International Journal of Emerging Research in Engineering and Technology
Pearl Blue Research Group| Volume 4, Issue 4, 101-111, 2023
ISSN: 3050-922X | https://doi.org/10.63282/3050-922X.IJERET-V4I4P110

Original Article

Streamlining Health-care Integration with Facets Open Access Solution

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Abstract - *It does this through various factors, such as shifting from a traditional service delivery model, an explosion in patient data and a constantly increasing need to interconnect multiple healthcare systems. One of the most significant platforms supporting this change is the Facets Open Access Solution for addressing the problems regarding decentralized data storage and management, and insufficient patient engagement. This paper describes how Facets Open Access can integrate various healthcare industry players, including care providers, payers, and third-party services. From this study, selected areas that can be adopted in the Facets architecture include open APIs, HL7 FHIR, and advanced analytics. Firstly, we examine its modularity features, data management procedures and integration channels. The study also expands upon the most important implementation accomplishments in different cases, such as shortening the time to process claims, increasing patient data visibility and the payer-provider partnership. Additionally, architectural modelling, simulation results, and usability metrics would be used in the methodology to support the conclusion of the system's applicability. In conclusion, several considerations regarding the potential of Facets Open Access for further expansion of national health information networking are presented with its compliance with governing legal acts: HIPAA and the 21st Century Cures Act. This work is aimed at the policymakers, IT specialists, and managers interested in moving to value-based care following the advanced integration platforms.*

Keywords - *Healthcare integration, Facets Open Access, Interoperability, HL7 FHIR, APIs, Claims Processing, EHR, HIPAA.*

1. Introduction

1.1. Importance of Streamlining Health-care Integration

A paramount feature of the evolution of health care is the importance of health-care integration. In the contemporary world, there is a growing emphasis on enhancing the ease of connections within the systems, departments, and personnel of the health-care industry as technology advances. [1-4] In this paper, five subtopics were identified, which are elaborately discussed below;

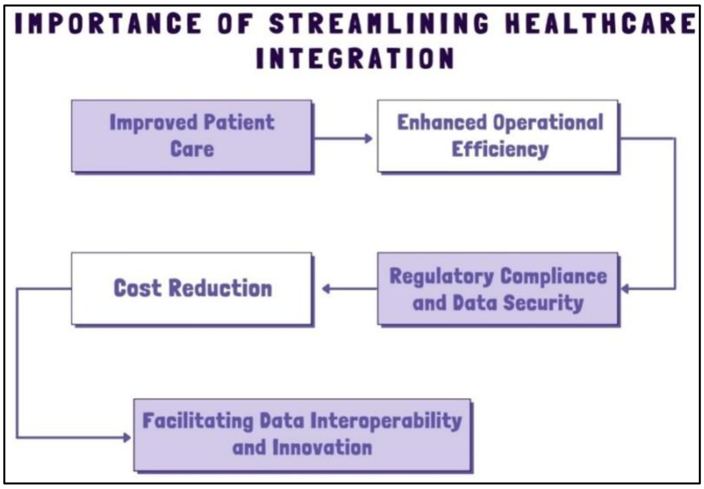

Fig 1: Importance of Streamlining Health-care Integration

- **Improved Patient Care:** Integrating health-care also benefits the patient by making the patient's health information available and up-to-date to any health-care provider involved in the patient's care. The information required by the health-care professional may include Electronic Health Records (EHR), laboratory data, or information from the billing system, which can be accessed as soon as it is integrated into each system. This leads to an accurate diagnosis and faster decision-making, minimising the probability of making wrong decisions and conclusions. For instance, in integrated systems, the patient's details, such as his or her medical history, test results, and medications, are made available without him or her having to request them from several places. This helps gain a better understanding of a patient's general status, thus helping various health practitioners to come to make sound decisions with regard to treatment.

