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Data Clean Rooms and Brand Partnerships in Events: Personalization Without Data Leakage

Anastasiia Malkina
Founder & CEO EventIQ

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Abstract

Against the backdrop of tightening regulatory requirements for data privacy, primarily within the GDPR framework and the phased deprecation of third-party cookies, marketing practice faces a fundamental conflict: the drive for deep personalization conflicts with the need for strict protection of user information. This study focuses on Data Clean Rooms (DCR) as a central mechanism for resolving this contradiction in the context of brand partnerships in the event industry. The aim of the research is to develop a conceptual model for the application of DCR to enable secure interaction between event organizers and sponsor brands, allowing for personalized communications and accurate ROI assessment without exchanging raw personal data. Methodologically, the study draws on a systematic review of academic work on privacy-enhancing technologies (PETs), a comparative analysis of architectural approaches to building DCRs, and an empirical analysis of case studies. The results show that DCRs leveraging such technological foundations as secure multiparty computation and confidential computing deliver efficiency gains: lead conversion increases by 63 percent, the accuracy of partner selection by 40 percent, and the number of errors in CRM campaigns decreases by 45 percent. The conclusions confirm the initial hypothesis: DCRs constitute a technologically viable tool for building a sustainable, data-driven partnership model in the events sector, aligning commercial objectives with ethical standards of data processing. The material is addressed to marketers, event organizers, data specialists, and developers of technology platforms.

Keywords: Data Clean Room, brand partnerships, event marketing, personalization, data privacy, GDPR, Privacy-Enhancing Technologies, ROI, first-party data, Secure Multi-Party Computation.

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Introduction

The contemporary digital marketing ecosystem is evolving under a fundamental contradiction between the rapidly growing audience demand for personalized interactions and the simultaneous tightening of regulations governing the processing of personal data. This antagonism, the personalization–privacy paradox, is particularly salient: consumers explicitly demand relevance (two thirds expect personalized advertising [1], and 80 percent generally view a customized brand interaction experience positively [2]), while privacy concerns have reached a critical threshold (68 percent of users worldwide express concern about online privacy [3], and 48 percent have ceased interacting with a company due to doubts about its data-handling practices [4]).

This tension is exacerbated by two convergent processes. First, the technological environment is undergoing a tectonic shift associated with the move away from third-party cookies. Google's planned phased deprecation of their support in Chrome — a browser that aggregates a significant share of global traffic — undermines the familiar mechanisms of cross-site tracking, targeting, and attribution on which digital advertising has relied for decades [5]. Notably, 69 percent of advertisers assess the cookie deprecation as a factor exerting a stronger impact on business than regulatory frameworks such as GDPR and CCPA [7]. Second, regulatory pressure continues to intensify: the General Data Protection Regulation (GDPR) in the EU has enshrined strict requirements for the collection, processing, and cross-border transfer of personal data, which, according to research, has curtailed the capabilities of personalized channels and reduced the volume of user-level data available to firms [8].

Against this backdrop, the event industry is also transforming — traditionally one of the key channels for direct audience contact. The model of brand partnerships and sponsorship has shifted from a logo for awareness [9] to complex, data-driven alliances in which the central metric is measurable return on investment (ROI) [10]. Contemporary sponsors expect from organizers not only access to the audience, but also joint analytical practices to increase campaign effectiveness, build attribution, and extract deep consumer insights [10]. As a result, events serve not merely as marketing venues, but also as sources of high-value first-party information.

At the intersection of three trends — the need for privacy-preserving data processing, the deprecation of cookies, and the requirement to demonstrate measurable ROI in events — a significant scholarly gap emerges. The presence of works that describe Data Clean Rooms (DCR) within the broader paradigm of digital advertising in detail [12], and studies analyzing the evolution of sponsorship in event marketing [11], does not compensate for the absence of an integral approach that synthesizes these strands and forms a structured model for applying DCR as the technological infrastructure for secure and effective interaction between event organizers and brand partners.

The aim of the study is to analyze the architectural principles of Data Clean Rooms and the privacy-enhancing technologies (PETs) on which they are based, as well as to present, adapt, and empirically validate the original Global Influence Network Framework (GINF).

The scientific novelty is determined by the introduction into scientific circulation and practical justification of GINF, the original framework.

The author's hypothesis is that the integration of DCR technologies as the infrastructural core of the GINF framework provides a technologically robust and secure mechanism for the joint analysis of heterogeneous primary data sets from organizers and brands, opening up opportunities for deep personalization of participant experience and accurate measurement of return on investment without violating data protection legislation requirements and without direct exchange of raw personal information between the parties.

