SPARK Matrix™

Security & Risk Management

SPARK Matrix™: Card Management System (CMS), 2021

Market Insights, Competitive Evaluation, and Vendor Rankings

October 2021

Quadrant Knowledge Solutions

Table of Contents

Executive Overview

This research service includes a detailed analysis of the global card management system (CMS) market dynamics, major trends, vendor landscape, and competitive positioning analysis. The study provides competition analysis and ranking of the leading CMS vendors in the form of SPARK Matrix. This research provides strategic information for technology vendors to better understand the market supporting their growth strategies and for users to evaluate different vendors capabilities, competitive differentiation, and its market position.

Key Research Findings

Followings are the key research findings:

Technology Trends

Card management systems vendors continue to make significant investments in ML technologies to offer advanced fraud prevention capabilities. With the evolution of newer, more complex types of frauds and suspicious activities, CMS vendors continue to adopt and invest in AI and ML technologies or offer integration with third-party best-of-breed fraud detection tools for analyzing customer's behavioral patterns and their transactional activities to identify new types of frauds and suspicious activities and combat advanced fraud and cybersecurity attacks across various channels.

Key Market Drivers and Trends:

- Driven by the growing adoption of cloud-first strategies for enterprise applications from different industries and increasing confidence of cloud-security, global issuing and acquiring organizations are increasingly evaluating hybrid cloud strategies. Most of the large organizations continue to favor the on-prem deployment of their CMS stacks. However, cloud-based deployments are expected to grow at a much faster rate compared to on-premise software licensing.
- Organizations are increasingly evaluating vendors with robust machine learning-based fraud detection solutions with greater emphasis on model performance, as the traditional rule-based fraud prevention systems are not effective in detecting the new types of frauds and suspicious activities.
- Leading CMS vendors are continuously enhancing their product configurability to offer low-code and no-code-based tools suitable for business users. Advanced CMS platforms include product configuration tools enabling

issuers to launch new card products easily without requiring complex customization.

- The API-first and open architecture to support extensibility in meeting the ever-changing business environment is becoming key for selecting a CMS solution. Leading CMS vendors continue to invest in improving platform extensibility overall customer ownership experience.

- Furthermore, the global regulations and compliance requirements are increasingly becoming stringent, and there is growing scrutiny by regulators on model governance and transparency. Therefore, CMS vendors are offering built-in security features and functionalities and focusing on expanding their geographical coverage to help organizations cope with the growing complexities of regulatory compliance.

- With COVID-19-induced disrupted business scenarios, increase in remote working, and rise in online activity and frauds, a robust card management mechanism is the need of the hour. Critical investments in CMS solutions are postulated to grow, with organizations focusing more on security and seamless user experience being the new long-term strategy to retain customers for the long term.

- Overall, the primary drivers for the adoption of card management systems include continued replacements of legacy and obsolete systems, increasing adoption of cloud-based solutions, growing awareness about advanced CMS systems with modern technology architecture and well documented open APIs, access to advanced product configuration tools to accelerate innovations, increasing complexity of compliance requirements, growing importance of personalized customer engagement, and requirements to support emerging digital services.

- The key value proposition of the CMS solution includes providing card lifecycle management, behavioral scoring, dispute management, account management, clearing & settlement, accounting, application processing, fraud monitoring & risk management, authentication & authorization, analytics and insights, customer communication, and compliance & reporting. The continuous transformation of CMS solutions driven by advanced technologies is propelling the market adoption amongst small to medium organizations and in large enterprises.

Competition Dynamics & Trends:

- This study includes an analysis of key vendors, including ACI Worldwide, BPC, CoreCard Software, Fiserv, HPS Worldwide, OpenWay, RS2 Software, Software Group, Sopra Banking Software, TietoEVRY, TSYS and Worldline.
- TSYS, Fiserv, BPC, TietoEVRY, ACI Worldwide and HPS Worldwide are the top performers in the global CMS market and have been positioned as the top technology leaders in the 2021 SPARK Matrix analysis of the CMS market.

Market Overview and Technology Trends

Quadrant Knowledge Solutions defines Card Management System (CMS) as:

"A software system that provides functionalities to support the comprehensive lifecycle management for debit, credit, prepaid, smart chip, and all multi-application smart cards. The CMS platform enables organizations to handle all aspects of card management, including billing, supporting multiple payment types including mobile and contactless, account management, clearing, settlement, credit scoring, dispute management, microfinance, and merchant servicing. It offers a centralized platform that supports a wide range of card-associated activities and services, including design card products for attracting new customers and increasing card usage for existing ones."

The Card Management Systems or CMSs were built by the financial institutions offering card products to manage and automate their card portfolios. However, the technology has significantly advanced from signature to magnetic strips to chips. Thereby, the platforms have also evolved to accommodate a variety of payment card types and emerging payment types and remains a critical component of payment infrastructure. However, despite its importance, it has not managed to grab the spotlight like other payment channels such as mobile payments, m-commerce, and similar others. However, this criticality is also an important element which is helping the card management system market's growth. Driven by the continued innovation and investments by leading vendors, modern CMS platforms provide a wide range of advanced functionalities for multiple use cases supporting multi-product, multi-language, multi-currency, multi-scheme, and all payment types, including contactless, QR code, in-app payments, tokenization, and such others.

Many leading CMS vendors are upgrading their card management features and capabilities to address the growing financial challenges faced by the customers in this pandemic. Vendors are offering capabilities such as installment pay option, payments holiday, credit card expiry bypass and virtual cards, helping banks and financial institutions to address customer challenges and comply with regulations too. The Installment pay option enables banks to provide their customers a payment instalment plan for one-time purchases. Further, banks can set up a repayment schedule on basis of customer's request, thus preventing any crimes related to temporary cash management issues. The Payments holiday option allows banks to temporarily hold principal and interest longer, thus supporting customers impacted due to lockdown. The credit card expiry bypass option allows banks to bypass the expiry date for transaction types, providing customers the access to cash and perform transactions. CMS vendors are also allowing banks to issue virtual cards to their customers to support them in meeting their various needs during the pandemic.