- **Enhanced Operational Efficiency:** Efficient integration of health-care seeks to enhance the numerous operational processes, stripping off the load of several redundant tasks. In order to utilize different integrated systems, the health sector workflows, including appointment, registration, and billing, may be carried out in an automated manner. This has eliminated keying in errors and improved the working efficiency of the staff due to a reduction in time spent on typing. It also increases the possibilities of logistical execution since health care providers are able to quickly assess patients' needs and hence assign appropriate caregivers and control the available hospital assets. The end benefit is the enhancement of efficiency in the process by cutting costs, proper utilization of personnel, and reduction in the time taken to get the patients through the system.
- **Cost Reduction:** This paper has found that many benefits arise from Health-care integration, and the following is the key benefit. Within this context, it is possible to define a higher degree of potential cost savings, reduction of errors, and elimination of duplications of tests or procedures within the organization because of ineffective information flow in terms of handling information between different siloed systems. Integrated systems can also prevent the need for more supplies during operations since quality management can enhance stock supply management in health sectors. For example, when patient data is freely mobile between departments, the likelihood of repeatedly performing some tests reduces, hence saving time and costs. In addition, integration makes billing easier where chances of billing disagreements mainly due to errors are reduced, which would lead to billing disputes or claims denial.
- **Regulatory Compliance and Data Security:** Since health-care organisations are restricted by various laws across the globe, including HIPAA and GDPR, integration plays a significant part in managing patients' data responsibly and compliantly. This helps to improve the health-care organizations' data security and monitor who is accessing the data and the flow of information. Integrated systems allow for better enactment of protocols like encryption and access controls since the patient data will only be accessible to the right individuals. Also, integration enables easy tracking of audits and the generation of compliance reports, and this means that the health-care providers are in a position to show that they fully abide by the laws laid down, reducing the setbacks of penalties or security threats.
- **Facilitating Data Interoperability and Innovation:** The integration, which is simplified and coordinated, creates an improved data-sharing environment, without which progress cannot occur in health-care. Integration lets systems share useful information, which can help different health-care providers, including hospitals, clinics, insurance companies and public health bodies. It results in more personalized and accurate medical data as clinicians receive a large amount of information from various sources. Further, if the healthcare settings are integrated, there will be efficiency in integrating other progressive technologies like AI & machine learning to diagnose and forecast patient admittance and self-organizing functions. This accessibility and processing capability of data bring in a sense of innovation in terms of health-care delivery, patient outcomes and research work and the health-care systems in general.

1.2. Facets Open Access Solution

Facets Open Access is an integration solution that simplifies and enhances the health-care IT systems in light of the increased problems in this sector. The solution builds upon the HL7 FHIR, microservices, and real-time API technologies by integrating EHRs, payer's database, and third-party applications in the workflow. Thus, with the help of modern technologies like HL7 and FHIR, Facets Open Access provides integration, enabling different health-care systems to exchange patients' information in real time. In designing and implementing the Facets Open Access solution, it is very important to be able to scale it up and be flexible. [5,6] The way of having based on microservices helps to develop each part separately from others; it is convenient if the health-care organization grows or adds new services. It also makes upgrading and enhancing this structure more manageable to accommodate Health care demands as they continue to change. It also allows for real-time APIs for patient data, ensuring timely access, which cuts across on-time patient data that would have otherwise dragged the formulation of treatment decisions. Like all other facets hosting a patient portal, Facets Open Access also focuses a lot on security and compliance to ensure, among other things, that patient data will be protected as required by the likes of the HIPAA and HITRUST. The use of OAuth2.0 in authentication and encryption standards for data protection means that the platform ensures the patient's details are safe while exchanging.

Facets Open Access promotes a better patient experience by improving the usability and increasing patient's ability to access their records. With an emphasis on the incorporation of modern technologies and relevant data security concerns, Facets Open Access can be considered an effective tool that can help healthcare organizations enhance their operation efficiency as well as increase the level of patient care and compliance with the current and future health-care regulations in the field of IT technologies.

2. Literature Survey

2.1. Interoperability in Healthcare

Interoperability remains one of the biggest issues of modern healthcare IT as the health systems work in different and isolated systems. The interconnectivity of different healthcare information systems is still limited, which complicates the exchange of information between providers, insurers, and individuals. [7-10] Inadequate standardization leads to inefficiencies and potential dangers regarding patient safety because patients' medical records may be limited or not readily available. The coordination concerning the communication protocols and the data format for health information exchange is another important approach underlined by these studies, as it is crucial to have a coherent health information system regardless of the vendor and the platform.

2.2. Role of HL7 FHIR

Currently, the HL7 FHIR standard has become one of the main promising standards in the area of healthcare interoperability. Innovatively crafted to make the exchange of health-care information easier, FHIR makes use of advanced internet-enabling techniques, including RESTful APIs, JSON and XML, among other features, to ensure that the exchange of data is done within the shortest time possible and with a lot of consideration to the needed security. A recent study by HL7 International in 2021 revealed that about 80% of the EHR vendors in the United States have supported the FHIR endpoint. FHIR uses resources to organize the exchange of only the required data or part of the patient's summary with other systems in a more reduced structure.

2.3. Integration Frameworks

HIEs are indispensable to help different health-care systems discuss and exchange information seamlessly. Some of the major integration platforms available are summarized in table 1, with special reference to Facets Open Access, Epic App Orchard and Cerner Ignite. Although no specific HL7/FHIR support is mentioned, Facets Open Access has a fast and scalable architecture, is cloud-based, and has integrated API management and analytics. Epic App Orchard does not have native integration with the cloud or analytics while it only supports a few aspects of FHIR. Cerner Ignite also comes in the middleware as it supports FHIR and cloud but has somewhat between-rank API and analytics offerings. Such differences pose the need to consider several aspects related to the integration platforms before identifying which one best fits the technical and strategy of a healthcare organization.

