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Future-Aware Lifecycle Technology Radar (FLTR)

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Abstract

Purpose: Technology radars help organizations assess options and decide when to adopt them. The Thoughtworks Technology Radar, for example, uses the categories Adopt, Trial, Assess, and Hold (Thoughtworks, 2026). Such recommendations are valuable, but a single edition does not necessarily show a technology's full history or an explicit five-year outlook. Supply chain decisions benefit from bringing these perspectives together.

Methodology: This paper proposes the Future-Aware Lifecycle Technology Radar (FLTR), a concentric-ring model in which the inner, middle, and outer rings represent past developments, present adoption, and possible future changes over the next five years. Technology paths connect these perspectives while distinguishing documented evidence from projections.

Findings: The paper explains the conceptual design and illustrates its use for supply chain management (SCM). Its contribution is an accessible, time-based view intended to improve the structure and transparency of strategic technology discussions. The model's decision-making benefits remain to be tested in practice

Unique Contribution to Theory Practice and Policy: The paper recommends exploring the FLTR model as a complementary tool for strategic technology assessment in supply chain management. Future research should empirically evaluate its usability, practical applicability, and effectiveness in improving technology adoption decisions across organizational contexts.

Keywords: *Technology Radar, Technology Lifecycle, Technology Foresight, Emerging Technologies, Supply Chain Management, Strategic Technology Planning*

JEL Classification: O33, O32, M15

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INTRODUCTION

Technology decisions require more than a view of what is available today. Supply chain leaders also need to understand how technologies have developed, how widely they are used, and which changes may matter over the next five years. Conventional radar recommendations and forward-looking industry reports offer useful but often separate perspectives. This creates a practical challenge: decisionmakers must connect historical evidence, present maturity, and uncertain future possibilities themselves. This paper addresses the question: How can a single, time-oriented technology radar make these three perspectives easier to compare and use in SCM planning?

LITERATURE REVIEW

The Thoughtworks Technology Radar organizes technology recommendations into Adopt, Trial, Assess, and Caution/Hold rings, depending on the edition (Thoughtworks, n.d.). Its technology assessments can change across editions; these movements do not constitute a dedicated lifecycle-age axis (Thoughtworks, 2026; Ford, 2015). Ford (2015) describes the radar as an assessment snapshot rather than a technology lifecycle assessment tool. These established approaches inform the FLTR proposal, which distinguishes technology maturity from temporal evolution.

Technology foresight also draws on research, industry reports, patent trends, adoption evidence, and expert judgment. These sources can inform future scenarios, but they do not by themselves establish the future maturity or adoption of a technology. FLTR proposes to bring historical development, current assessment, and explicitly labeled future scenarios together within one conceptual framework.

Future scenarios may draw on published studies, industry reports, patent trends, adoption evidence, and expert assessment. The International Energy Agency (2025) illustrates how published outlooks distinguish announced hydrogen projects from likely deployment. Reymond (2025) discusses potential quantum-computing applications in energy forecasting and optimization; this is an adjacent-sector example, not evidence of validated SCM performance. Prasser (2026) provides industry-oriented examples of emerging technologies. These sources illustrate horizon-scanning inputs rather than validate FLTR.

Research Gap

The research gap addressed here concerns how technology evidence is presented for decision-making. The selected radar approaches emphasize current recommendations, while trend and foresight reports discuss future possibilities. Neither perspective alone gives decisionmakers a continuous view of a technology's development from origin to a defined future horizon. FLTR responds with a concentric-ring design that links historical milestones, present adoption, and five-year scenarios. This is a proposed contribution to the reviewed approaches, not a claim that no comparable time-based visualization exists elsewhere.

Research Contribution

The main contribution of this research is the introduction of a two-dimensional perspective into the Technology Radar framework, combining Technology Maturity with Temporal Evolution / Lifecycle Age. Unlike traditional Technology Radars, such as ThoughtWorks, which track technologies across assessment and adoption stages (e.g., Assess, Trial, and Adopt), FLTR explicitly introduces time as a separate dimension.

The proposed Future-Aware Lifecycle Technology Radar (FLTR) represents this temporal dimension through three perspectives—past, present, and future—within a single visualization. This allows organizations to understand how technologies originated, where they stand today, and how they may evolve over the next five years. While traditional radars can show movement between adoption stages, FLTR explicitly connects technology maturity with historical development and future projections.

