



Secure CRM Modernization: Architectural Patterns for Migrating Enterprise Customer Data from Legacy CRM Platforms to Salesforce

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ABSTRACT: Enterprise organizations are finding it challenging to modernize the old Customer relationship management (CRM) systems and ensure data, business continuity and security. In this paper, I will design a safe architecture which will transfer enterprise customer data in the old Siebel CRM systems to Salesforce. The proposed solution will involve integrating ETL architecture, systematic data mapping, data-quality management, Salesforce data-model conversion, and security in addressing the intricacies of the heterogeneous legacy environments. Special focus is on the safeguarding of personally identifiable information (PII) and enhancing identity and access control as well as the confidentiality of data in the extraction, transformation, transfer, and loading process. Within the framework, there are gradual migration processes and organised validation processes to find out data wastage, replication, discrepancies and transformation errors until and beyond migration. It also analyses other methods of cutover, such as phased, parallel and controlled final-cutover methods to reduce the risks of disruption to operations and migration. The suggested model integrates the concept of modernization with security aware migration trends with an objective to provide a formal underpinning to trustworthy and verifiable Siebel-to- Salesforce transformation. The paper adds an architectural approach to the organizations that aim to explore scalable, secure and tested CRM modernization without deteriorating the quality of customer-data, adhering to regulations and ensuring business continuity.

KEYWORDS: Salesforce Migration, Siebel CRM, Legacy CRM Modernization, ETL Architecture, Data Quality, PII Security, Migration Validation

I. INTRODUCTION

CRM platforms have become a dependable tool among enterprise organizations to store customer profiles, customer interactions, sales and service transactions, account information and other data that are critical to the business processes. However, there are still CRM settings within several huge organizations that are developed on outdated technologies that have evolved over time. These are full of hugely customized data model, code tightly coupled application modules, archaic integration systems, and non-similar data repositories. The pressures of these limitations can make a legacy CRM ecosystem more challenging to sustain and to evolve with the ongoing changes in business needs, customer expectations, regulatory demands, and online-service potentials. Therefore, modernization has turned out to be a significant architectural policy by the organizations that want to enhance their scalability, interoperability, maintainability as well as operational agility and retain the valuable historical information about their customers.

Modernization of legacy systems is not just a technology change undertaking. It incorporates the knowledge of the current application architectures, the presence of business capabilities that can be reused, changing the traditional objectification and defining the appropriate integration mechanisms. Existing literature has highlighted how difficult it is to determine and isolate services of an old application, especially where the modernization needs to maintain existing business functionality and business relationship existing among application components [1]. Paradigms such as service-oriented and reengineering have therefore been sought as the means of transforming the largely obsolete environments to newer designs slowly [2]. These outcomes are particularly relevant to CRM modernization because of nature of enterprise CRM systems that are both interconnected, in the sense that they are interconnected in terms of customer, account, contact and opportunity data, as well as service and transaction data that need not necessarily be copied and efficiently transferred through basic database copying.

The issue of modernizing an old CRM-as-a-legacy platform to a cloud-based CRM area has even greater concerns regarding the data transformation and compatibility with a target system. Other platforms such as legacy platforms may have a distinct perception of business entities as compared to present CRM platforms and therefore, discrepancies of field structures, relationships, identifiers, data types, validation rules and business semantics may all be present. By



implication, since such migration is a systematic, data mapping and transformation, rather than a direct extraction and loading process. The data needs to be profiled, cleansed, transformed, matched and validated prior to being absorbed in the target environment. Not transforming could result in record on customers, nonexistent relationships, inconsistent values, negative references, or missing history information. These problems can be in turn applied to the customer service, reporting, analytics and organizational decision making.

Another aspect of modernization of CRM that is extremely important is security because the databases of the business customers usually contain personal identifiable information (PII), and contact data, transactional data, authorization data, and commercially viable information. This information is revealed to other processing steps through exposures of the modernization activities to subsequent processing steps as well as to intermediate storage and integration points and migration channels. A modernization architecture that is security aware should thus include correct identity and access control, data protection, secure transfer processes and preventing controlled access to migration environments. Investigations of legacy-system modernization have shown security in particular as an issue of importance in modernizing the older information systems into new technological setups [3]. This means security ought not to be regarded as a post-migration activity but something that has to be done during extraction, transformation, transfer, loading, and validation.

The re engineering of legacy systems also requires the systems to move the functionality and data into the new platforms slowly with little impacts on the running systems. Modernization strategies based on frameworks show how structured change processes are essential to address legacy dependencies, and organizational needs [4]. Similarly, modernization studies have investigated the way of re-engineering legacy applications to new modern architecture and yet ensuring the required business functionality [5]. In these perceptions, the migration planning should consider the target platform of the migration and planned order of migration processes, reliance of transformations, validation and operational transition plans, also.

