RECOMMENDATION & SIMULATION ENGINE FOR ENTERPRISE: DIGITALLY ACCELERATED LEAD CONVERSION

Abstract

In today's era of continuously evolving digital world, innovations along with rapid technological advances have significantly assisted Communication Service Providers (CSPs) to cater to millennials with 'next best offer'. Substantial investments are done on data science and big data to propose most suitable subscription, value added services, primary product offer …etc., by analyzing users' usage patterns, browsing behavior, social media hangouts, order history, discount history.

Are these considerations and investment also targeted for enterprise customer? What benefits would it bring and what are key data parameters along with solution tenets to build such digital recommendation engine?

This whitepaper conceptualizes digitally integrated Offer Recommendation Engine for Telco's enterprise segment, that should be designed to propose Data Driven best fit telco solutions for effective sales interactions, that aims to reduces Lead to Cash cycle time and significantly improve Lead Conversion ratio.

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Recommendation Engine – Significance to Enterprise business

Enterprise customers regularly consumes telecom services such as IPVPN, enterprise mobile, IaaS, ICT; often offload procurement and design tasks to either small networking/procurement teams or 3rd party vendors. Such teams rarely consider past and future service usage dynamics and request quote of telco offers which are either atomic or focused only on current need. This leads to multiple sales negotiation discussions on price points and discounts rather than catering to a telco enterprise solution giving maximum return on investment for the foreseeable future needs.

Communication Service Providers (CSPs) have built customer contextual, data driven, ML algorithm based 'next best offer' applications for retail customers however, there is no standardized framework to build such an engine for enterprise segment. Absence of such as engine leads to multiple shortfalls, which elongates 'Prospect to Quote' cycle time:

- Little guidance to enterprises on telco converged solutions - Standard Offers, Bundles, Add-ons, VAS.

- Not recommended Offer/ Bundle proposals on the enterprise mobile profile-based subscriptions, multi-site VPNs/SD-WANs, worker type based unified communications, usage based IaaS clusters

- Telecom regulatory compliance on pricing, country specific, at later stages of quote process

- Short-sightedness to cater future proof solutions resulting in multiple modify, change orders during contract lifecycle

- Absence of usage and invoice simulation capability on proposed solution leading to stringent margins for negotiations

Following graphs 'Figure 1: Association between Customer Satisfaction and Solution Effectiveness' and 'Figure 2: Evolution of Sales Negotiation Capability with Solution Effectiveness' denote telco solution effectiveness impact on customer satisfaction and sales negotiation efficiency
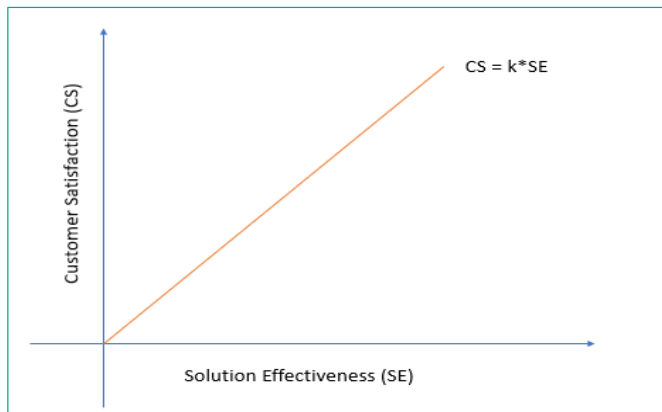

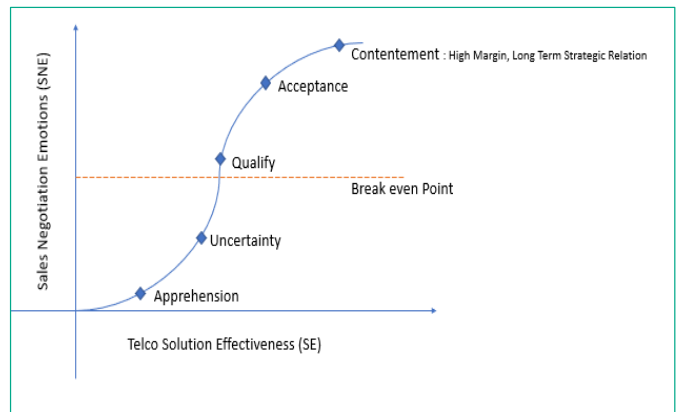Figure 1: Association between Customer Satisfaction and Solution Effectiveness

