VLDB'26 Workshop Proposal: Quantum Computing and Data/Knowledge Management

ABSTRACT

Quantum computing is rapidly progressing from foundational theory to experimental platforms that promise transformative computational capabilities. At the same time, modern data and knowledge management systems face growing demands in scalability, heterogeneity, security, and integration with AI-driven analytics. This creates a timely opportunity and necessity to explore the intersection of quantum computing with data and knowledge management.

The proposed workshop on Quantum Computing and Data/Knowledge Management (QC&DKM) aims to provide a focused forum for researchers and practitioners investigating how quantum computing can enhance core data management tasks and how data-centric requirements shape quantum computing architectures and applications. The workshop will cover topics such as quantum query processing and optimization, quantum-enhanced information retrieval, quantum data structures and indexing, quantum machine learning for knowledge extraction, quantum knowledge graphs and ontologies, hybrid classical–quantum data management systems, and data security and privacy in quantum environments.

QC&DKM will foster cross-fertilization between the database, knowledge representation, and quantum computing communities by bringing together cutting-edge research, invited keynote talks, and interactive discussion sessions. The workshop targets both theoretical advances and practical system-building efforts, with the long-term goal of shaping an emerging research agenda at the interface of quantum technologies and data/knowledge management.

1 ORGANIZATION

General Chairs:

- Haridimos Kondylakis (University of Crete, Greece), *Primary Contact* - kondylak@ics.forth.gr
- Stefanie Scherzinger (University of Passau, Germany) - stefanie.scherzinger@uni-passau.de

Program Committee Chairs:

- Bettina Kemme (McGill University, Canada) - bettina.kemme@mcgill.ca
- Vasilis Efthymiou (Harokopio University of Athens, Greece) - vefthym@hua.gr
- Yannis Tzitzikas (FORTH-ICS, Greece) - yannis@ics.forth.gr

Proceedings and Publicity Chairs:

- Manuel Wimmer (Johannes Kepler University Linz, Austria) - manuel.wimmer@jku.at
- Jose Garcia-Alonso (University of Extremadura, Spain) - jgaralo@unex.es

2 SHORT BIOS

Haridimos Kondylakis is an Associate Professor of Big Data Engineering in the Department of Computer Science, University of Crete, and an Affiliated Researcher at FORTH-ICS. He has delivered multiple tutorials in database and semantic web venues (e.g., EDBT, ISWC, VLDB), and he has co-organized multiple conferences (ISWC, IJCKG) and workshops (HEDAI, ISIP, QC&DK, SWH, IEEE Quantum Workshop).

Stefanie Scherzinger is a Full Professor of Computer Science at the University of Passau, Germany, where she leads the Scalable Database Systems group. She earned her Ph.D. from Saarland University and subsequently gained industry experience as a software developer at IBM and Google. Her research focuses on database schema management and the long-term maintainability of database-backed applications. More recently, she has been investigating the use of quantum computing for database management tasks, including query optimization and schema matching. She regularly serves as a reviewer for the IEEE International Conference on Quantum Software (QSW) as well as leading conferences in data management.

Bettina Kemme is a Professor in the School of Computer Science at McGill University (Canada) and head of the Distributed Information Systems Lab (DISL). She has co-authored over 100 papers in refereed journals and conferences, and she has received the VLDB 10-Year Test-of-Time Award and the 2024 VLDB Women in Database Award. Recent involvement in organizing scientific events include PC Co-Chair of EDBT 2025, lecturer at the 6th ACM Europe Summer School in Data Science, PC Co-Chair of DEBS 2023.