While most vendors provide core functionalities for card management, leading vendors are continuously innovating to incorporate latest technologies driven by ongoing market trends. A majority of the CMS vendors now offer microservices architecture with modular solutions to various CMS-related applications for both issuing as well as acquiring use cases. Leading vendors are also leveraging low-code development capabilities to offer advanced product configuration tools enabling issuers create card products easily to match their specific customer requirements.

Following are the key capabilities of a CMS solution:

A CMS platform offers comprehensive card management capabilities to support the complete card lifecycle by offering both issuing and acquiring capabilities on a single unified platform. The platform enables issuers to design new card products instantly, as well as support complex product types and product combinations of various card types. The platform offers issuers flexible fee calculation rules set up to automate their fee structures and offer product configuration tools to create card products quickly. It also offers multichannel acquiring capabilities across any location, channel, or industry.

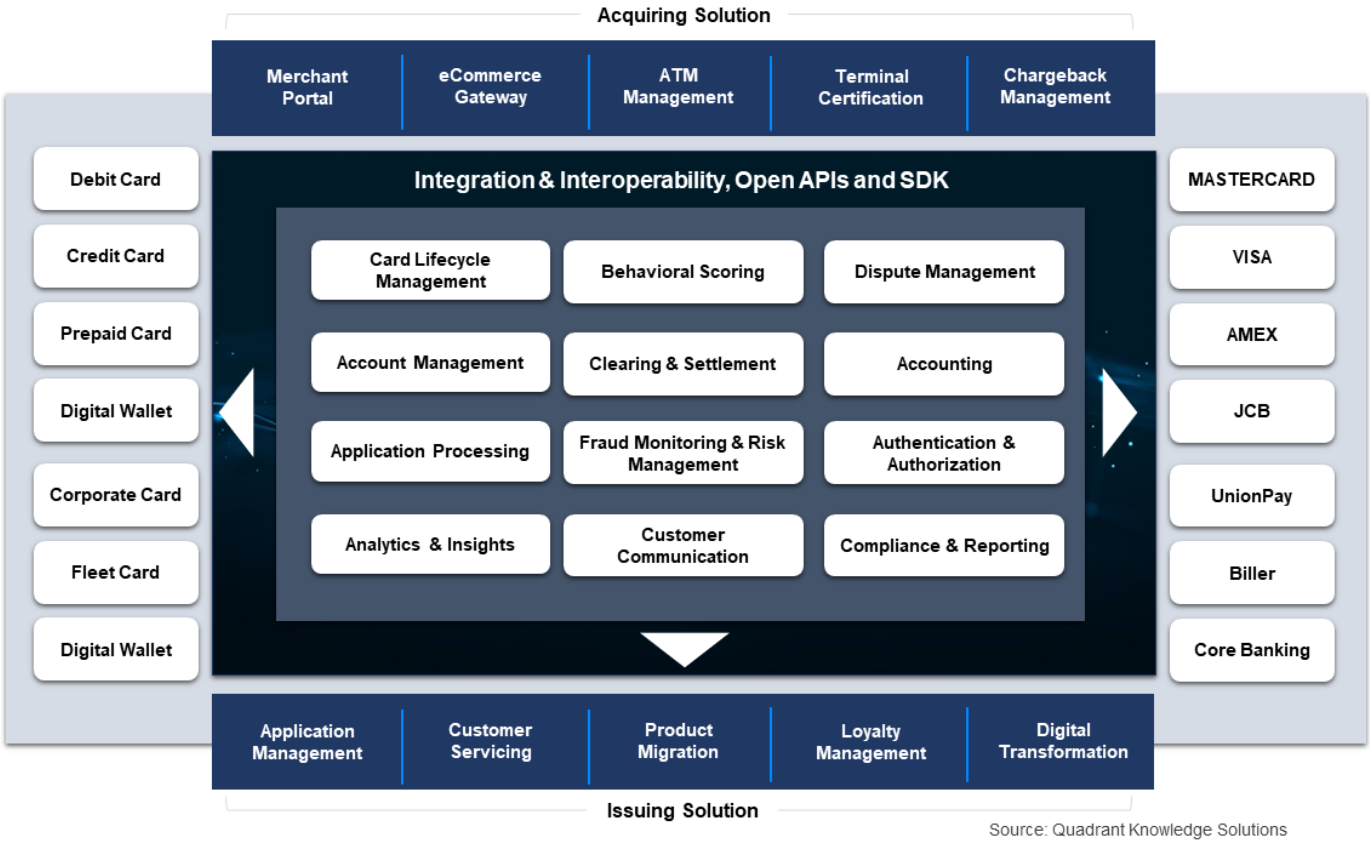
A CMS platform should provide support for multi-card products, as well as tokenization and mobile payments. Additionally, the platform should offer value-added key features, including real-time fraud detection, multi-lingual and multi-currency, multi-institution, and multi-country support. Overall, a CMS platform should offer robust functionalities for card issuing, merchant acquiring, digital wallets, account management, payment switch, eCommerce gateway, and digital banking. It should also offer end-to-end capabilities to manage all aspects of the card, including card lifecycle management, ATM management, billing, mobile, & contactless payments, settlement, point of sale, microfinance, and electronic payments processing.

CMS platform should offer real-time fraud prevention and behavioral scoring with actionable insights for all payment types. Many ML-driven CMS platforms can analyze payment transactions in real-time and are trained to identify suspicious transactions across multiple channels. These platforms perform scoring according to the device’s potential for abuse and manipulation. The platform can also perform behavioral profiling based on the card holder’s past transactions. Further, it ensures the current transaction’s behavior matches with a customer’s usual devices, location, and time, enabling organizations to identify any gaps or anomalies quickly. The platform’s ML-driven capabilities facilitate profiling of fraudulent behavior for future predictions and preventions. Many advanced CMS platforms combine an expert rules-based engine with behavior profiling and predictive analytics to facilitate accurate fraud detection and prevention decisions. These platforms leverage expertly defined rules, profiles, and scoring methods, enabling organizations to evaluate critical data continuously.