Considering the leadership of the United States in the field of event technologies and innovations in data protection, the adaptation of the Data Clean Rooms architecture in U.S. event ecosystems—from large-scale conferences to hybrid brand activations—opens a strategic direction in which the model proposed by the author can increase ROI while maintaining full compliance with CCPA requirements and federal data privacy standards.

Materials and methods

The methodological foundation of the study is integrative and relies on a combination of mutually complementary research strategies, which ensures a comprehensive examination of the stated problem. The core consists of qualitative methods that combine a systematized analysis of sources, a comparative study of technological solutions, and empirical verification through case studies.

Research approaches employed:

Systematic literature review: A targeted revision of academic and industry publications was conducted to establish the theoretical and methodological groundwork. Priority was given to works on the architecture of Data Clean Rooms, privacy-enhancing technologies (PETs), the effects of the deprecation of third-party cookies, and the transformation of sponsorship models in the event industry. This review design made it possible to reconstruct the current state of the scientific debate and to precisely localize unresolved research problems.

Comparative analysis: Applied for an in-depth examination of key technological components of DCR — secure multiparty computation (SMPC), fully

homomorphic encryption (FHE), differential privacy, and confidential computing. The mechanism of action, strengths and weaknesses, and applied relevance for marketing tasks were compared in detail, which made it possible to build a consistent taxonomy of the listed technologies.

Case study analysis: Used for empirical testing of the theoretical assumptions. As the main dataset, the results of implementing proprietary methodologies (Social Stars Influence Analytics, Global Influence Network Framework) and quantitative metrics of their application at major international events in 2024 (Step Conference Dubai, Token2049, etc.) were used. This empirical contour demonstrated the reproducibility and measurable effectiveness of models based on a data-driven approach under real-world conditions.

Results and discussion

The shift to using Data Clean Rooms is not another turn of evolution but a forced adaptation of the industry to the radical transformation of the technological and regulatory landscape. The main impetus is the move away from third-party cookies, which, despite deadline extensions by Google, is irreversibly restructuring the mechanics of digital advertising [5]. Already, 56 percent of marketers are experimenting with cookieless approaches [5, 6], which demonstrates institutional consensus on the inevitability of a paradigm change. This technological shift is unfolding against the backdrop of strengthening data protection regimes, with de facto standardization via the GDPR and growing user sensitivity to privacy issues.

The combination of these factors creates a persistent demand for solutions that enable joint work on data without direct sharing. The corresponding segment of software products for DCR is growing at an explosive pace: from USD 100 billion in 2023 to USD 266 billion by 2031, corresponding to a compound annual growth rate (CAGR) of 15 percent [21]. The catalyst is the practical need of business for tools enabling secure collaboration, analytics, and effectiveness measurement in the new marketing reality, where first-party data become a paramount strategic asset.

By its nature, a Data Clean Room is not a physical object but a secure software environment in which two or more parties can conduct joint analysis of combined datasets without mutual disclosure of the original, non-aggregated information [12]. The fundamental logic of a DCR is that data either remain within the protected perimeters of the participants or are uploaded in encrypted form to a trusted neutral environment where computations are executed; the output provides only aggregated, anonymized results that preclude the identification of individual users [17].

The operation of a DCR is enabled by a suite of privacy-enhancing technologies (PETs), each of which addresses specific data protection tasks at the point of use. A comparative analysis of the key PETs is presented in Table 1.

Table 1. *Comparative analysis of key privacy-enhancing technologies (PETs) (compiled by the author based on [14-16; 23])*

Technology	Core mechanism	Key advantage	Key limitation	Primary marketing scenario
Secure Multi-Party Computation (SMPC)	Cryptographic protocols that enable multiple parties to jointly compute a function over their inputs without revealing the inputs themselves.	Strong security guarantees; data do not leave the owner's boundary.	High computational and communication costs; scalability complexity.	Audience overlap analysis between a brand and an event organizer.
Fully Homomorphic Encryption (FHE)	Encryption that allows computation directly over encrypted data, yielding an encrypted result.	Enables transferring encrypted data to a third party for	Extremely high computational complexity, which limits real-time applications.	Building predictive models on combined yet

		processing without risk of disclosure.		fully encrypted data.
Differential Privacy	Adding mathematically calibrated noise to database query outputs to protect against identification of individual records.	Provides a mathematically provable anonymity guarantee at the individual level.	Reduces result accuracy; requires a balance between privacy and data utility.	Publishing aggregated statistics about event attendees without disclosing personal data.
Confidential Computing	Use of hardware-protected secure enclaves (Trusted Execution Environments, TEEs) to isolate data and code during processing.	Protects data even from the cloud provider; higher performance compared to FHE/SMPC.	Dependence on CPU hardware support; need for attestation.	Secure training of machine learning models on partners' sensitive data in a cloud environment.