These requirements are especially important to the Siebel-to- Salesforce migration scenario in the instance of modernizing CRM. The environments of Siebel CRM can have years of customer data, customized entities, business rules, industry integrations and company specific processes. Conversely, Salesforce provides cloud-based CRM architecture which has its data model, object relationship, security, interfaces and governance features. Moving legacy records without analysing the architecture can thus lead to issues related to the quality of data and compatibility. An effective migration should entail an integrated architecture that shall involve the extraction off the legacy, staging and profiling, transformation and mapping, quality improvement, security transfer, loading into Salesforce and automated tests. Modernization studies also show the importance of design and conceptual models to oversee the transfer of old systems to the new digital environments [6].

Even though research has already been discovered on the legacy modernization, service identification, transformation with a view to achieve security and the model driven modernization, there is still a research gap that would amalgamate the implementation of architecture which would be pertinent to the specific topic of secure enterprise CRM data migration. Specifically, the interrelation between data mapping, data quality, PII protection, identity and access management, incremental migration, migration validation and cutover planning needs to be considered in a systematic manner. These dimensions might be individually treated and lead to leaving important dependencies among data transformation and security controls incomplete.

The paper thus discusses a safe architectural guideline to modernize enterprise CRM settings by migrating off old Siebel CRM systems to SalesForce. The framework integrates application of ETL processes, legacy-to-target data-map, data-quality management, Salesforce data-model transformation, security controls and identity management, incremental migration, guided validation. It also considers the phased cutover, parallel cutover and the controlled cutover to ensure minimal disruption in the operations. It is meant to provide an architectural base formally to organizations that want to modernize pre-existing CRM systems in a way that does not impact customer-data integrity, security, traceability and business continuity.

II. RELATED WORK

The trend in modernization research on heritage modernization systems has shifted to novel systemic architectural approaches to systemically consider the application disintegration, services, security, interoperability, data changeover, and organizational needs without relying on the one-off code transformation method. Such studies provide a good



foundation to come up with secure procedures of moving CRM systems deployed in the past legacy setting to the recent cloud systems.

Abdellatif et al. systematically reviewed the literature on service identification strategies to be deployed in the modernisation of legacy software and developed a taxonomy in terms of input factors, the process, output and usability [1]. They analyzed 41 techniques of service-identification, highlighted the limitations into the field of automation, tool support, quality measurements, and Corporate scale systems validation. The results show that the process of modernization demands the methodical processing of legacies artifacts, preceding the change of architecture. This perspective can find its application in the context of CRM modernization in that the old customer entities and business functions are to be identified and appropriately aligned with target-platforms. Da Silva et al. also investigated into the reengineering and DevOps with service oriented process of creating micro services in a tax environment in Brazil [2]. Their contribution demonstrates how legacy applications can be further developed into modular services through step-by-step transformation of them into the fusion of the practice of development and operation. This research is applicable to CRM modernization due to the incremental change allowing to minimize risks that could arise in case of replacing closely integrated enterprise applications.

Modernization based on security has also been an issue that has been well covered. Khan et al. developed a modernisation model which had a particular objective of enhancing the security of the legacy information systems [3]. Their work is devoted to the fact that such aspect as security should be considered in the process of modernization and cannot be considered a separate post-migration project. This philosophy is particularly pertinent with regard to the CRM systems that store the personal identifiable information, customer credentials, account details and commercially sensitive records. Security conscious migration will then impose the right access control, data security during transfer and security requirements in the lifecycle of the modernization.

To the same end within the frame of the software development to mobile computing platforms, Alkhalil developed its development in terms of a framework and case-study approach [4]. The study shows the importance of coming up with the capacity to realign the existing software functions to emerging technological fields in a systematic way rather than copying the practice of implementation that was so obvious in the past. This method provides a convenient conceptual aid to the CRM migration in which case the functionality in the business must remain the same, but data structure, interfaces, and application services must be transformed in line with the benefits of a new platform. Perez-Castillo et al. went a step further to expand on this modernization problem by addresses modernization of the software in new technological conditions and the relevance of ensuring that the old systems are modernized and retained a lot of the functionality in the old systems [5]. Their writing assists the larger decree that the modernization has to deny across the commercial viability and features retention.