Figure 2: Evolution of Sales Negotiation Capability with Solution Effectiveness

Challenges in effective Telco Enterprise Solution propositions:

CSPs over the years have made several attempts to come up with enterprise solutions targeted for specific segments such as Banking, Hospitality, Pharmaceutical, Automotive, Smart Cities however, due to stiff competition from incumbents and over the top players, such solutions have piecemeal profitability and lacks flexibility to tailor dynamically that best suits the requirements. Moreover, sales representatives, partners, online channels are not fed with service usage history containerized at profile, license level to make informed decisions on appropriate product proposition.

This process is exacerbated by CSPs IT issues as follows:

- Sparsity of Data

- Product Identification challenges

- Staggered Product Catalogues

- Monolithic architecture patterns
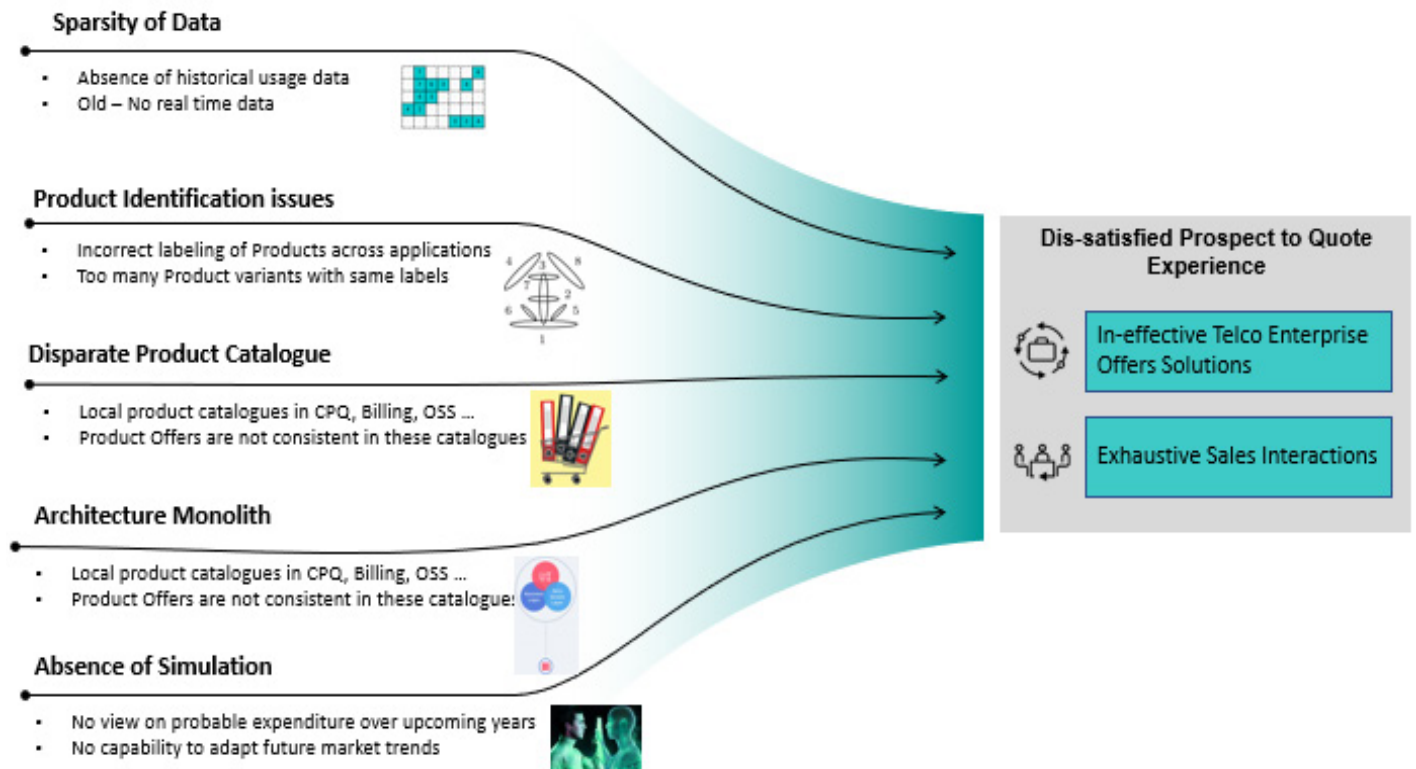
- Little simulation assistance