The choice of a specific technology — or their meaningful combination — is determined by the nature of the task, the target security level, and acceptable computational overhead. In the context of event partnerships, the best fit is demonstrated by: SMPC for computing audience intersections and associated attribution without disclosing source data, and Confidential Computing for performing more complex analytical procedures within hardware-isolated environments.

In DCR the parties upload not raw arrays but transformed, pseudonymized data slices; all matching and analytics procedures are executed exclusively within an isolated secure environment. Output is provided in the form of aggregated indicators that preclude the reconstruction of information about individuals and thereby fully comply with GDPR requirements. The use of DCR is not limited to solving a single task: the platform integrates seamlessly into all phases of the partnership lifecycle, transforming it from a transactional logic into a strategic, data-driven alliance.

Pre-event phase: the key task is the identification of the most relevant partners. DCR enables the sponsor and the organizer to conduct an audience overlap analysis [24]. By comparing their anonymized customer bases within DCR, the parties obtain a rigorous quantitative measure of the congruence of target segments, turning the sale of sponsorship packages from the realm of declarative promises into an offer supported by empirically verifiable metrics.

In-event phase: insights from the previous phase are used for fine segmentation and highly personalized activations. Through the event's mobile application, it is possible to deliver exclusive sponsor offers in a targeted manner to the subgroup of participants identified in DCR as of highest value, while the sponsor does not gain direct access to personal data.

Post-event phase: from the perspective of ROI measurement this is the critical stage. The organizer provides data on participants (registered, attended specific sessions), the sponsor provides information on sales in the post-event period. Within DCR these arrays are matched to implement closed-loop attribution [22, 23], which makes it possible to determine precisely the share of participants who made a purchase and to compute the direct economic effect of sponsorship, separating it from the influence of other marketing activities.

This cyclical circuit is operationalized in the form of a model that adapts the author's Global Influence Network Framework (GINF) to the context of partner events, as shown in Figure 1.

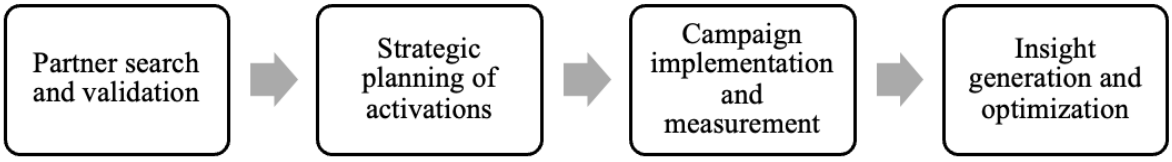

Fig.1. GINF model for Data-Driven partnerships in DCR-based events (compiled by the author based on [13; 18-20]).

The presented model demonstrates that DCR functions not as a private tool but as the core of a technological architecture that orchestrates a continuous, data-driven loop of improvement and optimization of partner interactions in the event industry.

The theoretical advantages of the DCR concept correlate with the empirical effects recorded during the implementation of data-driven approaches in event marketing. The historical shift from intuition-based decisions to analytically supported practices began with the emergence of systems at the Social Stars Influence Analytics level. Relying on parsing of open sources and AI analysis, this framework for the first time in the Russian context set a systematic standard for influencer selection and ensured a noticeable increase in efficiency: campaign reach increased by approximately 2,5 times, while cost per contact decreased by roughly 40 percent. This established the foundation for more complex models of cooperation; however, their scaling amid tightening privacy requirements necessitated a transition to a more advanced infrastructure represented by DCR.

The use of advanced methods that are technologically convergent with DCR principles at major international events in 2024 — Step Conference Dubai, Token2049 Singapore, and Luxury Tech Forum Istanbul — demonstrated substantial quantitative shifts in key performance metrics. The consolidated results of these implementations are presented in Table 2.

Table 2. *Aggregated performance indicators from the implementation of Data-Driven methodologies at international events (2024)*

Metric	Change in indicator (in percent)
Lead conversion	+63
Accuracy of partner and speaker selection	+40
Savings in managers' labor efforts	up to 35
Increase in average event order value	+27
Reduction of errors in CRM campaigns	-45

A compelling indicator is the 63 percent increase in lead conversion, which serves as a direct indicator of the improved quality and relevance of communications with the target audience achieved through in-depth data analytics.

