation: literature review

Existing gamification literature has primarily focused on gamification design interventions that can be regarded as *individualistic* (e.g., personal points) or *competitive* (e.g., leaderboards).

Attempts to explore how gamification motivates cooperative activity and how effective it is for this purpose have remained modest, until recently.

In the past years, there has been an **upsurge of studies that also explore the potentials of gamification in cooperative settings**,

such as in crowdsourcing (Morschheuser, Hamari et al., 2017),
cooperative work (Morschheuser & Hamari, 2019; Riar, et al., 2021),
collaborative learning (Knutas et al., 2019),
co-creativity (Arnab et al., 2019), and
knowledge & information management (Friedrich et al., 2020; Weretecki et al., 2021).

Riar, M., Morschheuser, B., Zarnekow, R., & Hamari, J. (2022). Gamification of cooperation: A framework, literature review and future research agenda. *International Journal of Information Management*, *67*, 102549. https://www.sciencedirect.com/science/article/pii/S0268401222000834

Gamification of cooperation: literature review

"A **better understanding of how gamification motivates cooperation** would help practitioners to **make better-informed design decisions when it comes to developing cooperative IS** and to achieve more effective and rewarding cooperation among team members."

"The advent of **Massively Multiplayer Online Games** (MMOG) significantly transformed the gaming landscape due to the ability of MMOGs to amass large numbers of players in highly social gaming environments where **people from all over the world come together to combine their skills and cooperatively overcome challenges, jointly complete quests, and work towards mutual achievements**. Cooperative games have **also taken on more serious contexts**, perhaps most prominently in education, in particular due to the potential of eliciting intrinsic motivation."

"Since **games have been found to bear extraordinary potential to support interpersonal relationships** via prosocial patterns and group-level reward structures, it has been proposed that **this potential can be conveyed as a form of gamification to reinforce social dynamics and cooperation in non-game contexts**."

Riar, M., Morschheuser, B., Zarnekow, R., & Hamari, J. (2022). Gamification of cooperation: A framework, literature review and future research agenda. *International Journal of Information Management*, *67*, 102549. https://www.sciencedirect.com/science/article/pii/S0268401222000834

Overview of contexts for gamified cooperation

Context	#	%
Education / Training / Pedagogy	**21**	41.2 %
Crowdsourcing, Knowledge sharing, Ideation & Co-creation	**17**	33.3%
IT / Software Development	**4**	7.8 %
Sustainability / Green IT	**4**	7.8 %
Shopping	**2**	3.9 %
Work / Production	**2**	3.9 %
Fitness / Exercise	**1**	2.0 %
Sum	**51**	100%

Riar, M., Morschheuser, B., Zarnekow, R., & Hamari, J. (2022). Gamification of cooperation: A framework, literature review and future research agenda. *International Journal of Information Management*, *67*, 102549. https://www.sciencedirect.com/science/article/pii/S0268401222000834

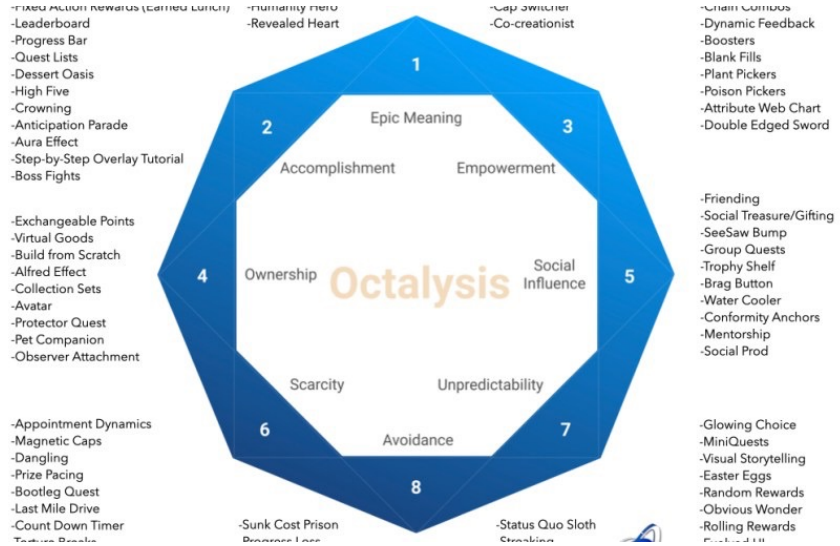
Overview of gamification features (partial table, used min 5 times)