Bakar et al. created an idea of legacy-systems modernization in the context of the citizen-oriented digital government [6]. Even though the area of application varies with the enterprise CRM, the study is applicable since it focuses on modernization as a planned organisational and technological change and not a mere replacement of old software. The model also attends to both the necessity to understand the effects of the legacy system features, but also aligning the modernization efforts with the requirements of the targeted environment.

Sanchez et al. explored a modernization process which is semantic and model driven and hinges on business process and web service alignment [7]. The approach they have taken does not require alteration of business processes and other technical services focus during modernisation. This is significant to CRM migration because the customer management processes more than frequently transcend multiple entities and integrations, workflows and service functions. Model-driven alignment may thus be able to help in systematic change of business requirements into target-platform structures.

Moutaouakkil and Mbarki also analyzed the modernization of PHP older code using the generation of Knowledge Discovery Model (KDM) models [8]. Their analysis in this case shows how it is convenient to extract structured representations of the old applications prior to changing them. Suchs can also be used in the analysis of dependencies and real application structures too which is also critical in the process of determining the relationship of data and business dependencies in the legacy CRM systems.

A framework to transform legacy systems based on the CMMI was then introduced by Khan et al. [9]. Their work accents the discipline of processes and a regular modernization of its processes and it has been suggested that successful transformation should entail recurrent procedures rather than a move to migrate seemingly on the spur of the moment. Similar notion of a guidance process to the modernization of the legacy applications to the Service-Oriented



Architecture was proposed by Baghdadi and Al-Bulushi [10]. Their approach sustains the need to plan thoroughly, study architecture, and nurture change towards the complex legacy structures.

Bakar et al. offered a first insight into the modernization of legacy-systems towards citizen-centric digital government and determined modernization as multidimensional process that included both technology and organization factors [11]. Miah considered the involvement of the end users in the development of e-government applications and came up with a conceptual framework highlighting the importance of the problems of the end user in system development [12]. These attitudes may be applied to the CRM modernization since the successful migration must be not only compatible, but also business-user requirement and customer-service functionality.

Flores and Rezende noticed how information created in social media can be taken as a support tool to plan digital-city and take citizen into consideration [13]. Their analysis shows the increasing significance of combining diverse information sources into the contemporary online setting. Srimuang et al. suggested a user-based evaluation framework of open government data, in which systematical evaluation of data-related components and relative importance is presented [14]. These results are conjectural insights that support the data-quality/validation processes in the context of modernization projects.

Fatorachian and Kazemi examined the impact of Industry 4.0 technologies on the supply-chain performance and demonstrated the role of digital transformation and the importance of integrating technologies in an organization as more important [15]. Muller et al. have touched on opportunities and challenges, which influence the implementation of Industry 4.0, and pointed out the need to strike a balance between the technological opportunities and organizational and sustainability-related challenges [16]. These studies altogether affirm the data that modernization is not simply a technical migration process but a bigger change process, which entails architectural planning, data management, data security, aligning processes, and organizational readiness.

On the whole, the literature reviewed provides solid grounds to legacy modernization, service decomposition, security enhancement, model-driven transformation, and organized digital transformation. Nevertheless, the literature lacks the systematization of these dimensions towards sizable enterprise CRM data recuperation. In particular, legacy-to-Salesforce data mapping, PII protection, and data-quality, identities, incremental migration, validation, and controlled cutover are not properly addressed. This non-integrity is what leads to the development of a hybrid secure architecture design of Siebel-to-Salesforce CRM modernization.

III. SECURE CRM MODERNIZATION AND MIGRATION ARCHITECTURE

The suggested framework presents a security-minded system, which allows a legacy Siebel CRM setup to be transformed into a new CRM ecosystem, built around Salesforce. The framework is based on the concept that the CRM modernization should not only revolve around the transformation of data, its quality, safety and business continuity and the validation of the migration, but it also should not be limited to a rather simplistic concept of viewing migration as an extract-and-load operation. The architecture will therefore be integrated with legacy-system discovery and managed extraction, transformation, secure transfer, Salesforce data-model correspondence, gradual migration, verification and final cutover. This kind of integrated architecture allows organizations to have valuable customer data as they gradually get out of a legacy tightly-coupled environment, into a scalable cloud CRM environment.