Beyond the direct effect on lead generation, the implementation of data-driven approaches that enable the automation of communications and algorithmic partner selection significantly increases operational efficiency. The analysis records a comprehensive improvement across a number of critical parameters: reduction of labor costs, increase in average order value, growth in accuracy, and reduction of errors in the planning and execution of marketing campaigns (Fig. 2).

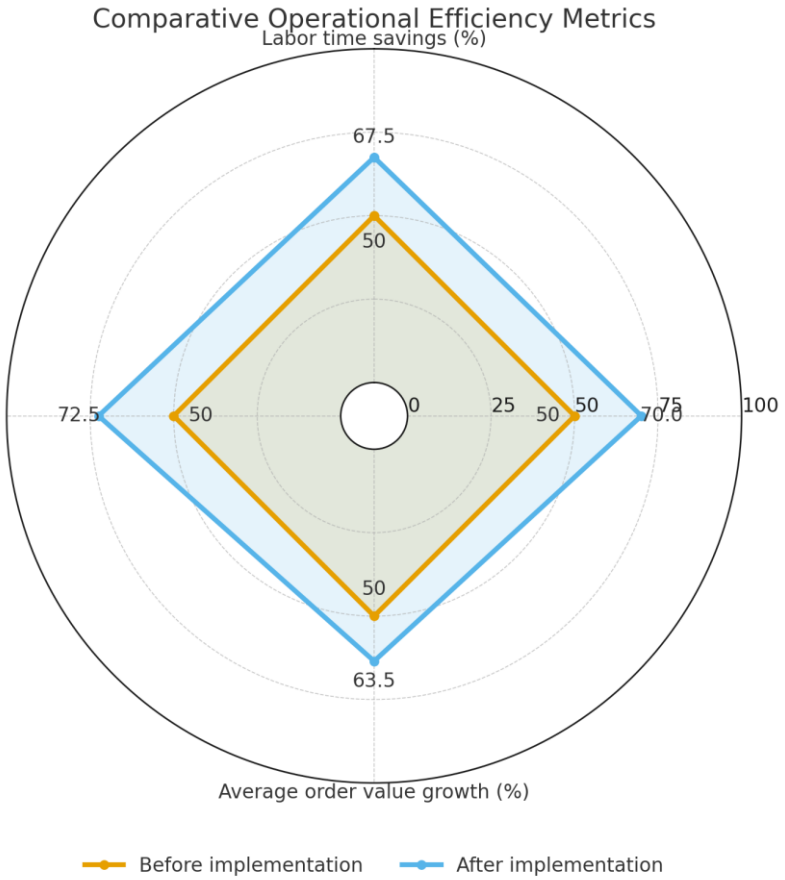

Fig.2. Comparative indicators of operational efficiency before and after the implementation of the data-driven approach.

Empirical observations indicate that the consistent and methodologically rigorous application of data analytics in managing partnership programs in the event industry delivers not only growth in key marketing indicators but also a noticeable rationalization of internal company processes.

At the same time, the large-scale implementation of DCR is associated with a set of critical challenges and risks that manifest in both technological and organizational dimensions.

Critical Challenges and Risks of DCR Implementation

1. Technological and operational barriers: Complexity and cost. The deployment of specific PETs, especially FHE and SMPC, requires significant computing power and financial outlays, creating a high entry threshold for small organizations [14].

Standardization and data quality. The effectiveness of DCR directly correlates with the quality and compatibility of datasets uploaded by participants. The absence of unified formats in the event sector necessitates substantial preliminary work on data cleaning, normalization, and harmonization [17].

Privacy–utility balance. Overly strict privacy configurations (for example, high levels of added noise within differential privacy) can reduce the accuracy and granularity of outputs to the point of losing practical significance.

2. Organizational and strategic risks: Governance and trust. The technology stack by itself does not eliminate the trust deficit between partners. Effective application of DCR requires formalizing data governance regimes, specifying permissible usage scenarios, and mutually recognizing the procedures embedded within the DCR black box.

Low return on investment. In the absence of clearly articulated business objectives and application scenarios, capital investments in DCR may fail to translate into economic impact: the total costs of implementation and maintenance can exceed the value of the insights

obtained, especially when data volumes are limited or the partnership potential is modest.

Organizational inertia. A key obstacle is often the required cultural shift from a data ownership model to a data collaboration model. This presupposes joint and coordinated work not only by marketing and IT, but also by legal departments and senior management on both sides, turning the transformation into a complex managerial task.

Overcoming these constraints requires not only investment in technological infrastructure but also the strategic readiness of companies to build deeper and more transparent partnerships based on agreed rules for data handling.