Beyond this distinction, FLTR introduces technology evolution paths, future technology projections, and a structured approach to connecting technology trends with strategic business decisions. It also extends the framework to Supply Chain Management (SCM), illustrating its potential application in technology planning, investment prioritization, and the identification of emerging opportunities and risks.

Together, these contributions provide a broader, lifecycle-oriented approach to technology assessment that complements existing maturity-based radar models and establishes a foundation for future practical validation.

METHODOLOGY

Conceptual Framework Development

This paper follows a conceptual framework-development approach. It draws on selected technology-radar and technology-trend publications cited in the manuscript, identifies a decision-visualization problem, and develops a concentric-ring model with a five-year outlook. The SCM example illustrates how the model can organize technologies in planning, logistics, warehousing, and operations. The study does not use survey participants, a sampled dataset, or statistical testing; therefore, the figures demonstrate the proposed design rather than measured performance. A practical validation phase would apply documented selection criteria, dated evidence, expert review, and periodic comparison of forecasts with observed developments.

The conceptual approach also considers the historical RAND Europe document Technology radar: Methodology (RAND Europe, n.d.).

This document provides background context, not empirical validation of FLTR.

Future-Aware Lifecycle Technology Radar

The Technology Radar is a tool that enables the tracking of technologies from their inception to the present day, as well as their projected future development. This allows for visualization of:

- When a technology was introduced
- How it has evolved over time
- Its potential future trajectory

The Technology Radar helps organizations identify patterns in technology development and evolution, supporting informed investment decisions. Companies can utilize this tool for strategic planning, determining when to invest in emerging technologies and when to divest from outdated ones. Additionally, the radar can be integrated with various sources, such as research papers and market trends, to ensure it remains up-to-date.

Figure 1 contrasts a conventional adoption-stage radar with FLTR. Traditional radars organize technologies by recommendation or adoption stage (such as Assess, Trial, and Adopt); changes between stages can be tracked over successive editions, but the ring positions do not themselves encode a distinct past–present–future axis. FLTR proposes an explicit temporal representation

alongside technology maturity. The three concentric FLTR rings represent past evidence, present observations, and future scenarios, while sectors can be adapted to technology categories.

- Past: the technology's origin and documented milestones; past does not necessarily mean obsolete.
- Present: its observed current use, adoption, and maturity, which may vary by industry or organization.
- Future: possible developments over the next five years, presented as scenarios rather than certain outcomes.

Figure 1 presents the conceptual contrast. The diagrams illustrate the proposed structure; they do not establish comparative performance or forecast accuracy.