Vasilis Efthymiou is an Assistant Professor at Harokopio University of Athens (HUA). Before joining HUA, he was a Postdoctoral Researcher at FORTH-ICS and IBM Research. He has given six tutorials in database and Semantic Web venues (SIGMOD, VLDB, WWW, ICDE, CIKM, ESWC), and he has co-authored two books. He is co-organizing the SemTab Challenge at ISWC, the TaDA workshop at VLDB, and was a co-chair of the VLDB 2023 PhD Workshop. He also co-organized UniversAI, an interdisciplinary symposium between astrophysics and computer science, as well as the MuMeNTA workshop on multi-messenger and numerical techniques in astrophysics, both held at HUA. Finally, he was the proceedings chair of ADBIS 2025 and the Web chair of EDBT/ICDT 2026.

Yannis Tzitzikas is Professor of Information Systems in the Computer Science Department at the University of Crete (Greece) and Affiliated Researcher of the Information Systems Laboratory at FORTH-ICS (Greece), head of the Centre for Cultural Informatics of FORTH-ICS. He has co-authored 3 books and over 210 papers in refereed journals and conferences, he has received four best paper awards. Recent involvement in organizing scientific events includes general chair of IJCKG 2025, chair of the 2025 international Summer School on CIDOC CRM Interoperability and Applications (July 2025), and general chair of IJCKG 2023.

Jose Garcia-Alonsois an Associate Professor at the University of Extremadura in Spain. His research spans quantum software engineering, pervasive and mobile computing, e-Health, and service-oriented systems, yielding numerous publications and leading to significant funded research projects in these areas. He has also played an active role in technology transfer and entrepreneurship, contributing to the founding of technology-based companies, and serves as Director of Technology Transfer and Business Development at the university, fostering collaboration between academia and industry.

Manuel Wimmer is a Full Professor and head of the Institute of Business Informatics - Software Engineering at the Johannes Kepler University Linz, Austria. His research interests comprise foundations and applications of software engineering in various fields such as cyber-physical systems, quantum computing, and digital twins. He serves as associate editor for IEEE Transactions on Software Engineering, Software and Systems Modeling, and Business & Information Systems Engineering. He has served as program co-chair for several conferences, including EDTconf 2025, QSW 2025, ICWE 2023, MODELS 2022, FASE 2022, SEAA 2020, ICMT 2015, and as general co-chair for SE 2024 and MODELS 2024.

3 WORKSHOP GOALS AND TOPICS

Goals. Quantum computing is evolving rapidly from a largely theoretical discipline to a technology supported by an expanding ecosystem of software frameworks, experimental platforms, and near-term devices. In parallel, data and knowledge management systems continue to face increasing challenges in scale, heterogeneity, privacy, and integration with AI-driven workflows. The convergence of these trends raises fundamental questions and creates promising opportunities: (i) how quantum computation can enhance core data management tasks, and (ii) how data-centric requirements and workloads can shape the development of quantum systems.

The primary goal of the proposed workshop on Quantum Computing and Data/Knowledge Management (QC&DKM) is to establish a dedicated forum at VLDB for exploring the interface between quantum computing and data/knowledge management. The workshop aims to bring together researchers and practitioners from databases, knowledge representation, information retrieval, and quantum computing to exchange ideas, present recent advances, and identify open research challenges.

More specifically, QC&DKM seeks to:

- foster cross-fertilization between the database and quantum computing communities;
- promote the development of quantum-enhanced methods for querying, retrieval, optimization, and analytics;
- explore how knowledge representation and semantic techniques can be supported by quantum models;
- stimulate research on hybrid classical–quantum architectures and workflows for data-intensive tasks;
- support community-building efforts through discussion sessions and shared research agendas.

Target Audience. QC&DKM targets a broad audience at the intersection of quantum technologies and data-centric systems, and is intended to attract both academic and industrial participants. It is relevant to database researchers working on query processing, optimization, indexing, and data systems; researchers in knowledge representation, semantic technologies, knowledge graphs, and reasoning; researchers and engineers developing quantum algorithms, quantum software, and programming platforms; and researchers exploring hybrid AI/ML pipelines that combine classical and quantum components. The workshop also addresses practitioners from industry and national laboratories who are investigating the potential of quantum advantage for data-intensive workloads in domains such as healthcare, finance, cybersecurity, and scientific computing. By offering a focused venue within VLDB, the workshop aims to bring these communities together, foster collaboration, and stimulate new research directions and practical solutions at the interface of quantum computing and data and knowledge management.