A CMS platform should also offer an accounting tool to manage the complexities of the payment business and support the full clearing and settlement cycle for all authorized financial and non-financial transactions. The platform should offer speedy application processing for card issuance and facilitate smooth customer onboarding. It should also enable issuers to update customers with the necessary details related to their card product-related transaction and usage and foster customer relationship management. In addition, the platform can generate alerts and notify the customers about any transactions performed on their card, as well as provide alerts for any fraudulent transactions.

Additionally, the platform must comply with regional and international payment regulations and support transactions such as e-payments, e-mandates, and e-identity.

Figure: Key Components of Card Management System Solution



Source: Quadrant Knowledge Solutions

Growing Adoption of Cloud-based Card Management

A majority of the large enterprise companies from various industries are moving towards a cloud-first strategy for the deployment of enterprise software and business systems. However, cloud-based card management and other banking technologies are still in the emerging stages, as most large banking organizations still prefer on-prem deployment. Growing complexities of global and regional regulations, data security, and privacy issues continue to impact the adoption of cloud-first strategies by large banking and financial service organizations. However, the advancements in security technologies and the growing confidence into cloud platforms are driving a shift in the status quo.

A majority of the issuing and acquiring organizations are increasingly evaluating vendors' capabilities to provide flexibility in deployment, i.e., supporting deployment over public cloud, private cloud, hosted, as well as on-prem. Cloud deployment allows FIs and banks to facilitate speed, elasticity and aids them in aligning with the latest technology trends in the market as well as organizational KPIs. Cloud deployment saves operational costs and optimizes the utilization of IT resources. Banks and FIs can also leverage cloud deployments in three ways, including infrastructure as a service (IaaS), platform as a service (PaaS), and software as a service (SaaS). Organizations should evaluate CMS vendors that offer a wide range of deployment flexibility to support organization-specific policies.

Growing Adoption of Digital Banking Solutions, real-time payments, and digital wallets

Digitalization across different industry verticals has significantly raised customer expectations from banks and FIs to provide a secure and consistent experience across all digital channels. While banking organizations and FIs continue to support digital channels as a primary way for customer engagement for various services, a hassle-free customer experience is becoming the primary competitive differentiation for the global banking industry. Digital strategies have significantly improved banking operations and customer service across a range of banking products.

There is a growing emphasis on offering a hassle-free banking experience in the banking industry to stand out in the highly competitive financial services industry. The focus on offering 24-hour availability of real-time settlement facilitated across various channels, including smart phones tablets, digital wallets, and the web, is helping the financial institutions (FIs), merchants and consumers gain a better visibility into payments. As a result, many CMS vendors are offering open banking APIs to help organization to utilize the benefits of real-time payments.

In addition, the COVID-19 pandemic has proved to be a key driver in the rise in the demand for digital wallets. This technology makes it easy for an individual to make transactions electronically, thus minimizing the need for physical wallets. Digital wallets store the user's payment information for different payment options. Therefore, there is no need to enter the payment details repetitively for payment activities. Numerous payment gateways including PayPal, Amazon Pay, Google Pay, Apple Pay, etc., support digital wallets. Therefore, many leading CMS vendors cards are offering e-wallet solutions to support the various electronic payment methods. Depending on the type of mobile wallet, an advanced CMS platform allows users to link their wallet accounts to any other available payment instrument, including cards, bank accounts, or e-wallets.

Configuration versus Customization Becoming a Key Evaluation Parameter for Selecting CMS solution

Traditional card management systems often require significant customization, resulting in a long implementation cycle, increased costs, and reduced agility to cope with the ongoing and future digital transformation trends. The modern, configurable CMS platforms are equipped with GUI-based product configuration tools to provide the necessary flexibility to enable issuers to create innovative card products easily. While configurability is amongst the essential components of all the CMS platforms, users should evaluate the ease of use concerning low-code to no-code-based product configuration tools. Organizations should evaluate product configuration tools capabilities to support the end-to-end process of issuing new card products with required functionalities for customizing billing, card settings, credit limit, interest levels, and such others to match customer requirements without requiring technical support.

Integration & Interoperability is Essential to Improve Customer Ownership Experience

Technology architecture plays an essential role in the successful adoption of digital strategies in transforming customer experience (CX) across digital and mobile banking channels. Organizations should look for card management systems built with API-first and open architecture to support extensibility in meeting the ever-changing digital banking and payment environment. The platform should offer seamless integration and interoperability with multiple core banking technologies, payment systems, analytical and AI tools, multiple channels, and other associated tools to improve business agility and overall technology ownership experience. Leading vendors may provide out-of-the-box integration connectors, well-documented APIs, API management, and extensive RESTful API to achieve integration with multiple

solutions for the issuing as well as acquiring environment. Users should evaluate the vendors' capability in providing out-of-the-box integration for best-of-breed core banking, payment solutions, digital transformation tools, and analytics technologies to accelerate the execution of their digital transformation roadmap.

Growing Importance of Advanced Fraud Prevention and Security Capabilities.

The cyberattacks are growing in number, sophistication, and complexities and are continuously expanding the financial institutions and e-commerce organizations' threat landscape. In recent years, global organizations have observed an increasing number of fraud attacks, including application fraud, account takeover, card-not-present fraud, cybersecurity breaches, and such others, driving the need for advanced fraud detection and management technologies. A rising number of internal fraud and data breaches targeting payment card data, personally identifiable information (PII), and credentials are resulting in a significant financial and reputational loss. Additionally, cybercriminals are increasingly targeting mobile channels for login attacks, as customers across the globe are increasingly adopting mobile applications for various financial transactions and online sessions.

In addition, the advancements of technologies are enabling attackers to use advanced tools and technologies for launching sophisticated and complex attacks. Cybercriminals are increasingly leveraging automation, artificial intelligence, and machine learning techniques to launch advanced fraud and cybersecurity attacks. Therefore, issuing and acquiring organizations are increasingly focusing on adopting solutions having advanced fraud detection and prevention capabilities along with robust security tools.

Issuing and acquiring organizations should evaluate CMS platforms' ability to offer advanced fraud detection and prevention powered by machine learning. The platform may include integrated fraud monitoring capabilities or may offer integration with third-party best-of-breed fraud detection tools. Additionally, organizations should evaluate built-in security features and functionalities as per their local and international regulatory requirements to cope with the growing complexities of regulatory compliance.