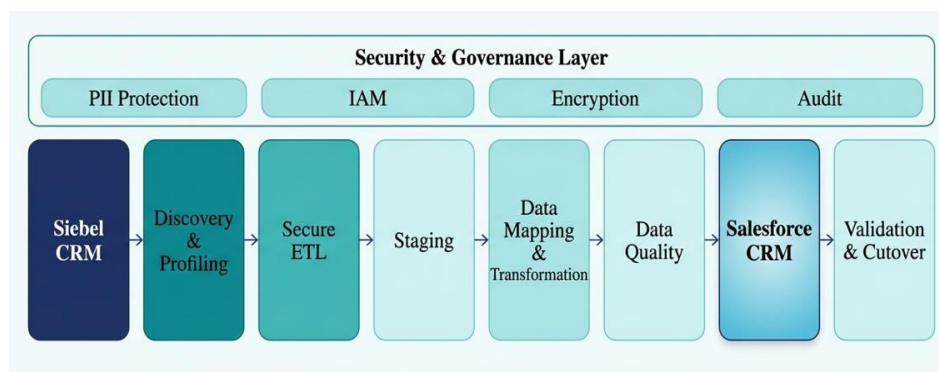


Figure.1. Secure Siebel-to-Salesforce CRM Modernization Architecture



3.1 Legacy CRM Discovery and Data Profiling

The first universe of the building will be about getting conversant with the present state of Siebel in the environment before the migration process is initiated. CRM discovery Legacy CRM discovery reveals key business objects, database tables, custom fields relationship, interfaces, workflows, historical entries, business regulations, and dependencies in regards to customer management processes. This is done since many long-lasting enterprise CRM systems are customized and may have structures that were not always replicated on Salesforce.

The next task is carried out to determine data profiling to identify the completeness, uniqueness, consistency, validity and structural attributes of available data. This is done by analyzing the records of the customers, accounts and contacts, opportunities, services and transactions to identify the missing attributes, inconsistent format, record biasing and duplicate records, out-of-date values and referential integrity. The product of this layer is a structured inventory of legacy-data that is the basis of mapping and transformation choices. The discovery phase also determines sensitive data, especially personally identifying information (PII) which leads to consideration of the security needs prior to data flowing into the migration pipeline.

3.2 Secure ETL and Staging Layer

The second tier will include the controlled ETL structure that will gather data out of Siebel, prepare it to be converted and deliver it to the target environment. This will be ripped out through controlled interfaces, or information-access mechanisms, appropriate to the legacy environment. Rather than loading the data into Salesforce the framework offers a controlled staging area in which any dataset extracted may be inspected, processed, reconciled and verified.

The staging layer provides segregation between the target and source system, and also facilitates reproducible cycles of migration. The data generated by the Siebel is tentative and is kept in a controlled environment where the access control and monitoring are availed. Sensitive datastores are stored in storage to ensure these are secured and when switching datastores, a migration process is documented to provide traceability. The ETL pipeline also supports incremental extraction of data, with a further step in the migration process being able to produce a fresh or updated record after the initial migration process. This will reduce the volume of data that is to be processed in the eventual transition and assists in business continuity.

3.3 Data Mapping and Salesforce Model Transformation

One of the key elements of the framework is the legacy-to-Salesforce data transformation layer. Siebel objects and attributes are mapped to Salesforce objects, fields and relationships and identifiers. Since both the source and the target systems have different data models, mapping decisions are required to account to both structural and semantic equivalence.

Mapping process entails creating associations between old objects and Salesforce objects and stipulates the rules of field conversion and convert data-type values, default values, mandatory values, reference determination, and identifier retention. Specific focus is taken on customer, account, contact, service and transactional information relationship. In cases where a one-to-one mapping is not available directly, transformation rules are specified to merge, separate, derive or restructure records based on the desired data model.

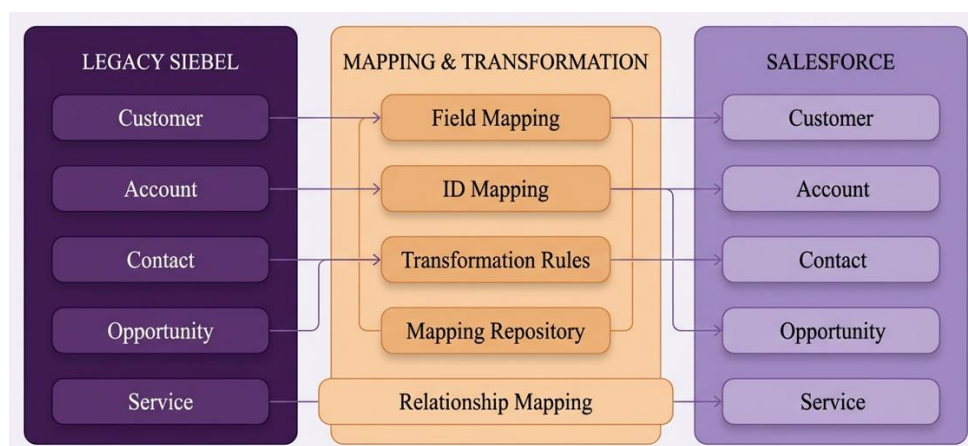


Figure.2. Legacy-to-Salesforce Data Mapping and Transformation Model



To achieve traceability of source attributes versus target attributes, a mapping repository is kept. This repository facilitates migration governance since it documents rules of transformation and is able to be used to explore the inconsistency that was found during the validation. It also lessens the chances of inconsistent transformation when migration is conducted in batches.