Features used in gamified cooperation	#	%
Points / Score	36	70.6 %
Challenges / Goals / Missions / Quests / Tasks	30	58.8%
Achievements (includes Rewards and Badges)	29	56.9 %
Progress / Levels	28	54.9 %
Leaderboard / Ranking	21	41.2 %
Teams	19	37.3 %
Qualitative Feedback / Commenting	15	29.4 %
Voting / Rating / Liking	14	27.5 %
User roles / Interdependent Roles / Team interdependence	10	19.6 %
Quiz	8	15.7 %
Rules	8	15.7 %
Time limit	8	15.7 %
Avatar	7	13.7 %
Narrative	5	9.8%

Riar, M., Morschheuser, B., Zarnekow, R., & Hamari, J. (2022). Gamification of cooperation: A framework, literature review and future research agenda. *International Journal of Information Management*, *67*, 102549. https://www.sciencedirect.com/science/article/pii/S0268401222000834

Theories applied in gamified cooperation research

n=5	**General motivation / behavioral / human need theories**	• Customer Engagement • Equity theory • Fogg's Behavioral Model • Motivational Affordance / Self-Determination Theory • Octalysis Framework
n=4	**Learning-related theories**	• Bauman's Layered-Learning Model • Cognitive Apprenticeship Theory • Experiential learning theory • Theory of skill acquisition
n=3	**Social theories**	• Social Influence Theory • Social cognitive theory • Theory of network externalities
n=2	**Cognitive theories**	• Elaboration Likelihood Model • Flow theory
n=2	**Cooperation theories**	• Social interdependence theory • We-Intention Theory
n=2	**Goal-related theories**	• Goal Contents Theory • Goal Setting Theory
n=2	**User typologies**	• Bartle's Theory • Hexad User Types
n=1	**Emotion-centered theories**	• Broaden-and-build theory