Rise in Adoption of AI and ML to offer Advanced CMS Capabilities

FIs and banks are cognizant of the importance of key technologies such as AI and ML in significantly improving the efficiencies in detecting and mitigating risks. The improvements in computing power, reduced cost of computing & space, and the huge datasets have led to the increased adoption of these sophisticated technologies. AI

helps in offering a seamless user experience as customers are now used to online and mobile shopping, and AI has streamlined the payment process by way of personalized banking. The ML and AI technologies analyze and scrutinize the customers' behavior patterns. This aids in evaluating the risk associated with the customer's activities, thereby coming up with a risk score and taking up necessary actions accordingly. AI can alert and notify the customer when there is suspicious activity and anomalous behavior. AI and ML technologies aid the FIs, financial organizations, and banks to detect and spot anomalies in real-time and help offer a hassle-free user experience. Therefore, many leading CMS vendors are adopting and leveraging machine learning technology, predictive and behavioral analytics, tailored rules, customer profiling methods, etc. in combinations, to aid in analyzing features such as customer's behavioral patterns and transactional activities, thereby forbidding the face to face and card not present frauds. These combinations aid the system in recognizing genuine and fraudulent transactions in real-time, thereby helping minimize false-positive rates, increase acceptance rates, and offer a seamless customer experience. These technologies also provide accurate and valuable insights to the front-end staff that helps in decision-making in real-time.

The growing complexities in data patterns and increasing focus on strengthening the fraud prevention strategies will drive CMS vendors to increasingly leverage automation and machine learning to automate repetitive tasks and manual processes for helping enterprises improve process efficiency, resource utilization, and productivity, protect customers, and improve overall customer experience.

Competitive Landscape and Analysis

Quadrant Knowledge Solutions conducted an in-depth analysis of major card management systems (CMS) vendors by evaluating their products, market presence, and value proposition. The evaluation is based on primary research with expert interviews, analysis of use cases, and Quadrant's internal analysis of the overall CMS market. This study includes an analysis of key vendors, including ACI Worldwide, BPC, CoreCard Software, Fiserv, HPS Worldwide, OpenWay, RS2 Software, Software Group, Sopra Banking Software, TietoEVRY, TSYS, and Worldline.

TSYS, Fiserv, BPC, TietoEVRY, ACI Worldwide, and HPS Worldwide are the top performers and technology leaders in the global CMS market. They provide sophisticated and comprehensive technology platforms to help organizations manage end-to-end card payment, management, and processing. They deliver comprehensive CMS solutions to address a variety of CMS use cases.

TSYS has received the highest ratings across the performance parameters of technology excellence and customer impact. Through its single PRIME platform for consolidated multi-product issuing and multi-channel acquiring, TSYS offers a complete range of CMS deployment models. The company delivers robust integration and interoperability through its comprehensive APIs, enabling FIs to perform their developments easily. It facilitates customizations without impacting the core while simplifying platform upgrades and ensuring backward compatibility. PRIME offers high flexibility in functional means and deployment options. TSYS offers a next-generation InterActiv digital technology framework for platform compatibility, application diversity, and a single base with low-code configuration Web tools.

Fiserv offers a platform for managing the complete lifecycle of card management, from issuing and origination to transactions and collections. Fiserv offers end-to-end CMS processing capabilities to meet the high scalability requirements of FIs. It provides web-based multilingual features enabling banks to offer a seamless customer experience. Fiserv's card management solution supports issuing, acquiring, consumer credit, branded card programs, private-label card programs, personal/corporate cards, prepaid card programs, e-commerce, revolving and deferred lines of credit, third-party processing, and third-party integration.

BPC offers settlements support between partner financial institutions and separation of issuing businesses through a single platform. It provides unique opportunities in terms of commissions and customizing options for the financial return of incoming transactions. SmartIssuer, a BPC's CMS solution, enables cross-interaction between products of a many-to-many system. It also offers flexibility in customer management while maintaining end-to-end customer ID, forming client segments, and dynamically determining customer profitability.

TietoEVRY's CMS solution supports all the multi-needs of the card suite, including multi-institution, multi-language, multi-country, multi-currency, multi-brand, and multi-payment channels. It also supports next-gen transaction monitoring and combines data from different channels, including device ID, biometrics data, and risk scoring models from KYC systems to protect card and account transactions.

ACI Worldwide offers a card and merchant management (CMM) platform with features including cloud-native, rule-driven product creation, fast time to market, and the collection of rest APIs for easier integration. It also offers orchestration capabilities to enable business flows and rules to deploy new customer services rapidly. Moreover, it provides a modular integrated solution covering any payment instrument processed through any available payment rails.

HPS Worldwide offers a robust technology value proposition with its PowerCARD platform. It is a single technology platform covering the entire payments value chain of issuing, acquiring, and switching. It offers full micro-service architecture for maximum scalability, availability, cloud-native to maximize cost reduction, easy deploying ability, maintenance, complete digital design, and instant payment solution. PowerCARD platform is natively multi-currency, multi-language, multi-scheme, multi-institution, multi-country, multi-time zone, multi-calendar, and multi-address.

Worldline, Sopra Banking Software, and Openway are positioned as challengers. **Worldline** is placed as a major challenger in Quadrant's CMS SPARK Matrix, 2021. It offers features like multi-channel, multi-brand, multi-country, and multi-currency processing solutions for acquiring a business. It allows organizations to provide a complete and efficient payment value chain to their retail customers.

Sopra Banking Software's CMS solution supports an innovative array of payment types, including SCT, SCT Inst, SDD core, SDD B2B, international transfers, high value transfers, debit cards, credit cards, and prepaid cards. It also offers flexible value chain coverage for PSD2, interbank exchange, ATM, and card issuing domains.

OpenWay's CMS platform named Way4 provides seamless internal and external integration through APIs and SDKs while offering flexible deployment options such as cloud and on-premises. Way4 offers smooth migration from legacy systems and ensures high availability. The Way4 Wallet functionality offers robust automated workflows, product and service management, online accounting and reconciliation, and fraud prevention. It provides benefits such as comfortable checkouts with QR codes, NFC, multi-digital payment methods, family wallet programs, and geo-targeted offers with chatbot banking and gamifies personal financial advice.