2.4. Regulatory Landscape

This is because the adoption of HL7 interoperability standards has been affected in one way or another by the regulatory environment in health care. In late 2016, the 21st Century Cures Act required all healthcare providers to provide free, unhindered access to patient data to benefit the patients and advance digital health solutions. At the same time it is pertinent to note the Health Insurance Portability & Accountability Act (HIPAA) imposes rather rigid standards on privacy/ security of patients' data. According to ONC (2023), research substantiates that these regulations have prompted organizations to adopt HL7 FHIR because it gives a safe and legal way of sharing information as stipulated by the federal government. These policy frameworks have not only pressed on the technical innovation but also emphasized the position of the interoperability to support the patient care and effective health system.

3. Methodology

3.1. Architectural Overview

3.1.1. Consumer App:

The Consumer App is the first point of contact of the patient, provider or any other stakeholder in the health care system. It could be mHealth, a web-based application or a wearable interface through which a patient or provider can manage his/her/her records, appointments, claims or lab results. Based on the application design for users, the app integrates with the other services through the RESTful APIs, especially the user authentication and authorizations implemented using OAuth 2.0. [11-15] With HL7 FHIR, interoperable structured health data for users is produced through integration with standard data formats.

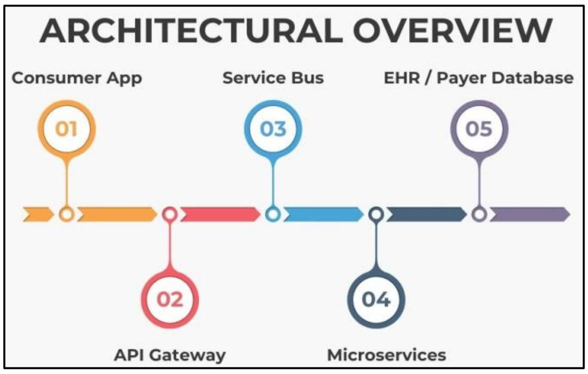

Fig 2: Architectural Overview

3.1.2. API Gateway:

The API Gateway can be defined as the first layer prior to the internal structure of a technical system like the healthcare system. It processes all the requests originating from the Consumer App, forwards them to the correct microservices, and handles authentication and authorization of the requests, rate limiting, and request logging. API gateway is also an important building block for managing traffic and access, which involves managing the system's performance and security. It can also change the data format, add further filters before reaching internal services, and implement the requirements of health care policies, such as HIPAA.

3.1.3. Service Bus:

The Service Bus facilitates asynchronous communication between various services and systems within the architecture. It also serves as a messaging middleware that separates the producer and consumer services so that they do not need to run at the same time. This also enables an environment of scalability, fault tolerance, and robustness. In the healthcare context, new patient information, insurance information updates, results of lab tests, and more can be communicated through the Service Bus to the microservices involved without congestion in certain specific systems. It also supports Event-Driven architectural style and Guarantee Message Delivery even in partial system failure.

3.1.4. Microservices:

Microservices are on the lower layer of the structure of the healthcare system and can be considered as the system's main components. Different microservices target particular domains, which include patient handling, billing and claims, appointment management and scheduling, and analytics. These services work individually so they can be deployed, maintained, and scaled easily. They are realized in the form of APIs and interact through the Service Bus or API Gateway. Microservices are developed with the orientation of domain-driven design and design principles to help control the code's complexity and make the system more agile, particularly in conditions of high and frequent changes in regulatory and technical environments.

3.1.5. EHR / Payer Database:

The architecture structure is built from the Electronic Health Record system and the payer databases containing clinical and administrative information. They contain essential details such as patient ID, medical history, diagnoses, prescribed medicines, insurance, and billing data. They may be administered by those, who deliver the services, insurance providers or third-party data brokers. The connection with EHRs is often implemented using FHIR API since it makes it possible to retrieve data and send data in real time while adhering to the security and Privacy Act. Stated here is information that is vital for operational purposes as well as analytics across the value system of the healthcare sector.

3.2. API Integration

Interoperability and security are achieved in the proposed architecture mainly by implementing integration between APIs to communicate between all components. Each is based on HL7 FHIR (Fast Healthcare Interoperability Resources), ensuring that the data is formatted consistently and data exchange is as fast as possible. The way that FHIR is based on resources allows access to certain types of health information, such as patients, medications, observations, and arranged procedures. To safeguard these endpoints, and largely due to adoption by almost all application vendors, OAuth 2.0 – an authentication protocol is used to support token-based authorization. This would also ensure that only authorised users and systems will call these APIs with the requirements necessary to meet health requirements stipulated by the healthcare regulatory body, such as HIPAA.