Sparsity of Data
- Absence of historical usage data
- Old – No real time data

Product Identification issues
- Incorrect labeling of Products across applications
- Too many Product variants with same labels

Disparate Product Catalogue
- Local product catalogues in CPQ, Billing, OSS ...
- Product Offers are not consistent in these catalogues

Architecture Monolith
- Local product catalogues in CPQ, Billing, OSS ...
- Product Offers are not consistent in these catalogues

Absence of Simulation
- No view on probable expenditure over upcoming years
- No capability to adapt future market trends

Dis-satisfied Prospect to Quote Experience
- In-effective Telco Enterprise Offers Solutions
- Exhaustive Sales Interactions

Figure 3: Impediments for effective 'Prospect to Quote' Experience

Telco Offer Recommendation Engine for Enterprise: Definition

It is an engine that possesses decisioning algorithm to propose appropriate enterprise solution options which are ranked on the merit of enterprise customer's overall business strategy, multi-site/employee usage patterns over last quarters, ongoing – upcoming market trends, regulatory compliance, existing product holdings, agreed contract pricing / discounts. Telco Offer Recommendation engine should deliver data driven outcome coupled with big data adaptive and predictive models with ability to key-in dynamic parameters during sale process.

Approach to develop a Telco Recommendation engine:

a) Gather relevant data

In today's era of the digital omni-presence, plethora of data is generated due to user transactions, internet surfing, mobile app use, advertisement enquiries, kiosk visits, tele channel engagements, chat bots …etc. 1st step in data procurement is what are legitimate and effective data sources? CSPs can get into the trap of sourcing abundance of data from various channels, which would increase data volumes and most of the information is in-significant to the analysis required.

Following should be the data sources in the sequence of priority:

1. Digital channel transactions: Browsing behavior, 'product similar to this', buying behavior on websites/ mobile apps

2. Collaborative/ 'look a like' audience: Opinions and actions of the users in similar context, situations

3. Market Research: Surge in the usage of IaaS, internet data due to 5G …etc.

4. Social Media: User engagement in social media for certain technological advancements, follow on communication/ collaboration features

5. Customer usage history: Usage patterns of mobile, voice, broadband, TV services

6. Customer invoice history: Customer spending pattern, intervals of invoicing

7. Competitor offerings: Similar situation competitor propositions & discounts

8. Product margin & cost: Margin thresholds defined by product management along with unit cost

9. Knowledge Based: User needs & readings on the subject and telco domain artefacts

b) Establish the E2E architecture and integration points

a. Enterprise Usage data source - to understand the patterns in consumer usage data based on which product offer can be recommended

b. Billing system - to get the previous invoices of the customer to analyze billing history & payment intervals

c. Enterprise Product Catalog(EPC) - Recommendation Engine needs to Integrate with Enterprise Product Catalog to get the details about the Products Offers along with its Price points(recurring/ One off charge/out of allowance charges) which will be offered to Enterprise customers. It can be fetched at runtime or design time as part of the integration.

d. Centralized Rules Engine - Recommendation engine needs to integrate with the Centralized Rules Engine to understand the incompatibility between different Primary Products Offers and Add Ons which can be considered while recommending the combination of multiple Product Offers

e. CRM & Enterprise Data hub- Recommendation engine needs to integrate with Enterprise CRM for the customer data like browsing behavior, buying behavior, interest in different types of products, social media interactions, cases/complaints raised in the past, etc.

f. Commercial Order Manager for the ordering history

g. Ticketing application (ITSM) for customer tickets /complaints/ enquiries

h. Contract Management application to fetch the contractually negotiated prices for an enterprise rather than standard catalog prices

i. Digital experience integrator – capability to integrate with different online, sales agents, tele-sales agents, and self-service channels via the micro-services platform to provide the recommended offers as per user profiles & invoice forecast

j. Integrated quote journey – recommendation offers/propositions need to be integrated with the quotation tool to proceed with quote lifecycle management & approvals

c) Data Insights algorithms

Machine learning Algorithms in Recommendation Engine - Recommendation engine should be capable of using machine learning algorithms such as root-mean-square error (RMSE), mean average precision (MAP) as well as normalized discounted cumulative gain (NDCG) … to deliver the following functionalities:

k.   Filter & process data e.g. high spikes in the usage

    i.   due to planned events such as festive promotions, roadshows

    ii.   due to un-planned events that drives human sentiments such as market upheavals, wars …etc.