3.4 Data Quality and Remediation Layer

Data quality management is a process, running through the entire migration pipeline, as opposed to being a part of change itself. It has a framework with profiling, cleansing, standardization, deduplication, validation and reconciliation processes that occur prior to loading data into Salesforce.

Entrepreneurs identify duplays and consolidate them in the records of the customers and accounts according to the laid down business rules. Missing values are fixed and invalid values fixed to be consistent. Referential relationships are also found to be that the records that have been migrated are in correct associations as needed. Records which fail to match predefined quality criteria are put into exception datasets to be reviewed, instead of being automatically loaded. This layer provides quality checkpoints you can measure prior to and following migration. This is because it will ensure that the successful loading will not be the sole indicator of migration success. Uniqueness, consistency, accuracy and structural soundness The information must be complete, consistent, valid and structurally sound in the target environment.

3.5 Identity, PII, and Security Control Layer

Security is a cross cutting layer which involves extraction, staging, transformation, transfer, loading and validation. Sensitive customer data is also likely to be contained in CRM datasets, thus, migration elements are restricted to particular jobs and tasks. Migration administrators, data stewards, operation users and developers are subject to identity and access management controls.

PII is defined as a part of the profiling process and is placed into proper protection measures across the lifecycle of migration. Data transfer is accomplished by employing an encrypted communication medium and sensitive testing data is guarded against unauthorized assaults. Integration services and administrative interfaces have authentication and authorization mechanisms. Material migration processes (extraction, transformation, transfer, loading, validation and exception handling) are represented by the migration to logs and audit processes.



Figure.3. Security-Aware CRM Migration Control Layer

Such security measures also offer separation of duties whereby one or the other operations role cannot liberate the rest of the migration activities. This will minimize the chances of unauthorized alteration and enhance accountability. Security validation is done as part of data validation to ensure that there is compliance with information-integrity and access-control requirements by migration processes.

3.6 Incremental Migration and Synchronization

The structure believes in the slow migration to reduce disturbance. A initial migration process transfers a limited number or a historical foundation of data to Salesforce. Subsequently, new migration cycles take copies of new or updated records of the Siebel environment and distribute them to the new platform.

Incremental processing allows migration team to identify transformation and quality concerns at an earlier stage compared to this being identified during final cutover. Migration cycle provides the information of the reconciliation, showing records extracted, transformed, loaded successfully, rejected or to be remedied. By using this method also allows the business stakeholders to check the migrated information before the ultimate transition.