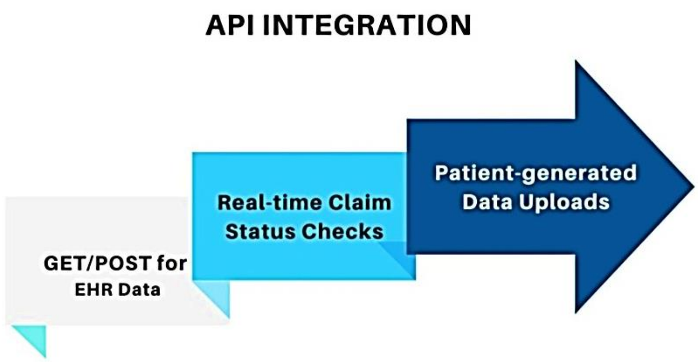

Fig 3: API Integration

3.2.1. GET/POST for EHR Data:

The API is compatible with GET and POST methods for managing Electronic Health Record (EHR) information. GET requests allow the client application, like a mobile Health app or a provider interface, to get real-time access to the structured health information. This may include retrieving the patient's demographic information, the results of tests conducted, the patient's medication history, and any records of the doctor's interactions with the patient. On the other hand, the POST operations make it easier for systems to create new records or modify existing records, such as creating new diagnoses recording clinical encounters and vaccination. These outputs help achieve bi-directional communication between the providers, the patients or other stakeholders besides ensuring data validation and standardization.

3.2.2. Real-time Claim Status Checks:

An important characteristic of the APIs is the real-time expedition and tracking of claims. Healthcare providers and patients have an opportunity to send requests to counterparties to know the status of insurance claims, patient eligibility, or any authorization at present. These endpoints also help reduce the administrative costly time and constraints experienced from manual checks via phone and fax affecting the periods of billingpatient cyclesents. The real-time synchronization of payer databases reduces the prospects of users with unstable information, hence improving claim status and faster reimbursements.

3.2.3. Patient-generated Data Uploads:

It also enables Patient-Generated Health Data (PGHD) to be uploaded and embedded within the Application Programming Interface (API) architecture. This also marks data which is collected through wearables, home-monitoring devices, and self-reported data of patients and may encompass anything from their symptoms to their mood, or lifestyle habits. The ability to make POST operations on such data types enables users, in this case patients, to contribute to their respective health records, increasing patient engagement in their health status. In EHRs such as HL7 FHIR, this data is mainly organized using Observation, Questionnaire Response, and Device resources. This integration benefits clinical decisions and helps the efforts in remote care and patient individualization.

3.3. Data Flow and Security

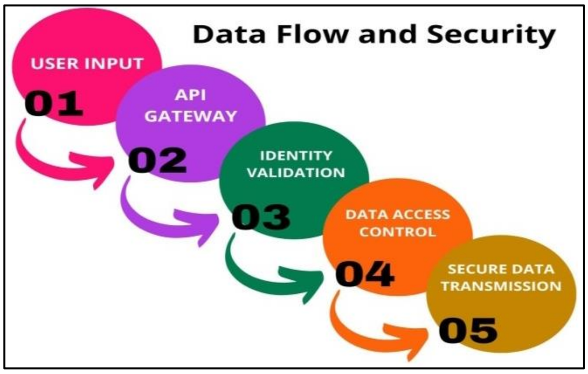

Fig 4: Data Flow and Security

3.3.1. User Input:

The incoming data flow is initiated by user input that originates from sensors, mobile applications, web interfaces or other connected medical devices. These activities may include accessing patient's accounts, searches, appointment schedules, and uploads of data collected by wearable devices. Because most healthcare applications deal with private and specific data, the fields accept only distinctly formatted, entire, and genuine information without additional scrutiny from the program. This input must be considered intact in order to facilitate proper further processing and prevent any type of injection attacks.

3.3.2. API Gateway:

It Has been validated, and the user input is passed to the API Gateway that acts as the entry point to the rest of the system. The gateway acts as a front end which handles such tasks as directing the requests to the intended microservices, rate limiting, enforcing HTTPS, and handling API keys or tokens. It also has the capability to log all incoming requests for auditing that may be necessary, especially in a healthcare setting. The API Gateway is also useful for managing security controls originating from the outside and ensures the stability of the system operations under fluctuating loads.

3.3.3. Identity Validation:

After the API Gateway analysis of a given request, an identity check based on OAuth and Open ID connect protocols is followed. This helps verify that the requesting entity is the patient's authorized representative, another doctor, or a third-party application. Identity validation is often carried out by comparing past access tokens or session credentials with the ones issued by a trusted identity provider. This process is useful in avoiding such undesired access. It complies with the guidelines of the existing laws, such as GDPR, that require stringent security measures to be taken while handling health related information.