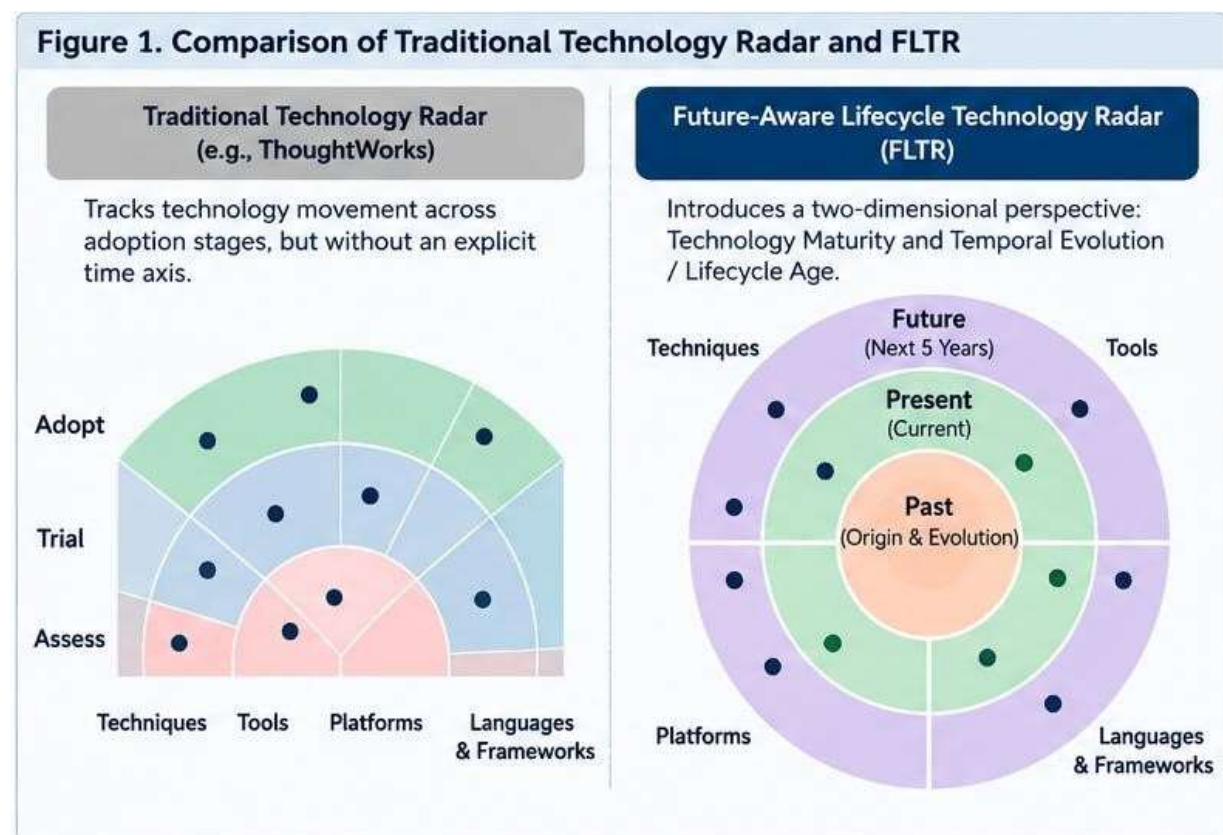


Figure 1: Traditional Technology Radar Compared with FLTR (Conceptual Illustration)

Figure 2 makes the two dimensions explicit: the horizontal axis represents Temporal Evolution / Lifecycle Age (past, present, and a five-year future outlook), while the vertical axis represents Technology Maturity (illustrative emerging, growing, and mature levels). This conceptual matrix complements the concentric FLTR display and clarifies that lifecycle timing and maturity are related but distinct assessments.

- Past: documented origin, earlier milestones, and historical evidence; a past position does not imply that a technology is obsolete.
- Present: observed adoption and maturity in a defined organizational or industry context; maturity should be assessed independently of lifecycle age.

- Future: plausible developments within the next five years, expressed as scenarios and accompanied by uncertainty rather than presented as measured outcomes.

The example technology markers in Figure 2 are illustrative placements, not empirical classifications. A technology may be mature today while also having a long history and a continuing future trajectory; a single technology can therefore have evidence across more than one temporal perspective.

- Established technologies: technologies with a long history that may remain important today and in the future.
- Mature technologies: technologies with relatively broad present adoption in a defined context.
- Emerging technologies: technologies whose future adoption or impact is uncertain and should be monitored.

Taken together, the concentric view and the two-dimensional matrix provide complementary ways to communicate technology history, maturity, and future scenarios. No numerical maturity score or quantitative vector is defined in this conceptual paper.

Figure 2 shows an illustrative two-dimensional matrix. Its sample labels are not validated maturity rankings, and future placements should not be interpreted as forecasts of certain adoption.