l.   Derive the statistical shape of the data to determine the reference value of the usage which will be used for recommending the optimal product offer

m. Determine the best suitable Product Offer based on the

    i.   Reference value of the usage with tolerance / predictive coefficient

    ii.   Enterprise Product Catalogue

d) Bill/Expense prediction algorithm

Future expenditure prediction - providing the expenditure simulation for foreseeable future i.e. 1 year, 2 year …etc. based on the previous usage/order history, billing patterns and recommended product offers for different user profiles e.g. office staff, sales team, industry executives …etc

e) High scalability, performance & reliability

Data which recommendation engine processes could be significant (>1 GB) as it could span across usage/order /invoice history of multiple months for multiple services such as Mobile, Data & Internet, ICT …etc of an enterprise. The architecture should be distributed computing & parallel processing to provide the response in milliseconds

f) Flexibility to change recommendation parameters

For end customer/agent to change filter parameters such as predictive usage coefficient, % margin change, regulatory coefficient, user group change …etc. Such modification should retrigger recommendation engine processes to propose best suitable product offers
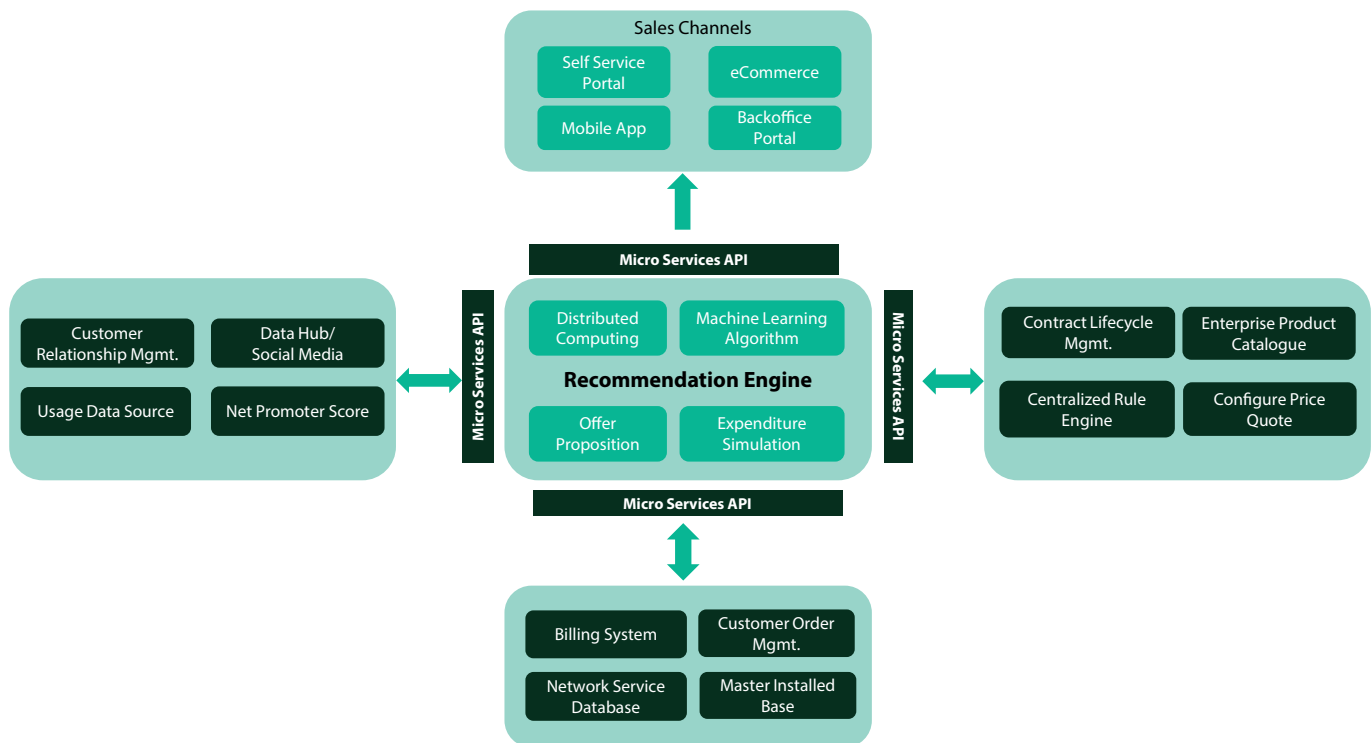