RS2 Software, CoreCard Software, and Software Group are placed as emerging challengers in Quadrant's CMS SPARK Matrix, 2021. **RS2 Software** provides omnichannel and multi-channel payment solutions and technologies for issuers and

acquirers on a single payment platform. The company serves across various industry verticals, including banking, travel, healthcare, eCommerce, and retail throughout Europe, North America, Latin America (LATAM), Asia Pacific (APAC), and the Middle East.

CoreCard Software's CMS platform offers features such as transaction processing, integrated dispute and chargeback management, and scalability. **Software Group's** CMS solution provides card issuing and management, ATM and POS development, traditional card transactions, and electronic payment processing. It further authenticates and authorizes large volumes of transactions and supports the operation of payment infrastructure.

Key Competitive Factors and Technology Differentiators

A majority of the leading card management system (CMS) vendors may provide off-the-shelf CMS capabilities including card lifecycle management, behavioral scoring, dispute management, account management, clearing & settlement, accounting, application processing, fraud monitoring & risk management, authentication & authorization, analytics & insights, customer communication, and compliance & reporting. However, the flexibility of deployment and authentication mechanisms may differ by different vendors' offerings. Driven by increasing competition, vendors are increasingly looking at improving their technology capabilities and overall value proposition to remain competitive. Some of the key competitive factors and differentiators for the evaluation of CMS vendors are as follows.

- **Breadth and Depth of Technology Capabilities:** Organizations should evaluate CMS tools that offer comprehensive capabilities in terms of providing modern, microservices-based, and open technology architecture, offering end-to-end card lifecycle management functionalities for multiple card types and multiple payment types. Most CMS vendors are offering capabilities for card lifecycle management, application processing, authentication & authorization, behavioral scoring, dispute management, account management, clearing & settlement, accounting, fraud monitoring & risk management, analytics & insights, customer communication, compliance & reporting. However, the breadth and depth of these capabilities might vary by different vendor offerings. Additionally, the vendor's customer value proposition may differ in terms of ease of deployment, ease of use, price/performance ratio, support for a broad range of use cases, global support service, and such others.

- **Ease of Use:** Users should evaluate CMS vendors that offer low code product configuration tools. Additionally, organizations should also evaluate CMS vendors that offer multi-region, multi-language, multi-currency, and multi-institution support in terms of deployment, user interface, and local support to facilitate seamless integration with complex banking environments.

- **Technology Vision & Roadmap:** The CMS vendors are constantly enhancing and innovating their technology value proposition in terms of providing a holistic CMS solution, starting from application processing, authorization & authentication to compliance & reporting. The vendors are also focusing on offering an exceptional digital experience to customers through a seamless CMS authentication process. Driven by the continually evolving payment dynamics and market trends, CMS platforms should offer robust extensibility, flexibility to support the continued evolution of the CMS platform and associated payment technologies. CMS vendors should focus on providing advanced functionalities to support the evolving needs of supporting new

cards and product types, emerging channels, and services. Organizations should carefully evaluate the vendor's existing technology capabilities along with their technology vision and roadmap to improve overall satisfaction and customer ownership experience for long-term success.

- **Vendor's Expertise and Domain Knowledge:** Organizations should evaluate vendors' expertise and domain knowledge in understanding their unique business problems, use cases, and industry-specific requirements. Organizations are advised to conduct a comprehensive evaluation of different CMS platforms and vendors before making a purchasing decision. Users should employ a weighted analysis of the several factors important to their specific organization's use cases and industry-specific requirements. Users should look for ease of use, comprehensiveness of offering, software's flexibility to adapt with constant market changes and regulatory requirements, minimizing total cost of ownership, and transparency.

- **Scalability and Availability:** Vendors across the globe often provide card management solutions that can provide requisite speed, scalability, latency, and availability to meet their users' distributed payment environments across the line of business, payment types, channels, and geographic locations. The platform should support scalability to process a large volume of transactions per second (TPS) with sub-second response times. Organizations should evaluate vendors platforms' capability in supporting a large volume of real-time transactions with the sub-second response time. The requirements of key CMS features may differ significantly from financial institutions to SMB to large enterprise organizations. Users should also look for a CMS solution with a history of successful large-scale deployments and carefully analyze the existing case studies of those deployments.

- **Cloud native capabilities:** Although a majority of the CMS deployments continue to be on-premise ones by large organizations, many vendors are also offering cloud-enabled deployments with cloud-native capabilities to cater to small and mid-sized organizations. This allows vendors to offer cost reduction, easy installation, and easy management by users.

- **Integration and Interoperability:** Seamless integration and interoperability with vendors' existing technologies are amongst the crucial factors impacting technology deployment & ownership experience. The CMS solution should offer seamless integration and interoperability with multiple fraud analytics solutions, third-party risk signals, and mobile security applications to ensure smooth operation, information exchange, and flexibility of implementation. The solution should also support integration with third-party device compliance solutions, payment service providers, and gateways. Users should evaluate

vendors' capability to provide out-of-the-box integration with best-of-breed technologies and custom integration. Also, users should assess the CMS platform in offering breadth and depth of integration capability specific to their existing tools and infrastructure.

SPARK Matrix™: Strategic Performance Assessment and Ranking

Quadrant Knowledge Solutions' SPARK Matrix provides a snapshot of the market positioning of the key market participants. SPARK Matrix provides a visual representation of market participants and provides strategic insights on how each supplier ranks related to their competitors, concerning various performance parameters based on the category of technology excellence and customer impact. Quadrant's Competitive Landscape Analysis is a useful planning guide for strategic decision makings, such as finding M&A prospects, partnership, geographical expansion, portfolio expansion, and others.

Each market participant is analyzed against several parameters of Technology Excellence and Customer Impact. In each of the parameters (see charts), an index is assigned to each supplier from 1 (lowest) to 10 (highest). These ratings are designated to each market participant based on the research findings. Based on the individual participant ratings, X and Y coordinate values are calculated. These coordinates are finally used to make SPARK Matrix.