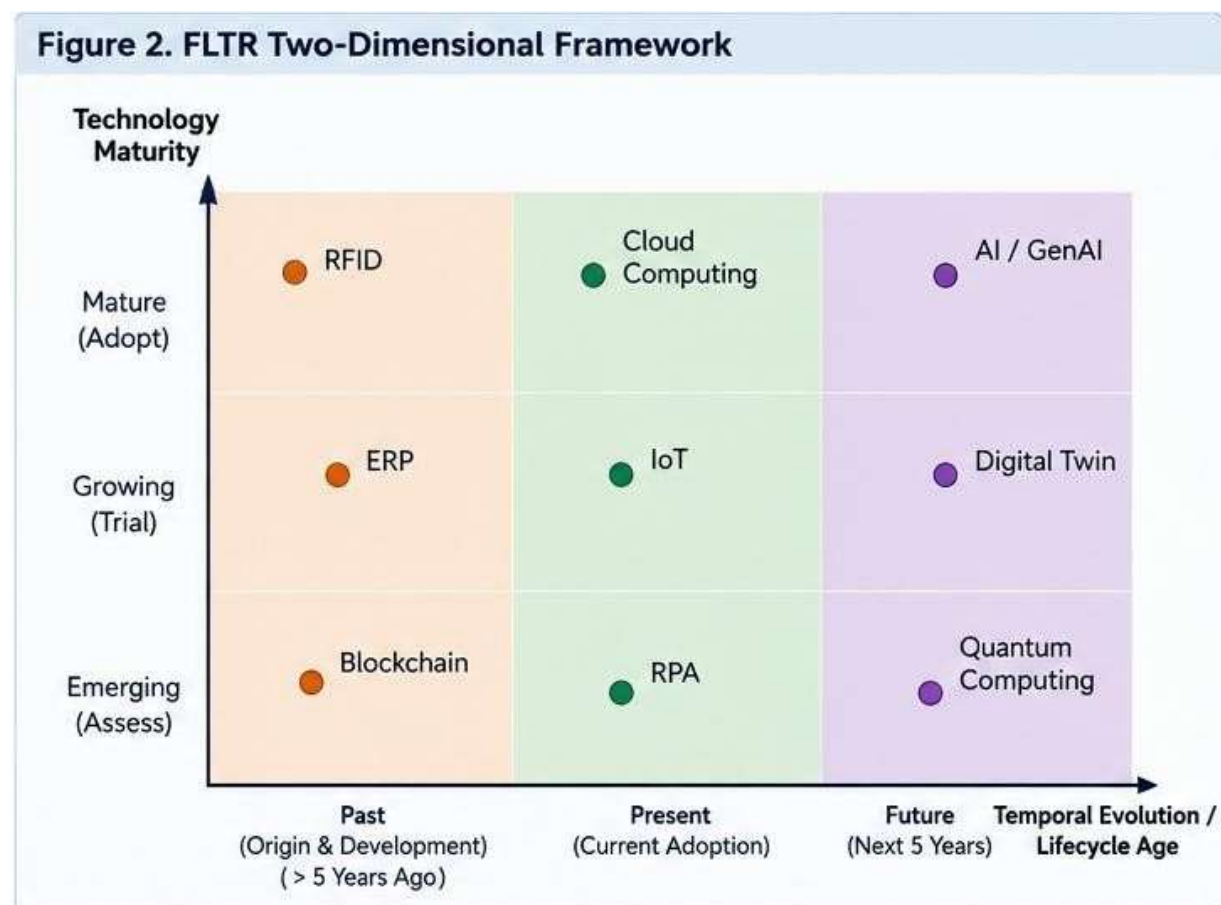


Figure 2: Technology Maturity and Temporal Evolution as Separate Conceptual Dimensions; Example Placements are Illustrative

Figure 3 applies the temporal FLTR view to four SCM domains: Planning, Procurement & Sourcing, Logistics & Transportation, and Warehousing & Operations. The concentric rings indicate past, present, and future perspectives, while the sectors identify the business domain. The accompanying examples illustrate possible classifications rather than an empirical assessment.

The same framework can be tailored to Supply Chain Management (SCM). The SCM illustration groups technologies by their role in planning, logistics, warehousing, and operations, then shows historical examples, current applications, and possible developments over a five-year horizon. The placements below are illustrative rather than the results of a validated industry survey.

- Track the progression of SCM technologies, such as Transportation Management Systems (TMS), Warehouse Management Systems (WMS) and Inventory Management Systems (IMS) from their inception to the present day
- Understand the current maturity and adoption levels of various SCM technologies, including their strength, weaknesses and potential applications

In Figure 3, orange denotes historical milestones, green denotes present applications, and purple denotes possible future developments. These time-based colors do not measure maturity: maturity remains a separate assessment dimension, as illustrated in Figure 2. Individual technologies may span multiple periods and should be classified using documented evidence and a defined organizational context.

In the SCM example, orange indicates historical examples, green indicates current applications, and purple indicates possible future developments. The preferred diagram uses these colors together with the inner (past), middle (present), and outer (future) rings. Color indicates time perspective, not whether a technology is obsolete or guaranteed to succeed.



Figure 3: FLTR Application to SCM Domains; Technology Examples and Future Scenarios Are Illustrative

Past (Orange)

The following technologies have been the foundation of supply chain digitalization:

- ERP Legacy Systems (SAP) – The backbone of supply chain digitalization, providing a centralized platform for managing business operations.
- EDI (Electronic Data Interchange) – The standard for B2B transactions, enabling the electronic exchange of business documents.
- Automation Systems – Used to enhance inventory management, improving efficiency and reducing costs.