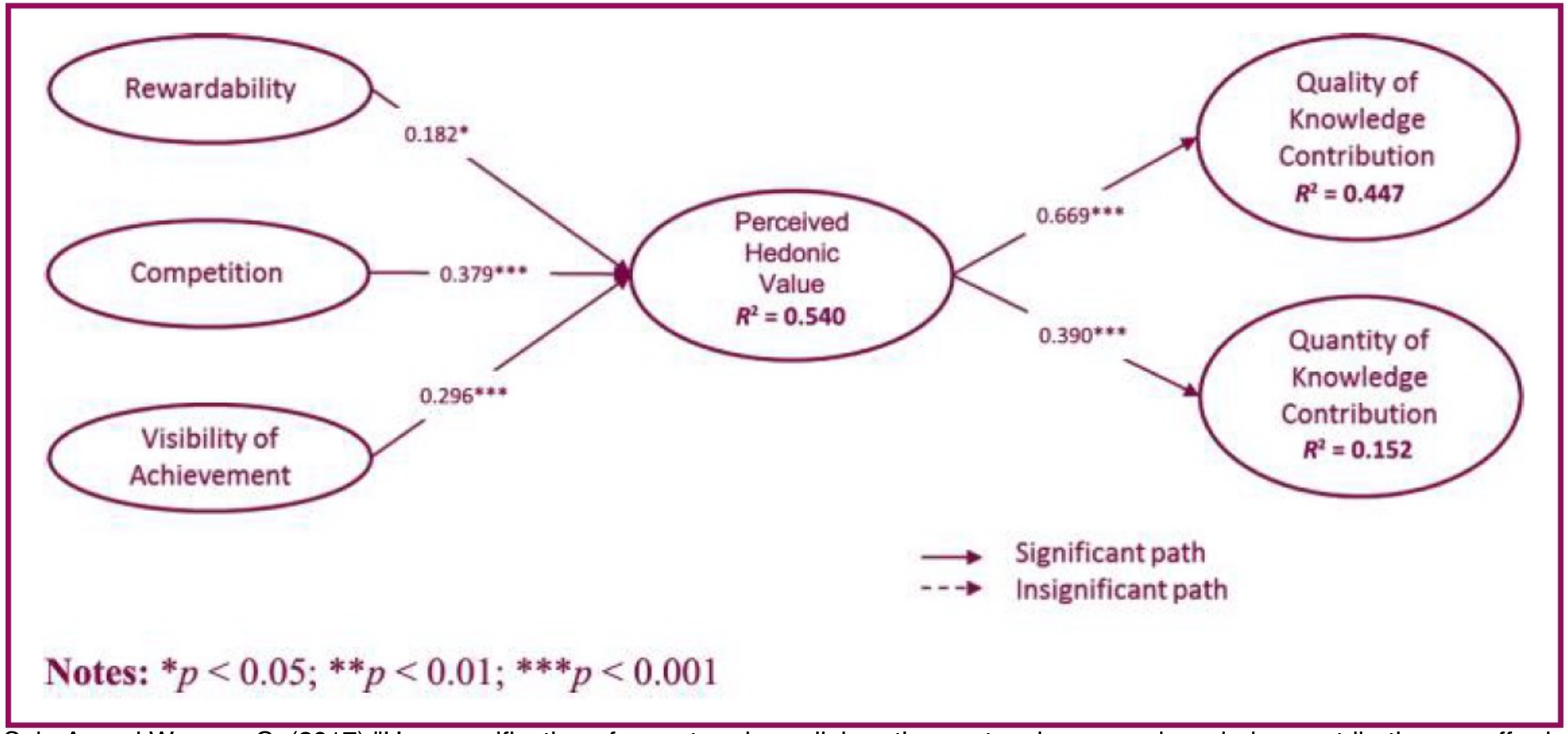


Riar, M., Morschheuser, B., Zarnekow, R., & Hamari, J. (2022). Gamification of cooperation: A framework, literature review and future research agenda. *International Journal of Information Management*, *67*, 102549. https://www.sciencedirect.com/science/article/pii/S0268401222000834

Octalysis framework: https://yukaichou.com/gamification-examples/octalysis-complete-gamification-framework/

Research how gamification in an enterprise collaboration system (ECS) can increase knowledge contribution

Results using SEM showed that three gamification affordances – **rewardability**, **competition** and **visibility of achievement** – jointly influenced employees' perceived hedonic value of the ECS, which, in turn, increased knowledge contribution.



Suh, A. and Wagner, C. (2017) "How gamification of an enterprise collaboration system increases knowledge contribution: an affordance approach", *Journal of Knowledge Management*, Vol. 21 Issue: 2, pp.416-431.

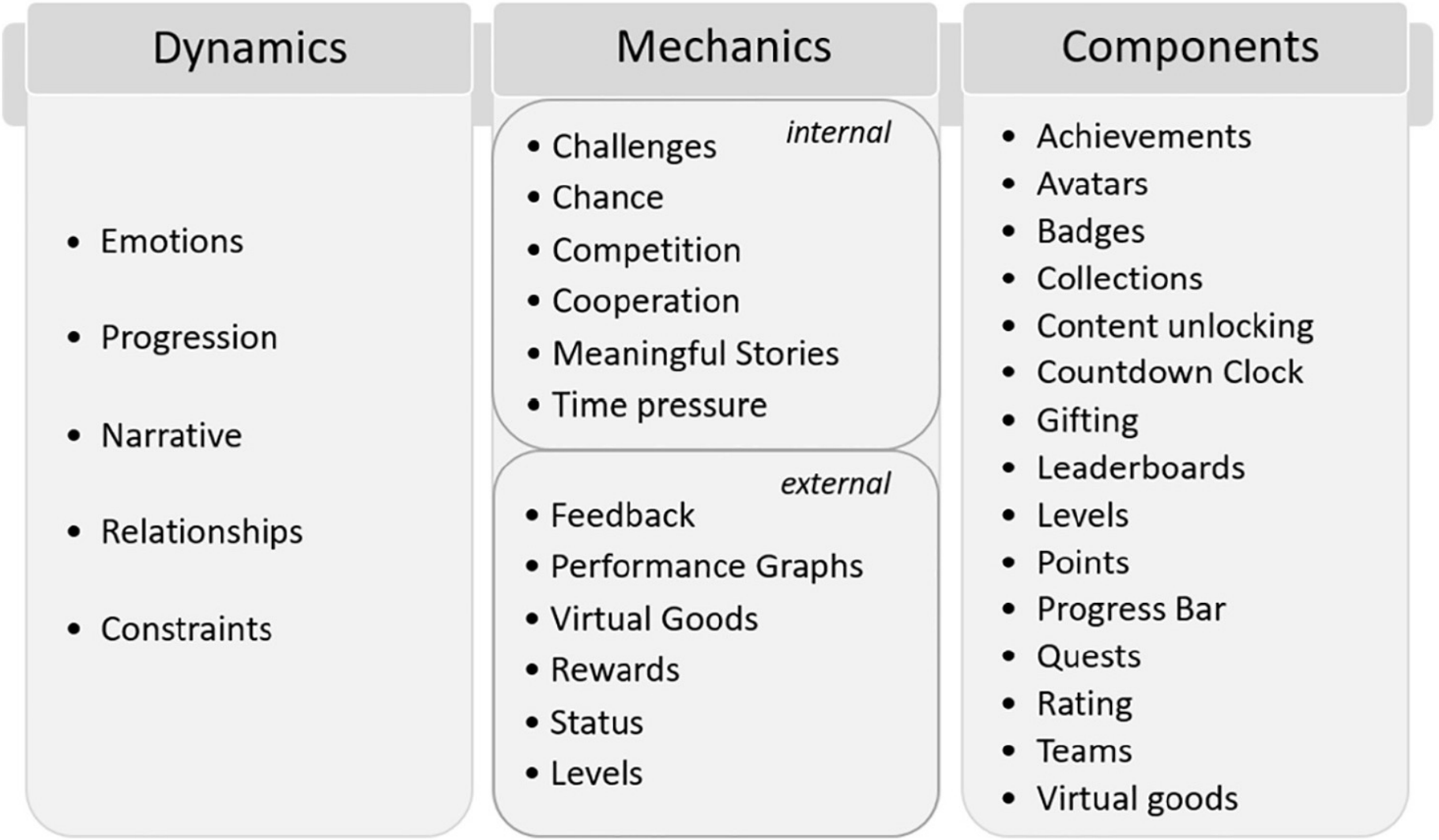
Multi-item constructs / questions used in the ECS study