Technology Excellence	Weightage
Sophistication of Technology	20%
Competitive Differentiation Strategy	20%
Application Diversity	15%
Scalability	15%
Integration & Interoperability	15%
Vision & Roadmap	15%

Customer Impact	Weightage
Product Strategy & Performance	20%
Market Presence	20%
Proven Record	15%
Ease of Deployment & Use	15%
Customer Service Excellence	15%
Unique Value Proposition	15%

Evaluation Criteria: Technology Excellence

- **The sophistication of Technology**: The ability to provide comprehensive functional capabilities and product features, technology innovations, product/platform architecture, and such others
- **Competitive Differentiation Strategy**: The ability to differentiate from competitors through functional capabilities and/or innovations and/or GTM strategy, customer value proposition, and such others.
- **Application Diversity**: The ability to demonstrate product deployment for a range of industry verticals and/or multiple use cases.

- **Scalability**: The ability to demonstrate that the solution supports enterprise-grade scalability along with customer case examples.
- **Integration & Interoperability**: The ability to offer product and technology platforms supporting integration with multiple best-of-breed technologies, providing out-of-the-box integrations, and open API support and services.
- **Vision & Roadmap**: Evaluation of the vendor's product strategy and roadmap with the analysis of key planned enhancements to offer superior products/technology and improve the customer ownership experience.

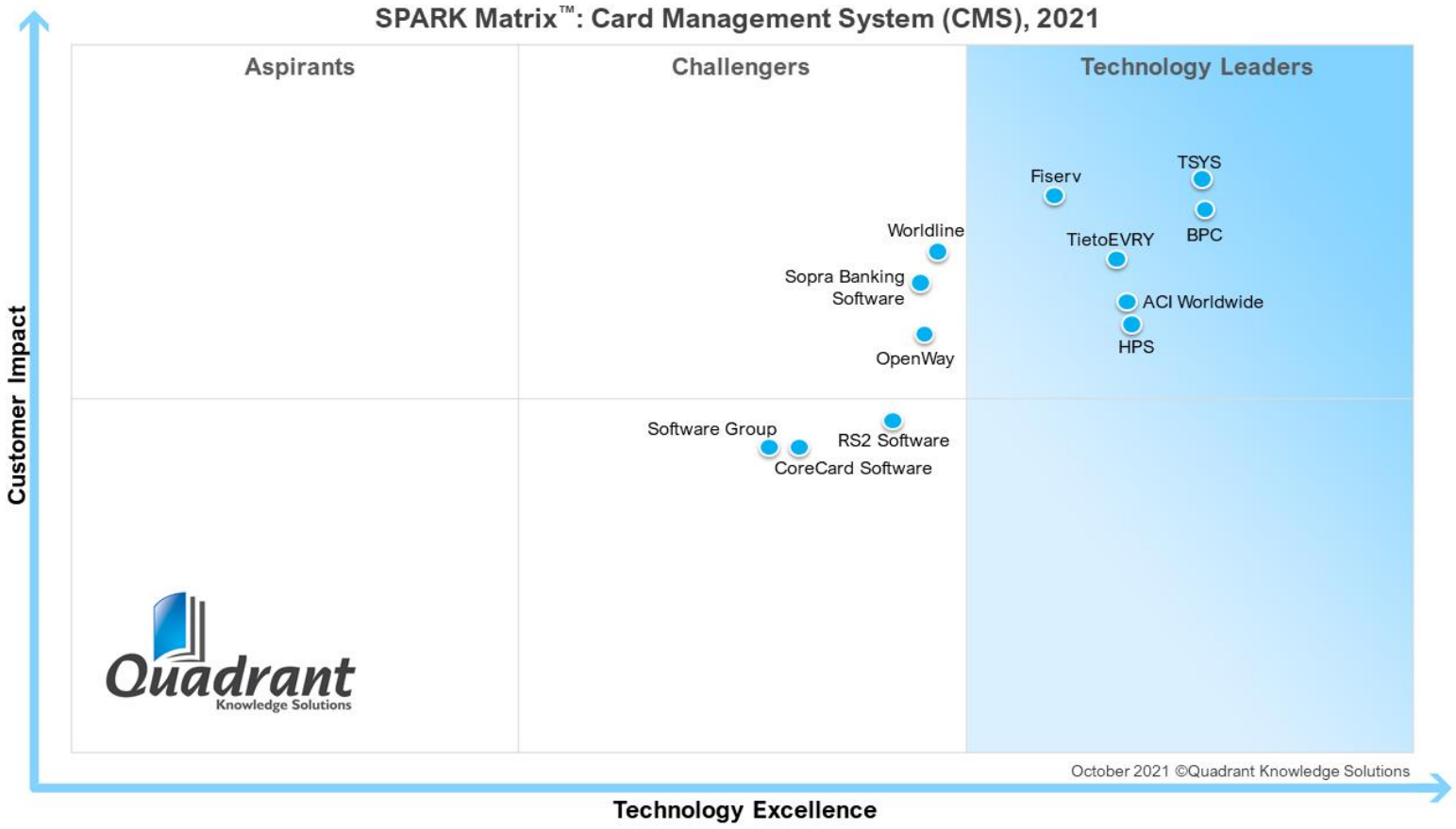
Evaluation Criteria: Customer Impact

- **Product Strategy & Performance**: Evaluation of multiple aspects of product strategy and performance in terms of product availability, price to performance ratio, excellence in GTM strategy, and other product-specific parameters.
- **Market Presence**: The ability to demonstrate revenue, client base, and market growth along with a presence in various geographical regions and industry verticals.
- **Proven Record**: Evaluation of the existing client base from SMB, mid-market and large enterprise segment, growth rate, and analysis of the customer case studies.
- **Ease of Deployment & Use**: The ability to provide superior deployment experience to clients supporting flexible deployment or demonstrate superior purchase, implementation, and usage experience. Additionally, vendors' products are analyzed to offer a user-friendly UI and ownership experience.
- **Customer Service Excellence**: The ability to demonstrate vendors capability to provide a range of professional services from consulting, training, and support. Additionally, the company's service partner strategy or system integration capability across geographical regions is also considered.
- **Unique Value Proposition**: The ability to demonstrate unique differentiators driven by ongoing industry trends, industry convergence, technology innovation, and such others.