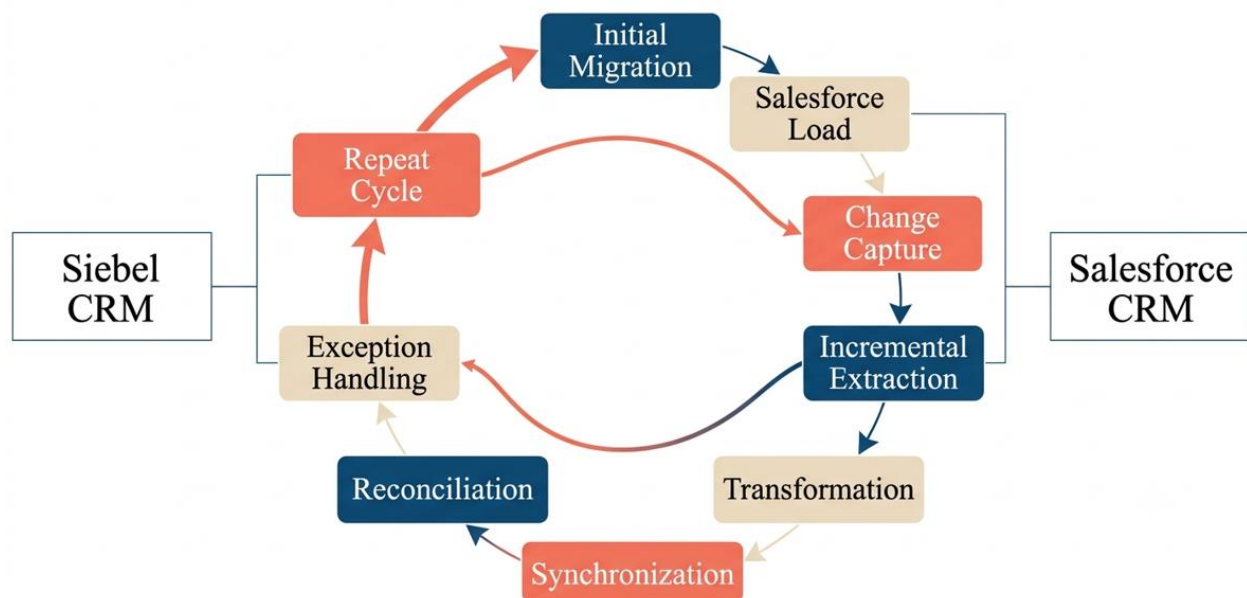


Figure.4. Incremental Migration and Synchronization Cycle

The synchronization processes are most crucial at the time when Salesforce is being prepared and Siebel is still running. Any changes that take place within the source environment need to be monitored and introduced into the further migration processes such that the target environment is in close enough agreement with the source prior to final cutover.

3.7 Validation, Reconciliation, and Exception Management

validation is not a matter of process post migration, but rather an architectural phase. The framework looks at the results of migration at different layers like the number of records, the values of different fields, relationships, business rules, data-quality requirements and security requirements.

When the release of missing, duplicated, transformed or rejected data is being done, the source-to-target reconciliation is performed to compare the extracted records with the Salesforce records. Validation checks consistency of relationships between migrated entities, as well. Exception records are classified based on the type of the problem and sent back to the relevant stage of transformation, quality or business-review.

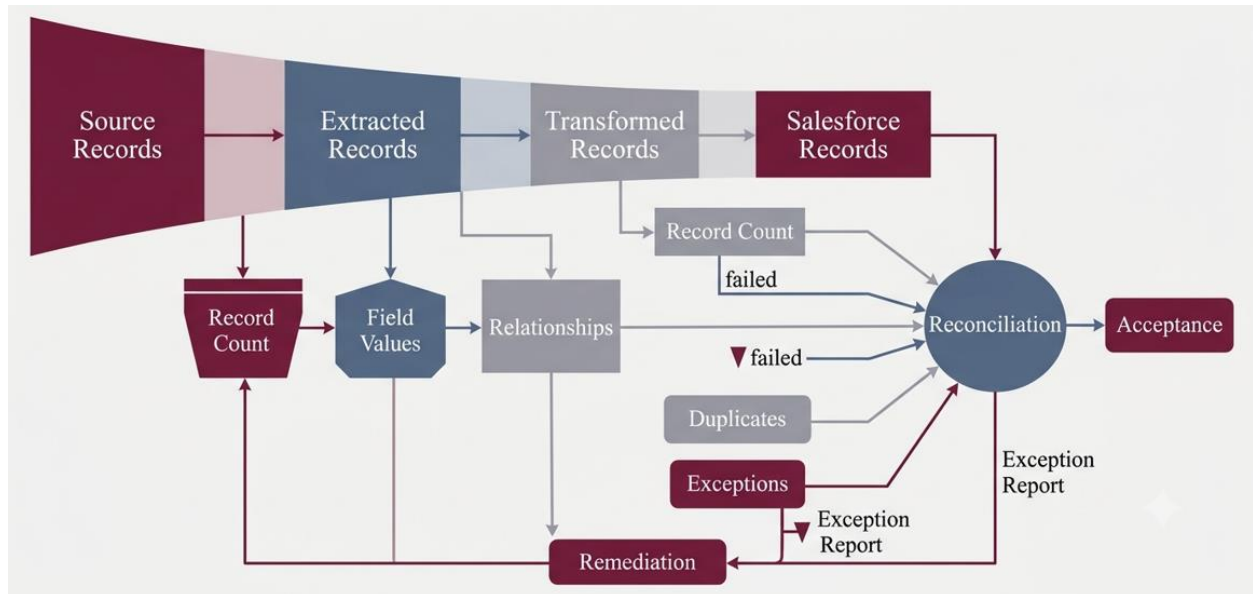


Figure.5. Migration Validation and Reconciliation Framework

The validation/remediation loop allows a repeated process of migration till acceptable pre-specified conditions are met. This provides an auditable process of migration whereby migration preparedness is determined with proofs instead of just successful system loading.