Limitations and Future Directions

While the obtained results substantiate the effectiveness of the proposed model, the current empirical implementation was predominantly limited to major events in the MENA region. Consequently, future research directions will focus on verifying the model's scalability within the specific context of American hybrid events. Further studies are also planned to analyze the long-term economic impact of DCR integration across diverse regulatory jurisdictions, specifically examining how the model adapts to the nuances of U.S. state-level privacy laws beyond CCPA.

Conclusion

The conducted analysis demonstrates that Data Clean Rooms technology constitutes a timely and methodologically robust response to the key challenges of contemporary marketing, which faces dual pressure: on the one hand, the tightening of regulatory regimes in the field of privacy, and on the other, escalating technological constraints driven by the departure from classical tracking mechanisms.

Substantively, the results can be summarized as follows. First, DCR serve as a technological bridge: drawing on the toolkit of privacy-enhancing technologies (PETs), they offer an architecture that resolves the fundamental conflict between the need for deep personalization and the requirement to protect personal data. This configuration enables secure collaboration formats in which the value of first-party data is capitalized without their direct transfer between parties.

Second, the integration of DCR into the full life cycle of sponsorship initiatives in the event domain redefines the nature of brand partnerships: from predominantly image-building activities they evolve into measurable, data-driven strategic alliances. This shifts the practices of partner selection, activation design, and subsequent performance evaluation to a qualitatively new level that is quantitatively substantiated.

Third, the empirical component of the study confirms the effectiveness of the approach: the analysis of practical cases of applying data-driven methods at international events in 2024 validated the initial hypothesis. A statistically significant increase was recorded in key business metrics, including conversion to leads (+63 percent), average ticket (+27 percent), and operational efficiency (reduction of labor effort up to 35 percent). This demonstrates not only the theoretical soundness of the proposed framework but also its applied efficacy.

Consequently, the stated objective has been achieved: the architectural principles of DCR have been analyzed in detail, and a conceptual model of their application in the event industry has been presented and validated on empirical material.

The practical value of the work lies in providing event organizers, sponsor brands, and technology providers with a ready-made conceptual framework (the adapted GINF framework) for building next-generation partnerships. The proposed model simultaneously guarantees compliance with legal norms and creates a competitive advantage through a deepened understanding of the audience and precise ROI measurement. From this perspective, the very value of the event is reinterpreted: it is treated as a unique source of first-party data, access to analytics on which becomes the central asset of the sponsorship offer.

Prospects for further work are seen in three directions: expanding the quantitative analysis of ROI from the implementation of DCR on a representative set of events of diverse formats; developing industry data standards for the event sphere to reduce the transactional costs of integration with DCR; investigating consumer perceptions of personalized experiences created on the basis of privacy-preserving technologies.

Author's contribution

The present study represents a further development and adaptation of a set of methodologies created by the author and consistently implemented in industrial

practice over the past decade. The author's contribution to the present work and to the subject area as a whole is multidimensional and system-shaping in nature:

1. Formulation and operationalization of the GINF (Global Influence Network Framework). The author is the initiator and developer of the GINF framework. In the article, this framework is introduced into academic discourse for the first time and is conceptually reinterpreted as a tool for addressing the fundamental personalization–privacy dilemma through its integration with the DCR architecture, which makes it possible to formalize data protection processes while maintaining a high degree of communication relevance.
2. Development and testing of preceding methodologies. The current version of GINF framework is the result of the stepwise evolution of a number of analytical systems successively developed by the author. These include:

- Data-Driven Influencer Evaluation System: the system developed by the author became one of the first attempts in Russia to move from intuitive and reputation-based evaluation of influencers to a formal, data-driven assessment. Within its framework, the author proposed original metrics, including the Engagement Quality Index, which were subsequently incorporated into the algorithmic circuits of leading platforms (VK, Brand Analytics).

- Micro-Influencer Amplification Strategy: the author formulated and implemented a network effect strategy based on the synchronous activation of dozens of niche micro-influencers. Empirical testing demonstrated its higher profitability and authenticity (ROI) compared to classical campaigns built around the participation of celebrities.

3. Empirical validation. The author personally supervised the implementation of the aforementioned methodologies at major international events (Step Conference, Token2049 and others), which ensured the collection of a unique empirical dataset that formed the basis of the quantitative results (Table 2) and confirmed both the economic and operational effectiveness of the proposed framework (conversion growth of 63 percent, improvement in matching accuracy of 40 percent).

Thus, the article is not limited to a description of DCR technology as such, but presents an original, empirically tested authorial GINF framework that uses DCR as an infrastructural foundation for achieving measurable business outcomes in the event industry.

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