Figure 4: Conceptual Recommendation engine architecture within Enterprise

Recommendation Engine execution model

Recommendation engine plays critical role during the new sales or contract renewal where Sales representative is presented with an opportunity to upsell/cross-sell to the enterprise customer. Previous Invoices will be fetched from the Billing system which will form the source of usage for the customer using 'Customer Bill Management API'. Along with this information, existing customer Inventory will be fetched from Master Installed base using 'Product Inventory Management API', Product Catalog information from Enterprise Product Catalogue using 'Product Catalog Management API', Intra Product Capability rules from Centralized rule engine using 'Product Offering Qualification API', Contractual information from Contract Lifecycle Mgmt. using 'Agreement Management API'. Once all this information is fetched and fed into the Recommendation engine, Sales User will take input from the customer for creating the user groups e.g. Finance Grp, Sales Grp, etc. These groups can also be auto-created by the Recommendation engine based on the usage patterns. Customer

will provide input on the prediction coefficient if they think in the future there will certain % increase in roaming voice usage, National data usage, roaming data usage, etc. Recommendation Engine will start the processing based on various inputs mentioned in Figure 4: 'Conceptual Recommendation engine architecture within Enterprise' and will provide Recommended Product Offers in form of 'Offer Proposition' and future Invoices (which customer would pay) in form of 'Simulated Invoices' to the Sales User/Customer.