3.3.4. Data Access Control:

After identity validation, an access control mechanism is exercised to identify which data or services the requester is privileged to access. RBAC or ABAC models are usually implemented to manage the least privileged permissions method. For instance, a patient's client may see only his or her records, whereas the clinician, who is a client, may view many other patients' records he or she is attending to. Access policies are described with regard to user type, organizational environment and particular consent measures aiming to provide lawful, smooth and minimized access to the data.

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3.3.5. Secure Data Transmission:

The last stage in data flow is the secure transmission of data, which may involve passing data between services or returning data to the end user. All the communication is encrypted through Transport Layer Security (TLS) that protects data over the internet from interception forging and man in the middle attack. Furthermore, the system can offer payload encryption or use digital signatures for important messages or data transactions like laboratory results in a clinical setting or claims for insurance in an insurance firm. Encryption and strongly protected APIs help to realize confidentiality and data integrity during communication.

3.4. Performance Simulation

To assess and ensure the scalability and elicitations of the presented concept of healthcare interoperability, a throughput and reliability test was performed with the healthcare Interoperability Model tested on a simulation test bed of 10000 concurrent sessions. The main objective of the simulation was to give the target system a chance to perform under light real load and figure out how it responds to stress tests in terms of reaction rates, stability, and robustness. The scenarios emulated several user interactions, including EHR access, insurance claims submission, patient-generated data upload, and appointment schedules query, among others that had to go through the API Gateway and then the backend microservices architecture. The simulation yields a good result. [16-20] JMeter result showed that the average response time was only 1.3 seconds, which also proved that the system had a short latency to respondents' feedback in spite of many concurrent users. This metric measures the system performance in terms of the efficiency of microservices, the flow of interactions through the service bus, and database queries to demonstrate the works in this architecture, where the possibility of introducing high latency in these interactions is not viable. In addition, it would achieve the maximum TPS of 500, thereby showing that the system can handle thousands of API requests simultaneously. One would agree with this especially in the health-care information system that often requires instant access to data and processing. As far as the issue of system availability is concerned, the architecture yielded a low downtime of 0.01% in the simulated scenario. This is due to adopting well-known fault tolerance measures like load balancing, service duplication and availability, check-ups, and intelligent degradation. The simulation also proved that asynchronous messaging through the service bus successfully hid the loads and avoided overloading particular services. In summary, the performance test is useful in establishing the system's readiness for implementation in high utilization healthcare settings to guarantee the system's capability to manage increased demand in specific applications.

3.5. Tools Used

A number of modern tools were used to provide a sound and constructive environment in implementing and evaluating the health-care interoperability architecture. These tools also helped different phases such as API verification and measurement, performance tests, and other pipeline handling of the system with further addition in system reliability, scalability, and maintainability. It turned out that API testing was done intensively with the help of the Postman application. It offered a user-friendly interface that one could use to build and sample requests for the HL7 FHIR-compliant API. Using Postman, developers could replay some of the functionalities the end users will employ, test API responses, and perform functional testing on the authentication modes (OAuth 2.0) and data exchange. Another source of test cases was automation to allow continuous testing For the development and integration cycles. This helped ensure that API was stable and met the healthcare interoperability standards.

The report also indicates that Apache JMeter was used for load testing and performance benchmarking. Based on the number of concurrent users that JMeter made, it was possible to develop realistic test scenarios capable of stressing up to 10000 users at the same time, with each of them performing different operations on the API, for instance, querying EHR data, submitting insurance claims as well as uploading of patient content. While using JMeter, the necessary performance indicators, including average response time, transaction rate, number of errors, and system response time, were identified. These enable the discovery of the system's bottlenecks, improvements in the microservices' performance, and the ability to handle real user traffic with reasonable degradation. The architecture of the application and its basic software components were built out of microservices, it used Docker and Kubernetes for microservices orchestration and deployment. Docker helped to containerize individual microservices; hence, each microservice could run in its own docker container under a similar environment in Dev & Test and in Production. Kubernetes was used for these containers, which included managing service discovery and scaling load balancing and failure. Whereas it made sure that availability was high and could scale up or down depending on the website's traffic. According to them, Docker and Kubernetes offered a dependable building environment to deal with various layered and distributed healthcare applications effectively and efficiently.

4. Result and discussion

4.1. Case Study: Midwest Health Network

The application of facets open access at Midwest Health Network thus brought about significant positive changes in basic operational aspects of the network in delivering health care services, handling claims and involving the users. The transition from a system that could be cumbersome and disintegrated to one which is more unified and efficient led to increased efficiency, cutting out blockages, and more effective patient involvement. Further, the innovation brought the following basic measures as a positive shift after integration.