SPARK Matrix™: Card Management System (CMS)

Strategic Performance Assessment and Ranking

Figure: 2021 SPARK Matrix™
(Strategic Performance Assessment and Ranking)
Card Management System (CMS) Market



Vendor Profiles

Following are the profiles of the leading CMS vendors with a global impact. The following vendor profiles are written based on the information provided by the vendor's executives as part of the research process, along with publicly available information. The Quadrant research team has also referred to the company's website, whitepapers, blogs, and other sources for writing the profile. A detailed vendor profile and analysis of all the vendors, along with various competitive scenarios, are available as a custom research deliverable to our clients. Users are advised to directly speak to respective vendors for a more comprehensive understanding of their technical capabilities. Users are advised to consult Quadrant Knowledge Solutions before making any purchase decisions regarding CMS technology and vendor selection based on research findings included in this research service.

ACI Worldwide

URL: https://www.aciworldwide.com/

Founded in 1975 and headquartered in Miami, USA, ACI Worldwide provides real-time digital payments software and solutions. ACI Worldwide offers a card and merchant management solution (CMM) suite enabling financial institutions to manage existing and introduce new payment products, fine-tuned across the customer segment. CMM offers three key functional offerings: Issuing, Acquiring and Clearing & Settlement of retail payments. The CMM suite provides a comprehensive card management solution across credit, debit, smart card, pre-paid, tokenized, and corporate card verticals. For end-to-end merchant account management CMM covers account settlement and operation of complex settlement environments with a flexible system designed to support changing business models. For clearing & settlement, CMM operates in two modes: Issuing, ensuring appropriate clearing files are produced following appropriate reconciliation processes; and acquiring, processing in-bound clearing files, running matching and reconciliation, and then running interchange pricing analysis before executing GL and settlement activities for merchants.

ACI Worldwide's CMM solution offers key capabilities and features, including online authorization services, card, token, and account management, clearing and settlement services, enablement for emerging and alternative payment methods, integration and orchestration capabilities, API infrastructure, connectivity to a wide number of card networks, payment schemes and value-added services in the industry, and a wide range of APIs and web services.

ACI Worldwide's Enterprise Payments Platform, which complements the Card Management solutions, offers online authorization services, which provide authentication, routing, and authorization while acting as an intraday balance system for real-time authorization. It supports authorization methods like negative authorization, positive authorization, and positive with balances authorization. The card and account management functionality serves as a system of record for all sources of value.

The clearing and settlement services provide connectivity to the payment networks' batch processing. It also generates network settlement files and performs network reconciliation. Moreover, it offers an interface for managing adjustments, disputes, and reports.

The logic architecture of the system independently manages accounts and payment instruments while providing access via APIs and web services. The capability originates transactions using any data as an identifier, thereby enabling the

determination of the target through phone numbers, e-mail addresses, customer ID numbers, and tokens. Accounts or payment instruments can be linked to QR codes and social media accounts through the API infrastructure.

ACI's solution offers integration with mobile wallets, portals, and social media. The API infrastructure facilitates it through the extensibility of the API library. The orchestration capabilities and the API infrastructure enables ACI's solution to offer processing of high-value and low-value payment transactions and route them through card rails, instant payment rails, and transaction banking rails.

ACI's solution provides connectivity to over seventy card networks and processors and more than ten Instant payments central infrastructures, plus high value networks and cross-border through Swift. It also provides connectivity to a wide number of domestic connections using ISO20022, ISO8583 and proprietary protocols.

Analyst Perspective

Following is the analyst perspective of ACI Worldwide's capabilities in the global card management systems (CMS) market:

- ACI Worldwide offers a wide payment portfolio through its retail solutions, enabling companies and FIs to introduce new payment products and services rapidly. ACI retail solutions include ACI Issuer™, ACI Acquirer™, ACI Interchange™, ACI Token Manager™, and ACI Token Manager for Mobile. These solutions offer advanced features that are compliant with the major international payment schemes, such as Visa, Mastercard, AmericanExpress, Discover, and JCB. It enables organizations to rapidly create new products for the customers through configuration in the UI and parameters-based model.

- Some of the key differentiators for ACI Worldwide's CMS solution includes cloud-based deployments with cloud-native capabilities, rule-driven product creation, fast time to market, collection of rest APIs for easier integration. It also offers orchestration capabilities to enable business flows and rules to rapidly deploy new customer services. Moreover, another differentiation for ACI Worldwide is a modular integrated solution covering any type of payment instrument processed through any available payment rails.

- In terms of geographical presence, ACI Worldwide has a strong presence in Europe, followed by APAC, MEA, Latin America, and North America. From an industry vertical perspective, the company caters to banks (retail, wholesale, and transaction) and payment processors, acquirers, PSPs, central infrastructures, and card networks. The solution supports multiple use cases, including buy-now-pay-later, instant issuance and digital issuance, and