Present (Green)

The current state of supply chain technology includes:

- Cloud-based SCM Platforms (SAP IBP): Providing a scalable and flexible platform for managing supply chain operations.
- Advanced Analytics & Demand Forecasting (AI/ML-driven): Enabling organizations to make data-driven decisions and predict demand.
- IoT in Logistics & Warehousing (real-time tracking, smart sensors): Improving visibility and efficiency in logistics and warehousing operations.
- Digital Twins for Supply Chains (simulation and scenario planning): Allowing organizations to simulate and optimize supply chain scenarios.

Future (Purple – next 5 years, emerging)

The following are possible areas of development over the next five years, not technologies guaranteed to emerge or achieve wide adoption:

- AI Agents for Autonomous Planning (self-adjusting demand/supply balance): Enabling organizations to automate planning and decision-making.
- Quantum Computing for Optimization (complex supply network modeling): Providing the ability to model and optimize complex supply networks.
- Autonomous Supply Chain Networks (self-healing and self-restructuring): Enabling organizations to create self-healing and self-restructuring supply chains.
- Hyperautomation in Procurement & Logistics (AI + RPA + IoT): Already adopted by some organizations, with further development and wider adoption expected over the next five years. The integration of AI, RPA, and IoT may enable more advanced automation of procurement and logistics processes, improving operational efficiency and decision-making.
- Green Supply Chain Tech (carbon tracking platforms, circular economy systems):

Already implemented in some organizations, with broader adoption and further development expected over the next five years. These technologies can help organizations monitor and reduce carbon emissions, improve resource efficiency, and support more sustainable supply chain operations.

Organizations could pilot this radar using a documented evidence register and periodic expert review. Any automated updating, scoring, or forecasting remains a proposed future enhancement, not an implemented or validated capability of this paper.

Research Implications

The proposed Future-Aware Lifecycle Technology Radar (FLTR) offers potential benefits for research and business practice. Conceptually, it distinguishes two related assessment dimensions, Technology Maturity and Temporal Evolution / Lifecycle Age rather than treating movement between adoption recommendations as an explicit time axis. The concentric view communicates past, present, and future, while the accompanying matrix makes the two-dimensional distinction visible. For SCM leaders, the approach may help organize evidence, compare maturity across domains, and discuss investment timing and future scenarios. These implications are proposed uses and require practical validation.

The proposed Future-Aware Lifecycle Technology Radar (FLTR) offers potential benefits for research and business practice. From a research perspective, it extends conventional technology

radar approaches by using time as a central visual dimension, connecting documented technology history, current adoption, and possible future developments within one framework. This provides a basis for further studies on how technology evolution can be assessed and communicated.

From a practical perspective, FLTR can help organizations compare existing and emerging technologies, identify opportunities worth monitoring, and make more informed technology investment decisions. In Supply Chain Management, the radar can support discussions about planning systems, logistics, warehousing, automation, and future digital capabilities, helping leaders align technology roadmaps with long-term business priorities.

From a managerial perspective, the model offers a shared view for discussing technology priorities, investment timing, and potential disruption across business and technology teams. These are expected applications of the proposed framework rather than demonstrated outcomes; their effectiveness should be evaluated through practical implementation.

Future Research

Future research should test FLTR through structured SCM case studies and expert assessments. Such studies could define consistent technology-selection criteria, document supporting evidence, compare assessments across users, and evaluate whether the five-year outlook improves decision quality. Regular updates and explicit forecast uncertainty would also help assess the model's reliability over time.

This paper introduces FLTR as a conceptual extension of technology radar visualization. It distinguishes technology maturity from temporal evolution and represents historical origins, present adoption, and possible developments over the next five years. The comparison, two-dimensional matrix, and SCM illustration are complementary conceptual figures rather than empirical results. Future research should test whether this approach improves clarity, consistency, and decision support in practice.

This paper introduces FLTR as a practical, time-oriented extension to technology radar visualization. By linking technology origins, current adoption, and possible developments over the next five years, the model brings historical context and strategic foresight into one view. The SCM illustration shows its relevance to planning, logistics, and warehousing technology discussions. The contribution is a defined conceptual framework and a sectorspecific illustration, not a claim of proven forecasting performance. Further application and evaluation can establish how reliably it supports decisions and where the model should be refined.

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