Process of changing User Groups/Prediction coefficient/ negotiated prices will be done in multiple iterations until the customer is satisfied with the output and provide their sign-off. Once the customer signs the new contract or renew the existing contract Offer Proposition(Quote) will be decomposed into Commercial Order by CPQ engine using 'Product Ordering API' and Order will be sent to the Order Management system.
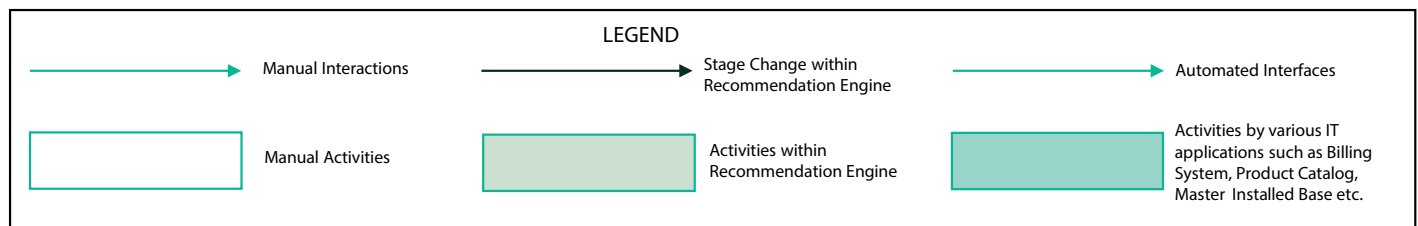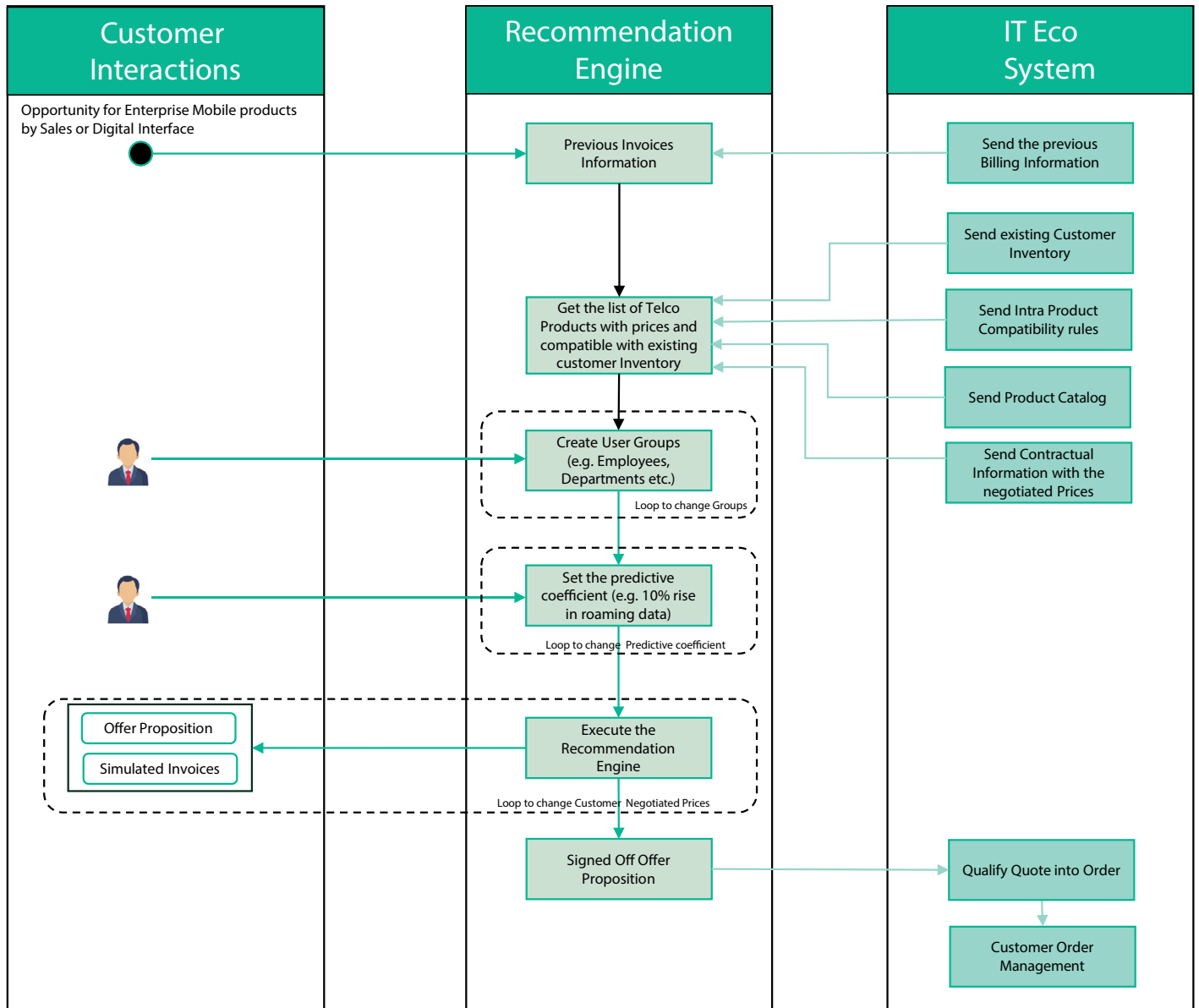
Customer Interactions

Opportunity for Enterprise Mobile products by Sales or Digital Interface

Offer Proposition

Simulated Invoices

Recommendation Engine

Previous Invoices Information

Get the list of Telco Products with prices and compatible with existing customer Inventory

Create User Groups (e.g. Employees, Departments etc.)

Loop to change Groups

Set the predictive coefficient (e.g. 10% rise in roaming data)

Loop to change Predictive coefficient

Execute the Recommendation Engine

Loop to change Customer Negotiated Prices

Signed Off Offer Proposition

IT Eco System

Send the previous Billing Information

Send existing Customer Inventory

Send Intra Product Compatibility rules

Send Product Catalog

Send Contractual Information with the negotiated Prices

Qualify Quote into Order

Customer Order Management

LEGEND

→ Manual Interactions

→ Stage Change within Recommendation Engine

→ Automated Interfaces

Manual Activities

Activities within Recommendation Engine

Activities by various IT applications such as Billing System, Product Catalog, Master Installed Base etc.