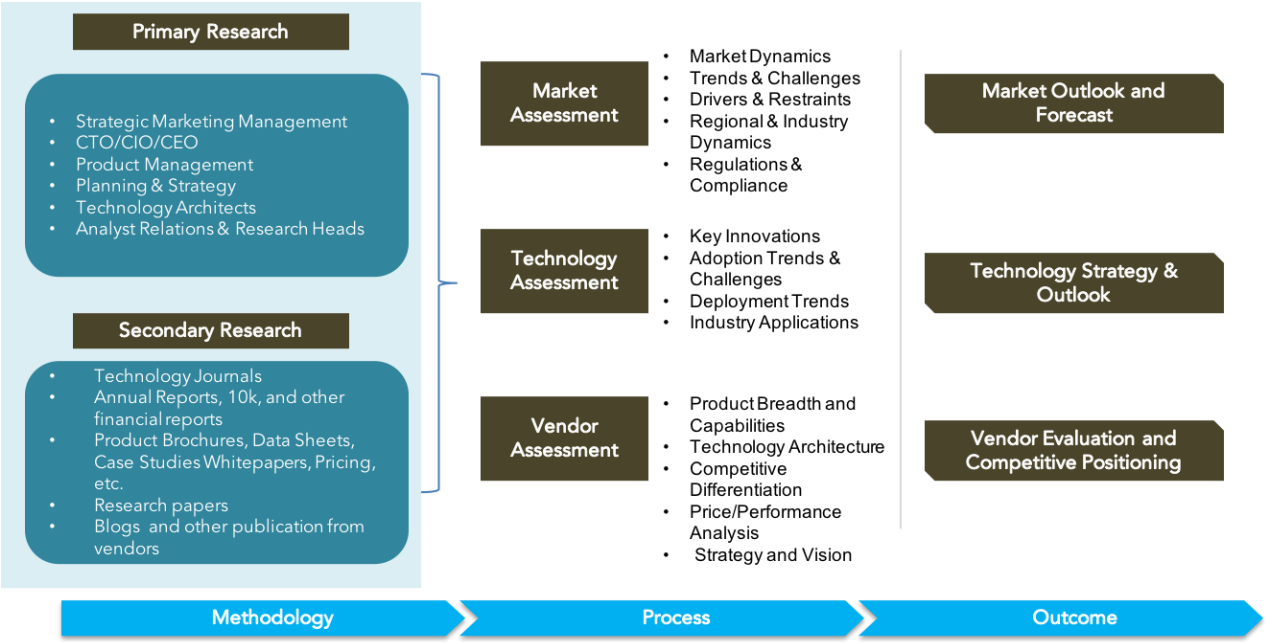
customer control. It creates loyalty programs and integrates different payment rails.

- ACI Worldwide is well placed to tackle the ongoing marketplace challenges driven by changing consumer behavior, API ecosystems, and competitive disruption. It may face competition from well-established and emerging players in the global CMS market. However, with its competitive and scalable CMS solutions and interoperability with ACI's other payment offering, ACI will expand its market share across the global CMS market.

- From the roadmap perspective, ACI Worldwide is focused on product investments in three areas, firstly, improvements of cloud-native transformation that includes micro-service decomposition, containerization, and the use of cloud-native services and elasticity. Secondly, functionality enrichments based on customer demand around the globe, such as additional fleet capabilities, improved loyalty options, and integration with alternative payment instruments and rails. Lastly, the company is focused on expanding the geographical coverage by developing additional connectivity to regional schemes and ensure compliance with global and local regulations and standards.

Research Methodologies

Quadrant Knowledge Solutions uses a comprehensive approach to conduct global market outlook research for various technologies. Quadrant's research approach provides our analysts with the most effective framework to identify market and technology trends and helps in formulating meaningful growth strategies for our clients. All the sections of our research report are prepared with a considerable amount of time and thought process before moving on to the next step. Following is a brief description of the major sections of our research methodologies.



Secondary Research

Following are the major sources of information for conducting secondary research:

Quadrant's Internal Database

Quadrant Knowledge Solutions maintains a proprietary database in several technology marketplaces. This database provides our analyst with an adequate foundation to kick-start the research project. This database includes information from the following sources:

- Annual reports and other financial reports
- Industry participant lists
- Published secondary data on companies and their products
- Database of market sizes and forecast data for different market segments
- Major market and technology trends

Literature Research

Quadrant Knowledge Solutions leverages on several magazine subscriptions and other publications that cover a wide range of subjects related to technology research. We also use the extensive library of directories and Journals on various technology domains. Our analysts use blog posts, whitepapers, case studies, and other literature published by major technology vendors, online experts, and industry news publications.

Inputs from Industry Participants

Quadrant analysts collect relevant documents such as whitepapers, brochures, case studies, price lists, datasheet, and other reports from all major industry participants.

Primary Research

Quadrant analysts use a two-step process for conducting primary research that helps us in capturing meaningful and most accurate market information. Below is the two-step process of our primary research:

Market Estimation: Based on the top-down and bottom-up approach, our analyst analyses all industry participants to estimate their business in the technology market for various market segments. We also seek information and verification of client business performance as part of our primary research interviews or through a detailed market questionnaire. The Quadrant research team conducts a detailed analysis of the comments and inputs provided by the industry participants.

Client Interview: Quadrant analyst team conducts a detailed telephonic interview of all major industry participants to get their perspectives of the current and future market dynamics. Our analyst also gets their first-hand experience with the vendor's product demo to understand their technology capabilities, user experience, product features, and other aspects. Based on the requirements, Quadrant analysts interview with more than one person from each of the market participants to verify the accuracy of the information provided. We typically engage with client personnel in one of the following functions:

- Strategic Marketing Management
- Product Management
- Product Planning
- Planning & Strategy

Feedback from Channel Partners and End Users

Quadrant research team research with various sales channel partners, including distributors, system integrators, and consultants to understand the detailed perspective of the market. Our analysts also get feedback from end-users from multiple industries and geographical regions to understand key issues, technology trends, and supplier capabilities in the technology market.

Data Analysis: Market Forecast & Competition Analysis

Quadrant's analysts' team gathers all the necessary information from secondary research and primary research to a computer database. These databases are then analyzed, verified, and cross-tabulated in numerous ways to get the right picture of the overall market and its segments. After analyzing all the market data, industry trends, market trends, technology trends, and key issues, we prepare preliminary market forecasts. This preliminary market forecast is tested against several market scenarios, economic scenario, industry trends, and economic dynamics. Finally, the analyst team arrives at the most accurate forecast scenario for the overall market and its segments.

In addition to market forecasts, our team conducts a detailed review of industry participants to prepare competitive landscape and market positioning analysis for the overall market as well as for various market segments.

SPARK Matrix: Strategic Performance Assessment and Ranking

Quadrant Knowledge Solutions' SPARK Matrix provides a snapshot of the market positioning of the key market participants. SPARK Matrix representation provides a visual representation of market participants and provides strategic insights on how each supplier ranks in comparison to their competitors, concerning various performance parameters based on the category of technology excellence and customer impact.

Final Report Preparation

After finalization of market analysis and forecasts, our analyst prepares necessary graphs, charts, and table to get further insights and preparation of the final research report. Our final research report includes information including market forecast; competitive analysis; major market & technology trends; market drivers; vendor profiles, and such others.