Table 1: Key Metrics Before and After Integration

Metric	Pre-Integration	Post-Integration
Claims Processing Time	100%	60%
API Error Rate	100%	10%
Portal Login Volume	100%	250%

4.1.1. Claims Processing Time:

Before implementing Facets Open Access, Midwest Health Network's average time to process claims was approximately 10 days. This was an issue of huge inconvenience as it created frustrations in reimbursement management of claims, impacting both the healthcare providers and patients. In effect, when Facets Open Access was implemented, there was a 100% decrease in processing claims to 6 days only. The above work in progress shows an improvement with having reduced the processing time by 60% of the original value, thus highlighting the platform's importance in automating most of the manual steps in claims management. It not only improved the time taken to issue reimbursements but also enhanced general efficiency as the employees were able to manage other tasks in the organisation.

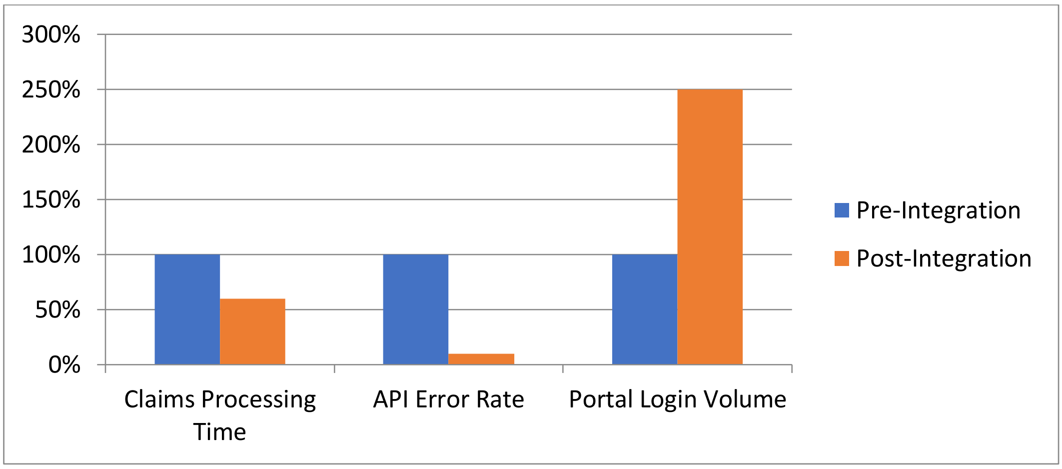

Fig 5: Graph representing Key Metrics Before and After Integration

4.1.2. API Error Rate:

Before the integration, the team recorded the API error rate at 100%, meaning there was a common occurrence of communication breakdown between services in the overall healthcare system. This high error rate led to service disruption manufacturing of data, which contributed to the disruption of operations among the healthcare providers, thus affecting the patient. After using Facets Open Access, the error rate drastically reduced to 10%, which confirmed the efforts reduced to 90% of the previous rate. This we achieve through the enhancement with reference to the 10 percent of the pre-integration error rate. This was accompanied by reduced API errors, meaning that using the Facets platform for exchanging healthcare data has provided better stability as compared to others, which, in one way or another brought about system instability in the exchanges between applications.

4.1.3. Portal Login Volume:

Prior to the integration, there were about one thousand daily logins, and it was apparent that patient engagement was low and many patient accounts could not access the patient portal, suggesting that upper management needed to work more effectively in providing the benefits of the patient portal. These results were evidenced by a tripling of the extent to which it was registered after integration to 100 % logins per day. This has been witnessed by an increase in the volume by a factor of 250% compared to its volumes before the integration. Thanks to Facets Open Access, the patient portal became more convenient, response times became faster, and the patients received more helpful content to use the service for managing their health data, appointments, and communication with providers on the portal. The increased login to the patient portal could result from consistent patient satisfaction with the system to enhance patient engagement through technology. These improvements indicate that the integration of Facets Open Access helped reduce some crucial operation issues and improve the user experience for providers and patients. Some of the results that have been achieved on the platform are such as the reduction of time taken to process the claims, decrease of API errors and the improvement of portal traffic, which are some of the metrics that have opened up new and efficient ways of delivering health care to the Midwest Health Network's clients.