Topics of Interest The workshop invites original contributions that advance the theoretical, practical, and experimental understanding of how quantum computing impacts data and knowledge management. Topics of interest include (but are not limited to):

- Quantum query processing, optimization, and compilation for data workloads
- Quantum algorithms for database search, join processing, and aggregation
- Quantum-enhanced information retrieval and ranking
- Quantum data structures, indexing, and storage models
- Quantum algorithms for data mining and knowledge discovery
- Quantum machine learning for knowledge extraction and representation learning
- Quantum computing for big data analytics and large-scale graph processing
- Quantum knowledge graphs, ontologies, and semantic reasoning
- Quantum information theory and its application to data semantics and metadata
- Hybrid classical–quantum data management systems and execution frameworks
- Benchmarking, datasets, and evaluation methodologies for quantum data workloads
- Data security, privacy, and trust in quantum environments
- Applications of quantum computing in knowledge-intensive domains (e.g., healthcare, finance, scientific research)

4 RELATION TO OTHER EVENTS

Several events and workshop series address aspects of quantum computing, quantum algorithms, and quantum machine learning, while others focus on knowledge representation, semantic technologies, and data management. However, the proposed workshop fills an important gap by providing a dedicated venue within the VLDB community for research at the intersection of quantum computing and both data management and knowledge management.

Relation to Quantum Computing Venues. Major quantum computing conferences and workshops (e.g., IEEE Quantum Week/QCE, TQC, APS March Meeting sessions on quantum information, and specialized workshops on quantum algorithms) primarily focus

on quantum hardware, error correction, quantum algorithms, programming models, and quantum information theory. There is also a range of workshops on quantum software engineering (QSW) as well as software engineering (Q-SE, IEEE QSW, WQUANTEST, QP, PLanQC), that encourage quantum-related submissions; the focus is different, however, mainly concerned with software engineering methodologies, testing, debugging, etc. While data-related topics may appear occasionally (e.g., quantum machine learning, quantum optimization), questions that are central to the database community—such as query processing, indexing, optimization, information retrieval, semantic data modeling, benchmarking, and scalable system architectures—are typically not addressed in depth. QC&DKM complements these venues by explicitly positioning quantum computing research in the context of data and knowledge management challenges and by leveraging the strong systems-oriented perspective of VLDB.

Relation to Database and Systems Workshops. Workshops co-located with VLDB, SIGMOD, ICDE, and related venues frequently explore emerging topics in data management and systems (e.g., ML for systems, responsible data management, graph processing, or new hardware trends). In this context, the Q-Data workshop series (https://itrummer.github.io/qdata/) co-located with SIGMOD is a closely related and highly relevant forum that explores how quantum computing and quantum-inspired technologies can enhance data processing, data management, and data analysis systems, with a particular focus on hybrid quantum–classical approaches and system-level integration. QC&DKM is aligned with this systems-oriented perspective and complements Q-Data by explicitly broadening the scope toward knowledge management aspects, including quantum knowledge representation, quantum knowledge graphs, ontologies, semantic reasoning, and the role of semantics in quantum-enhanced data processing. Furthermore, QC&DKM is positioned as a VLDB workshop, enabling direct engagement with the VLDB community and providing a bridge between database researchers and emerging quantum computing developments. Although in VLDB'23 and VLDB'24 the QDSM workshop was held, this was not continued in VLDB'25, and to our knowledge, there is currently no established VLDB workshop series that targets the combined intersection of quantum computing with both data and knowledge management as its primary theme.