3.8 Controlled Cutover and Operational Transition

The last level of framework deals with the Siebel- Salesforce transition. It is possible to consider three strategies, namely, phased cutover, parallel operation and controlled final cutover. A smooth transition period decommissionizes business units or functional regions with minimal severity of any transition. Parallel operation retains the two environments over a specified time to enable business users to compare outputs and determine the inconsistencies that still exist. controlled final cutover services transition the organization to Salesforce following content-datatype-predetermined data-quality, security, reconciliation and business-ready benchmarking.

The framework proposes that the cutover determinations should be based on quantifiable validation results and, not just based on the calendar. Before the transition, the last synchronization cycle runs and checks of essential customer and business records should be done. Monitoring Post-cutover This is then proceeded by post cut over monitoring to identify any anomaly of operations and resolve any remaining migration exceptions.

Overall, the proposed structure integrates legacy discovery, secure ETL, data mapping, Salesforce model transformation, data-quality management, security and PII protection, incremental migration, validation, reconciliation, controlled cutover, on a single modernization initiative. Its key contribution is that it injects these traditionally torn asunder migration problems in to a security conscious CRM modernization architecture to provide a formal basis to a plausible and verifiable Siebel-to Salesforce conversion, and to improve upon data sanctity and business resiliency.

IV. ARCHITECTURAL CONFORMANCE AND MIGRATION READINESS ASSESSMENT

The framework offered is tested based on the architectural and migration-readiness standpoint instead of being tested by implementing the framework. The evaluation checks on the sufficiency of the framework in dealing with the key risks and needs of the secure Siebel to Salesforce CRM modernization. Evaluation considers architectural coverage, data transformation, their security, their validation, and their traceability and operational continuity. It is on these dimensions that a structural foundation is established of whether the framework would enable the support of an auditable controlled process of migration.

4.1 Architectural Coverage and Component Alignment

The initial measurement aspect looks into issues covered of critical migration issues in the suggested architecture. The framework has legacy discovery, data profiling, secure ETL, data mapping, Salesforce model transformation, data-



quality management, PII protection, identity and access management, incremental migration, validation, reconciliation and controlled cutover. The wide coverage minimizes the chances of addressing migration as a data-transmission operation.

The building elements also make a logical progression on the basis of progressive flow. Mapping is informed with discovery, requirements requirements defined by mapping, data-quality judgment motivated with transformation, and databases put under controlled loading and cutover to the successful databases. Consequently, one can distinguish individual major migration activity that has a definite place and a link in the overall architecture.

4.2 Data Integrity and Transformation Readiness

Evaluation of the framework is conducted based upon its ability to cope with both structural and semantic differences between Salesforce and Siebel. The support of data profiling, repository mapping, transformation rules, deduplication, standardization, and reconciliation offers the data integrity mechanisms across the migration lifecycle.

This is a very big plus since transformation is not linked to final loading. Prior to the loading of information into Salesforce, data can be analyzed and remedial measures taken, but in contrast, exception datasets enable the correction of records which do not satisfy any predefined quality standards. This architecture enables migration readiness by making sure that the quality of data is considered before, during, and after transformation and not considered to be based only on successful loading.

4.3 Security and Compliance Readiness

The conformance of security is established after audit of sensitive CRM information to ascertain whether the data is safe all through the migration lifecycle. It consists of PII identification, controlled access, identity management, secure data transfer, and secure staging, audit logging, and separation of duties. These controls define security as a cross-cutting architectural issue not a dedicated post-migration activity.

Even the key migration operations can be identified within the framework. The recording of extracts, transformation, transfer, loading, validation and exception-control processes can assist in accountability and interrogation in case discrepancies and unauthorized operations are found.

4.4 Validation and Traceability

Migration validation and reconciliation processes are also done to check the Migration readiness. Record level comparison, field level checks, relationship checks, exception management and source to target checks all have multiple checkpoints that determine the consistency of the information migrated and that in the legacy source.

Repository and migration logs mapping also allow traceability back of the origin records, transformation operations, the target records and any known exceptions. This kind of traceability may be particularly essential in deploying use of enterprise CRM environments where a migration decision may need to be taken into account by technical staff, data custodians, security staff and business stakeholders.

4.5 Operational Continuity and Cutover Readiness

The last dimension of assessment is related to business continuity. Contracted final relocation, gradual migration, phase transition, operation concurrently, and repeated synchronizing are collectively employed to minimize the dependence on single high-risk moment of migration. The framework also enables identification of the issues of migration in the previous cycles hence some of the corrections can be implemented even before the transition.

A combination of data-quality, reconciliation, security, business and synchronization is what determines the outcome of cutover. This allows a more detailed migration decisions than schedule-based cutover.