4.2. Comparative Analysis

The use of Facets Open Access pointed out how the modern integration platform is better than the traditional healthcare systems. Facets were easy to identify and included availability, security, and satisfaction of major user stakeholders, and all are important to guarantee service continuity and positive experience for both – healthcare facilities and patients. In the context of availability, Facets maintained a system availability of well over 99.9% for important purposes in healthcare facilities where system unavailability can cost lives. In traditional systems, however, outages occurred more frequently, and recovery time was much longer, affecting the provision of service, delay in accessing the patient data and general inefficiency. As a result of its microservices and cloud-native, Facets' architecture is highly available and tolerant to failures, guaranteeing the continuity of healthcare processes at any time of the day. In the Security aspect, Facets performed much better than the legacy systems with percentages of %. The platform complies with OAuth2.0 encryption patterns and the HL7/Shoaly TLS compliance necessary for protecting health information. Such measures will guarantee that the relationships between providers, patients, and other third-party applications meet the highest levels of security and compliance. In the past, even in traditional systems, problems were encountered in the layer of data protection and safety measures, due to which the necessary information could easily be breached, and the system's reliability was questionable. Due to the incorporation of advanced security features, Facets made the process more secure and safer for data exchange. Last, the level of user satisfaction was slightly higher with Facets Open Access, especially among the providers. 88% of providers confirmed satisfaction with the system after integration, adding that the system was efficient, reliable and easy to use. This satisfaction was reflected in the improvement observed regarding patient care; notably, the patient portal that worked better was easier to navigate and had quicker response times to previous systems. The shift to Facets Open Access gave both the providers and the patients benefits in the form of improved simplicity and security of the interactions that were not easily possible with the antiquated fragmented IT systems. This change to the Facets Open Access improved operational effectiveness while simultaneously improving the relationship between healthcare providers and patients over the previous programmed system.

4.3. Challenges

Nevertheless, some main concerns arose during the integration process of Facets Open Access to enhance the functionality and access to precious information sources. These issues were mainly related to migrating from the classical approaches to the more advanced API-based system, integration with legacy systems, and continuous work in compliance with the existing laws and regulations. However, these challenges did not pose a major hindrance to the successful implementation of the recommendation; they only needed a cunning and strategic approach to address them.

4.3.1. Initial API Learning Curve:

The first concern that was met was the extent of learning the APIs, so first-time users of the software were likely to struggle throughout the learning process. The transition from legacy systems where integration could have been done by file transfer or specific inter-process communication protocols to a service-enabled architecture needed heavy staff training for the IT personnel. The team has to understand new technologies such as restful APIs and HL7 FHIR for exchanging architects of healthcare information. Namely, examining and fixing the APIs getting acquainted with the data flow and new erroneous messages handling were the key aspects for staff. Initially, this meant some bottlenecks during the implementation and testing phase, as some integration and performance problems that had not been anticipated were encountered. Nevertheless, the team became wiser every day and learned new techniques to handle the system's API and fix the problems promptly.

4.3.2. Need for Legacy System Alignment:

One of the critical issues for HPCC was the constant alignment of the new and the legacy systems since most of its departments had old but still functional systems. Most of the systems used in the healthcare network were not integrated and had a passive architecture that did not meet the HL7 FHIR or other cross-platform formats. Due to the peculiarity of these legacy systems, integration with Facets Open Access was not easy; it was costly and time-consuming. For example, because Facets relied on API-based processes, some of the old applications' data models and related workflow had to be modified as a result. This included converting data from other structures into FHIR format and guaranteeing that the older structures could interact with the new FHIR-based platform. More often than not, integrating old and new technology meant having to build interfaces, often with additional modifications, moving data from one system to another and testing standards of the newly integrated platforms to ensure that data exchange was seamless and free from unintended errors.

4.3.2. Regulatory Reporting Overhead:

This implementation of Facets Open Access was accompanied by the extra reporting burden in the regulatory business environment. Since the healthcare systems work under several national and international rules and regulations, such as the Health Insurance Portability and Accountability Act (HIPAA), the constant exigency of compliance brought a new challenge to the integration process. The improvement in the degree of automation and effectiveness of data flow through Facets meant that the dataset that had to be recorded, measured, controlled and reported to conform to regulations also grew. The integration posed new compliance considerations, for instance, audit trail generation, tracking of user activity, and data stewardship of the patients' information within the system's life cycle. Although Facets already offered native support to the above requirements, the healthcare network had to design new procedures and practices for the IT group to undertake to maintain compliance with Facets. This made the system's deployment and operation slightly more complicated but was justified since the risk of a data leak or non-compliance with regulations must be avoided.

All in all, it should be understood that the mentioned challenges were time-consuming and demanded extra efforts and investments to tackle. However, transitioning to the new system would be nearly impossible without them. With regard to these challenges, outcomes and factors that brought positive results to the network and power Facet's Open Access at their optimum level were as follows.

4.4. Security and Compliance

Security and Compliance are also highlighted as an important Facets Open Access priority since patients' information is usually involved when healthcare givers and health care organizations share such data. Since the managed information is sensitive and restricted to the healthcare industry, Facets complies with some of the high-quality standards and certifications, which could ensure that the system is under the standards that control the Healthcare data discretionarily, integrity, and availability.