Relation to Semantic Web and Knowledge Graph Events. Events in the Semantic Web and Knowledge Graph communities (e.g., ISWC/ESWC and associated workshops) increasingly include discussions on AI and emerging computation models for knowledge representation and reasoning. However, these venues tend to emphasize semantic modeling, linked data standards, and reasoning methods, rather than systems-level data management topics (query optimization, storage, indexing, scalable execution, and benchmarking) that are central to VLDB. QC&DKM bridges these perspectives by bringing semantic and knowledge management topics into a VLDB-style workshop, while also incorporating quantum computing advances.

Distinctiveness and Complementarity. Overall, QC&DKM is distinct in its explicit focus on: (i) quantum-enhanced techniques for core data management tasks (query processing, optimization, analytics, and retrieval), (ii) quantum approaches for knowledge management (knowledge graphs, ontologies, and semantic reasoning), and (iii) hybrid classical–quantum architectures, benchmarks, and evaluation methodologies for real data-intensive workloads. The workshop is therefore complementary to existing events—including Q-Data—and is well positioned to serve as a unique forum for building an emerging research community at the intersection of quantum computing and data/knowledge management within VLDB.

5 DESIRED WORKSHOP FORMAT

Preferred Duration: The proposed workshop is planned as a full-day event and will be organized as an interactive forum that combines invited talks, peer-reviewed paper presentations, and discussion-oriented sessions.

Preferred Date: September 4, 2026

Tentative Schedule: A tentative full-day schedule is outlined below. The final program will be adapted based on the number and type of accepted papers and the availability of invited speakers.

Time	Activity
09:00 – 09:15	Opening remarks and workshop overview
09:15 – 10:15	Keynote Talk 1
10:15 – 10:45	Coffee break
10:45 – 12:15	Paper Session 1 (3–4 papers)
12:15 – 13:30	Lunch break
13:30 – 14:30	Keynote Talk 2
14:30 – 15:45	Paper Session 2 (3–4 papers)
15:45 – 16:15	Coffee break
16:15 – 17:15	Panel / moderated discussion
17:15 – 17:30	Closing remarks and outlook

6 REVIEW PROCESS AND TIMELINE

Submission Types. QC&DKM will solicit high-quality contributions spanning both foundational and applied work at the intersection of quantum computing and data/knowledge management. We plan to accept the following submission types:

- **Regular research papers** (up to 12 pages, excluding references): mature contributions presenting original research results.
- **Short papers / work-in-progress papers** (up to 6 pages, excluding references): preliminary results, novel ideas, position papers, or system descriptions.
- **Extended abstracts** (up to 2 pages, excluding references): contributions intended for lightning talk presentation, particularly suitable for PhD students and early-stage work.

All submissions must be original, not under review elsewhere, and must follow the formatting instructions specified in the workshop call for papers. The final page limits and camera-ready requirements will align with the VLDB 2026 workshop guidelines and the proceedings venue (if applicable).

Review Process. All regular and short paper submissions will undergo a single-blind peer-review process carried out by the Program Committee (PC). Each paper will be reviewed by at least three PC members. Reviews will assess:

- **Relevance** to the workshop scope and the VLDB community,

- **Originality** and novelty of the contribution,
- **Technical soundness** and methodological rigor,
- **Significance** and potential impact,
- **Clarity** of presentation.

Following the review phase, the organizers will coordinate an online discussion among reviewers to resolve disagreements and ensure consistent quality standards. Final acceptance decisions will be made by the workshop chairs based on reviewer feedback, novelty, and overall program balance. The authors of accepted papers will be required to address the comments of the reviewers in the camera-ready version.

Conflict of Interest Policy. We will continue to use the CMT submission system and request a declaration of COI regarding both domain and individual conflicts from participants, as well as from PC members. The COI criteria will be identical to those provided in the VLDB submission guidelines.