Figure 6: Proto-type of Workflow & Touchpoints for Recommendation Engine with IT applications in the digital architecture

Exemplification:

As the customer comes to the CSP for a Product Offer recommendation for Enterprise Mobility, will share their existing invoices with the CSP. Invoices information constitutes historical charges and data/roaming usage of customer. The recommendation engine will process customer's order history, browsing behavior, customer service interactions from the Data Hub. CSP provides a vast range of mobility products for Enterprise customers explained below with different allowances.

Primary Subscription Products

Product Name	Enterprise Mobile XS	Enterprise Mobile S	Enterprise Mobile M	Enterprise Mobile L	Enterprise Mobile XL
Recurring Charges	Recurring Charge – 5$	Recurring Charge – 10$	Recurring Charge – 25$	Recurring Charge – 40$	Recurring Charge – 50$
Allowance	No Allowance	National voice calls – 100min National Data – 4GB	National voice calls – 150min National Data – 10GB	National voice calls – 300min National Data – 25GB	National voice calls – Unlimited National Data – 40GB
Out of allowance charges	National voice calls 0.1/min National Data 0.6/MB	National voice calls 0.1/min National Data 0.6/MB	National voice calls 0.1/min National Data 0.6/MB	National voice calls 0.1/min National Data 0.6/MB	National voice calls 0.1/min National Data 0.6/MB

Add Ons: For National Data Usage

Product Name	Internet XS	Internet S	Internet M	Internet L	Internet XL
Recurring Charges	Recurring Charge – 4$	Recurring Charge – 10$	Recurring Charge – 15$	Recurring Charge – 25$	Recurring Charge – 30$
Allowance	National Data – 500 MB	National Data – 3GB	National Data – 6GB	National Data – 16GB	National Data – 30GB

For Roaming

Product Name	Roaming S	Roaming M	Roaming L
Recurring Charges	Recurring Charge – 95$	Recurring Charge – 295$	Recurring Charge – 495$
Allowance	Roaming data in rest of world (MB) – 1,024 MB	Roaming data in rest of world (MB) – 5,124 MB	Roaming data in rest of world (MB) – 10,248 MB
Out of Allowance charges	Roaming data in rest of world – 0.2	Roaming data in rest of world – 0.2	Roaming data in rest of world – 0.2

For International calls

Product Name	International to ROW S	International to ROW M	International to ROW L
Recurring Charges	Recurring Charge – 2$	Recurring Charge – 4$	Recurring Charge – 8$
Allowance	International voice calls to ROW (MIN) – 60	International voice calls to ROW (MIN) – 120	International voice calls to ROW (MIN) – 300

According to the customer invoices, it is having consistent usage of the data ranging from 25-30 GB per month and very less calls every month ranging from less than 150 min. Taking this into consideration and the existing install base information recommendation engine will propose the Primary Product as 'Enterprise Mobile S' and Add On as 'Internet XL'. Both products are compatible with 'Unified communications'(existing install base for the customer). Only compatible Add Ons will be proposed which is needed to provide additional or higher magnitude of services to the customer.

Instead of going for a higher plan i.e. 'Enterprise Mobile XL' the recommendation engine has proposed 'Enterprise Mobile S' and Add On as 'Internet XL' as its more Optimal Plan for the customer according to the usage. 'Internet XL' is providing more data allowance to the customer at lower prices instead of going for a higher plan i.e. 'Enterprise Mobile XL' which also includes Voice allowance but it is not required according to the usage of the customer.