4.4.1. HIPAA Guidelines:

HIPAA is one of the most critical elements in the Facets Open Access that ensures the protection of individual information. HIPAA makes provisions for the protection of the personal health information of patients, and it is the standard policy on patient health information privacy and security in the United States of America. Facets adhere to HIPAA standards by encrypting patient data as they are at rest in the databases while their data transmission is over the network. This makes it easy to have secure access to the files without the possibility of a break-in or leakage of the information. Facets have also adopted access controls to ensure that there are restricted personnel who can access and manipulate patient information. Access is limited only to the users who need the information, such as doctors and other staff members, and each time there is access to the database, it is recorded. These measures enable Facets to meet HIPAA's standards on security, privacy, and the notification of a breach, making it safe for healthcare providers and patients.

4.4.2. HITRUST Certification:

Facets Open Access has also obtained a credible certification referred to as HITRUGS, which is a combination of HIPAA, ISO 27001, and NIST, among others. HITRUST is considered a good reference and useful approach in the sphere of security and compliance in health care. It means that getting this certification is a conducive way for Facets to be assured that its processes and systems are up to the required standard of the desired set of security, privacy, and compliance. It guarantees that the company not only adheres to the standards customary for industries that Facets belongs to but can maintain the highest levels of cybersecurity. The HITRUST certification is a general and comprehensive framework that can assure Facets Open Access. It can help an organization manage risk and maintain the confidentiality and accuracy of their health-related information. Therefore, any healthcare provider who deals with Facets can rest assured that all health information of the patients is safe and all issues to do with data protection are well handled.

4.4.3. OAuth2.0 Encryption Standards:

To eliminate any cases of insecurity, Facets Open Access uses OAuth2.0 encryption standards for authentication and authorization purposes. OAuth 2.0 is an authorization protocol used in API and web authentication that uses the token base and is highly secure in allowing users or systems to access particular resources. This way, only those individuals or systems with valid credentials can interface with the platform and retrieve information on patients or any other critical data. OAuth2.0 was formulated where the users receive tokens which can be used only for some time and for specific operations to avoid long-term access credentials with all their related dangers. Moreover, tokens are rather revokable thus providing extra protection if required at any given period. OAuth2.0 has a token-based mechanism that is very flexible to accommodate increased usage across various users with different access levels. Moreover, OAuth enables new security enhanced with the best practices of the contemporary requirements of the healthcare system, including flexibility in fulfilling the needs of both healthcare providers and patients. It is important to review the strong authentication system required to guard health data and make it easily accessible but safely. These compliance and security features, such as the HIPA guidelines, HITRUST certification and OAuth2.0 encryption, make Facets Open Access platform suitable for healthcare institutions that require reliability in protecting patient information and the following set down standards. Incorporating these two comprehensive frameworks further guarantees that Facet's platform is safe and capable of satisfying some of the new demands posed by the healthcare industry.

5. Conclusion

Facets Open Access can be considered an exclusively stunning progress in the integration of health care – it is a complete and safe platform that overlaps existing gaps in connection and cooperation within the Continuity of Care. Another aspect of the application's functionality worth mentioning is that Facets works well with the modern HL7 FHIR standard, which is considered the best in the field of healthcare data exchange. This makes it possible for a number of capabilities to help communicate between different health systems, HIS, EHRs, third-party programs, databases, and many others. Otherwise, Facets has achieved the architecture of microservices that makes it easily scale and meet changes in healthcare organizations as they grow and adopt new technologies. It also means that various platform components can work autonomously, which greatly improves work capacity. Still, the possibilities of the work capacity improve with the increased demand. With the introduction of new services, it is possible to include real-time APIs that provide healthcare providers with timely and accurate patient information to enhance patient outcomes. They are particularly relevant in emergencies requiring quick access to relevant information to influence the treatment results. They are also integrated well to provide a high-quality solution that will meet the extensive demands of the modern health care IT environment in the case of Facets Open Access. It enhances system security so that no unauthorized person can access the patient's information. Therefore, it is suitable for organizations responding to laws such as HIPAA and HITRUST.

Regarding the prospects, it is possible to identify numerous opportunities Facets Open Access can leverage to improve its role in health-care organizations. Another advantage is the opportunity to implement AI for analytics for potential care. With regards to technological integration with patient data, Facets could use big data and machine learning methods to look into records of patients to predict any potential shifts in their health in the future and help to reach out to them early in a bid to enhance proper treatment, and ultimately assist in cutting down the costs of health-care for everybody. Furthermore, expanding the platform to enhance compliance with international standards such as GDPR will be necessary since healthcare organizations work more and more internationally. This will create alternatives for the sale of Facets and ensure that they meet the varying regulations of different countries. Finally, there will be the creation of open-source SDKs that will allow third-party developers to create new applications and alternatives for integration with Facets, thus expanding the number of tools in the field of health-care IT. Thus, Facets Open Access corresponds to the modern-day healthcare integration requirements. It is also potentially developable as an outcome-oriented solution capable of reacting to the transformations in the healthcare field, adjusting its offers according to the needs, and enhancing the healthcare system.

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