Timeline. The following timeline is proposed to ensure smooth and timely organization of QC&DKM. The exact deadlines will be aligned with the official VLDB 2026 workshop schedule:

- **Call for Papers Announcement:** March 2026
- **Paper Submission Deadline:** May 2026
- **Notification of Acceptance:** June 2026
- **Camera-ready Deadline:** July 2026

PC Members. The Program Committee guarantees rigorous peer review by bridging theoretical foundations and industrial application. The confirmed lineup (below) includes two renowned experts in database theory (Schweikardt, Geerts) and representatives from leading industry labs (Exasol, RelationalAI).

- Jose Garcia-Alonso (University of Extremadura, Spain)
- Oleksandr Kozachuk (Exasol, Germany)
- Nicole Schweikardt (Humboldt University of Berlin, Germany)
- Uta Störl (Fernuniversität in Hagen, Germany)
- George Stamatiou (FORTH-ICS, Greece)
- Manuel Wimmer (Johannes Kepler University Linz, Austria)
- Frank Leymann (University of Stuttgart, Germany)
- Floris Geerts (University of Antwerp, Belgium)
- Grigoris Karvounarakis (RelationalAI, USA)

We will also be actively expanding the board after proposal acceptance, to further broaden the coverage of quantum-specific algorithms and hybrid systems.

7 PUBLICITY AND DISSEMINATION

Publicity. We are planning to publicize and disseminate the workshop on several social media (X, LinkedIn, Facebook, Bluesky, Youtube), mailing lists (DBworld etc), as well as to sub-communities (Google groups). The workshop will have its own X handle and YouTube channel. Co-organizers will also use their social circles to publicize the workshop in their local communities.

Proceedings. We are going to publish the proceedings jointly with other VLDB workshops. We plan to publish the full and short papers accepted in the research track, as well as extended abstract papers. We will also encourage (but do not require) invited speakers to provide a 2-page extended abstract of their talk, which can be included in the proceedings. We are also planning on having an overview paper, co-authored by the co-chairs, with the key findings of the workshop. We will clarify to all authors that the inclusion of their work in the proceedings is optional but highly encouraged.

8 KEYNOTES AND INVITED TALKS

QC&DKM will include two invited keynote talks by leading researchers and practitioners at the intersection of quantum computing and data and knowledge management. The keynotes will offer a high-level view of the state of the art, highlight open challenges and emerging directions, and foster discussion across communities.

Speakers will be selected for their contributions to quantum computing and/or data and knowledge management, their ability to address both theoretical and systems-level aspects, and the relevance of their work to real-world data-centric and hybrid classical–quantum applications, with balanced representation from academia and industry. We plan to invite experts in quantum algorithms for data-intensive tasks, hybrid classical–quantum systems and software stacks, and industrial or laboratory perspectives on near-term quantum advantage.

Each keynote will be allocated approximately 45–60 minutes, including discussion, and invited speakers will be encouraged to participate in the panel session to help shape a shared research agenda on the role of quantum computing in future data and knowledge management systems.

9 PREVIOUS EDITIONS

The proposed workshop is based on a previous successful edition held in 2025. The previous edition established an initial community at the intersection of quantum computing and data/knowledge management and confirmed strong interest in creating a dedicated venue for this emerging research area.

QC&DKM@IJCKG 2025: The first edition of QC&DKM was held on October 15–17, 2025, at Heraklion, Greece[1]. The workshop aimed to bring together researchers from databases, knowledge management, and quantum computing, and provided a forum for presenting early results, discussing open challenges, and identifying promising directions for hybrid classical–quantum data-centric systems.

The workshop attracted submissions on a broad range of topics, including quantum query processing, quantum-enhanced retrieval, quantum machine learning for knowledge extraction, and quantum knowledge representation. The program included paper presentations and community discussions that helped shape a research agenda for quantum-aware data systems.

We summarize the statistics for QC&DKM 2025 below:

- Number of submitted papers: 6
- Number of Invited Talks: 1
- Number of accepted papers: 4
- Number of (in-person) participants: 20

[1] https://ijckg2025.github.io/workshops/workshops.html#quantum_computing