Construct	*Measurement items*
Rewardability	The ECS[a] offers me the possibility to: make my knowledge contribution rewarded get rewards for my knowledge contribution get more rewards if I try harder
Competition	The ECS offers me the possibility to: compete with others compare my performance with that of others threaten the status of others by my active participation
Visibility of achievement	The ECS offers me the possibility to: show my achievement to other colleagues make visible my performance in contributing knowledge make it visible to what extent I have contributed my knowledge
Hedonic value	I have fun interacting with the ECS Using the ECS provides me with a lot of enjoyment I enjoy using the ECS
Quality of contribution	The knowledge that I post is reliable The knowledge that I post is relevant to the topics I contribute to the development of my team
Quantity of contribution	On average, how many writings and commentaries do you post through the ECS per week? On average, how many replies do you post through the ECS?

Note: [a]The name of the ECS was specified in the questionnaire. The respondents were asked to keep the system in mind when they fill out the questionnaire

Suh, A. and Wagner, C. (2017) "How gamification of an enterprise collaboration system increases knowledge contribution: an affordance approach", *Journal of Knowledge Management*, Vol. 21 Issue: 2, pp.416-431.

Overview of concepts of gamification from the literature from a Knowledge management study



Friedrich et al. (2020), "Incentive design and gamification for knowledge management (KM)", *Journal of Business Research*, 106, 341–352. https://www.sciencedirect.com/science/article/pii/S0148296319300992

Gamification mechanics addressing knowledge sharing motivation

Motivation for KS	Gamification mechanism
Altruism/helping others	Feedback
Contribute to the company success	Feedback, performance graphs
Fun/enjoyment of KS	Challenge, feedback, competition
Self-efficacy/visibility of achievements	Feedback, performance graphs
Reciprocity	Feedback, rewards
Fellowship/participation	Feedback, status
Reputation	Feedback, status, rewards
Signaling competence	Performance graphs, status
Recognition	Feedback, rewards, status
Conformity/following norms and orders	/
External rewards	Rewards

Game components realizing gamification mechanics

Game mechanics	Incentive implementation in KMS
Challenge	Badge collection, team quests
Competition	Contributor ranking, knowledge quiz, team quests
Feedback	Content rating, contributor ranking, qualitative badges, peer-to-peer rewards, team chat
Performance graphs	Badge collection, contributor ranking, points for contribution, quantitative badges
Rewards	Qualitative badges, quantitative badges, peer-to-peer rewards, points for contribution
Status	Contributor ranking, content responsibilities, content unlocking, knowledge status

Friedrich et al. (2020), “Incentive design and gamification for knowledge management”, *Journal of Business Research*, 106, 341–352. https://www.sciencedirect.com/science/article/pii/S0148296319300992

Questions or comments?

Next week: 2 guest lectures

Tue 5.3. **Organizational change in the digitalization era–how to bring myth to life?**
Modern Work Lead *Karoliina Kettukari*, Meltlake (part of Futurice)

Thu 7.3. **Service Design and human-centred design methods in healthcare**
Assistant Professor *Johanna Viitanen* and Post-doc researcher *Paula Savolainen*, Aalto SCI & ARTS