The framework generally has a good architectural coverage in the key dimensions of the secure CRM modernization. Its analysis indicates that its data integrity, security, traceability, incremental migration, validation and operational continuity are inter-related concerns. The framework thus makes a systematic foundation about the measurement of migration preparedness as well as regulating the hazard of change that makes it not necessary to have the assessment rely on a given experimental treatment or data set.



V. ARCHITECTURAL INSIGHTS AND MODERNIZATION IMPLICATIONS

According to the proposed model of safe CRM modernization, the process of enterprise CRM migration cannot be perceived as the data-moving process but something that belongs to the architectural change. The framework integrates legacy discovery, data-profiling, ETL, semantic mapping, data-quality management control, security control, incremental synchronization, validation and controlled cutover. This unification breaks a barrier of contemporary studies of modernisation that did not succeed in creating work of research that remains unchangeably different in the matters of architectural change, security and data management [1], [3], [6].

Among the implications is that there should be data quality and data security that should be implemented as issues that relate to migration. Poor quality records of customers when copied, mis-linked or transferred without adequate provisions can serve as a security/governance concern. Profiling, PII identification, access management, secure transfer, and validation are placed in the migration lifecycle in the given architecture. It builds upon this by introducing the security-oriented approach to modernization advocated by Khan et al. [3] by putting security controls in the CRM data-transformation activities.

Semantic/traceable transformation is also observed as a fundamental component required in the scheme. The migration of Siebel to Salesforce involves variations in entities, attributes, relations and identifiers and business rules. It has a mapping repository layer and transformation layer that are used to provide traceability of the legacy representations to Salesforce objects. This is in line with the general concept of modernization suggested by Sanchez et al. [7] and Moutaouakkil and Mbarki [8], whereby structured representations are used to build changes, in a methodical manner, to the legacy environments.

The other key implication regards risk of migration and continuity of the business. Reconciliation Numerous separate cuts are made to reduce dependence on a large high-risk migration. Controlled cutover Repeated reconciliation Minimizes dependence Repeated reconciliation Numerous separate cuts are made to reduce dependence Cuts and synchronization Minimize dependence on a large high-risk migration. This reinforces process oriented modernization views of Khan et al. [9] and Baghdadi and Al-Bulushi [10]. The data completeness, consistency, security, and traceability are considered joint measurement rather than determining the success of migration a technical loading factor.

The framework, typically, suggests a security-sensitive architecture of CRM modernization that mediates data conversion and control, and operational contingency. The primary benefit it brings is harmonizing all of these dimensions into a standard path of migration that by providing imbued roots of reducing the uncertainty of the migration act, and retaining the integrity of customer-data and of the functioning facility of the business.

VI. CONCLUSION

More than a mere migration of records within a legacy system into a modern cloud based system is required to support enterprise CRM modernization. It entails planned data change, quality, safety, validation, and persistence of operations management. The article presented a riskless architectural model of the process of customer data migration in companies (old Siebel CRM system) to Salesforce. The framework consolidates systems legacy-system discovery, data profiling, secure ETL, systematic data mapping, Salesforce data-model conversion, data-quality administration, PII security, identity and access control, incremental synchronization, validation, reconciliation, and controlled cutover into a coordinated way of modernizing.

The architectural evaluation showed that the components can be used collectively to tackle big migration issues related to the heterogeneous legacy CRM environments. In particular, the framework dwells upon the fact that the data quality management should belong to the migration lifecycle, and cannot be evaluated solely once it is loaded in the target platform. Similarly security is also introduced as a cross cutting cut between extraction, staging, transformation, transfer and loading and validation. Traceability is also provided through the tracking in repositories and migration logs, which will enable organizations to trace decisions utilized in transformation, exceptions and discrepancies in a sequential migration campaign.

The business-needs include also the business-continuity-needs i.e. the incremental migration needs, synchronization-needs, phased migration needs, parallel-operation needs and controlled final cut over. These processes are not dependent on one migration event and provide organizations with potential to find and solve data and security and



transformation issues prior to complete operational transformation. Migration status can thus be determined based on evidence of reconciliation, data-quality analysis, security checks and business checks rather than basing it on successful data loading.

The enormous contribution to the study can be therefore concluded as a combined architectural perspective that integrates CRM modernization, safe data transformation, quality governance, validation and continuity of migration and operations. The structure provides audible principles in a systematic way to organisations with intentions of modernising Siebel-to Salesforce data and business shutters with integrity of customer records and business capabilities. The framework can then be expanded in future research by applying to larger enterprise data, automated data-quality and mapping, more complex anomaly detection and quantitative analysis of the migration risks, security state, and post-migration operational performance.

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