In addition to proposing the Product Offer, the recommendation engine will also provide the simulated invoices for upcoming months which give an idea about the future invoices to the customer.
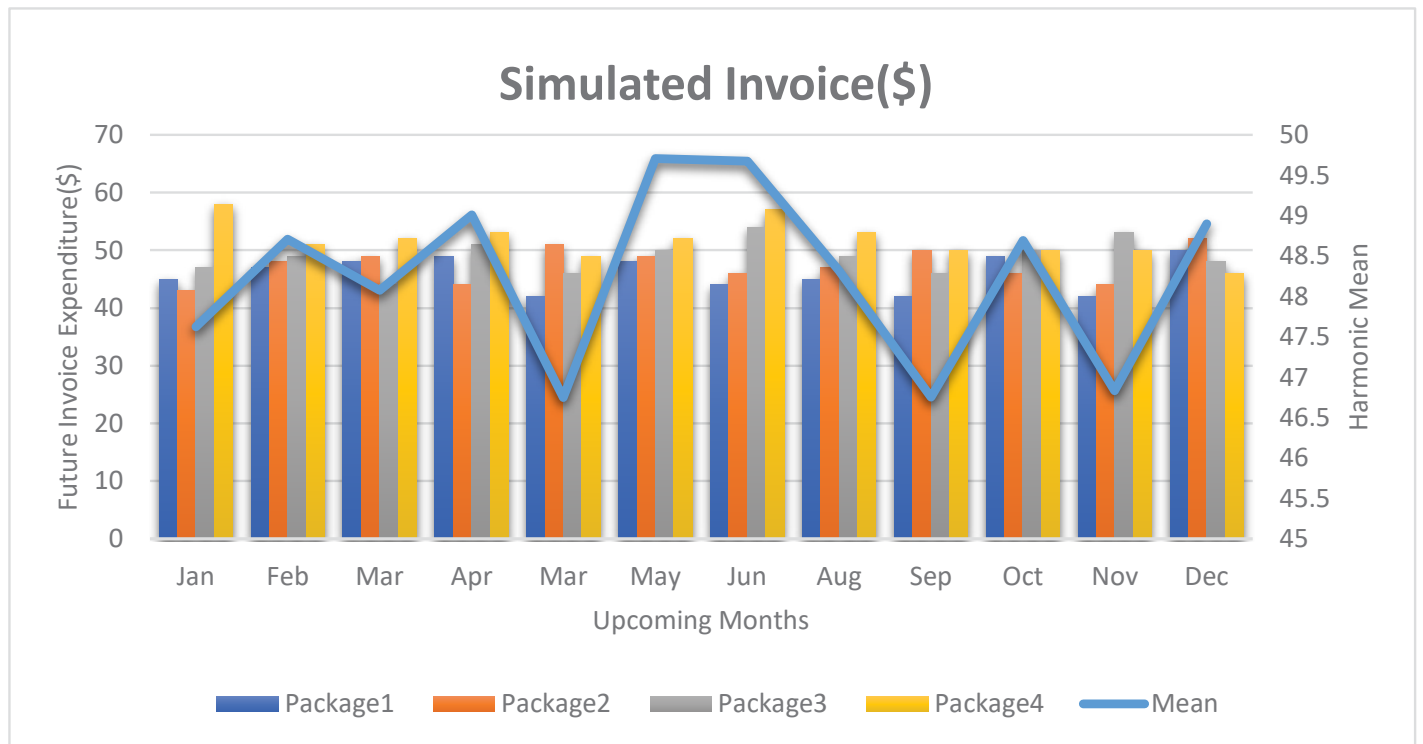

Figure 5: Graphical representation of the Simulated Invoices to the customer.

Package 1	Enterprise Mobile S+ Internet XL
Package 2	Enterprise Mobile XS+ Internet XL
Package 3	Enterprise Mobile L
Package 4	Enterprise Mobile L+ Internet S

Performance Indicators of Recommendation Engine

The principal benefits of using the Recommendation & Simulation engine is efficient CPQ where sales effectiveness is fostered by insight driven offer/price plan/bundle recommendation. In addition to it, invoice simulation provides enterprise customers tailored view on the forecasted expenditure along with sales having clear view of upcoming revenue. This enables transparent price negotiations with tight control over the margins and customer satisfaction with competitive pricing.

The amount of improvement varies depending on the scope envisioned for recommendation engine with each CSP, but typical perceived business and IT benefits include:

- Up to 45% increase in the lead conversion rate

- Up to 25% increase top-line-growth along with 30-35% increase in profitability index

- Up to 40-45% reduction in sales operational expenses as the number of manual touchpoints are reduced significantly.

- Up to 60% increase in the accuracy of recommended solution at right first time

- Up to 40% increase in customer loyalty due to digital integration with insight led recommendation engine with improved overall NPS index

The predictive capability of recommendation engines is majorly dependent on data quality and its readiness. However, the adaptive capability holds greater significance as the engine must continuously learn from the feedback and train statistical models to propose Telco offers/solutions which are customer contextual and aids in increasing the adoption ratio. Thus, predictive accuracy of these statistical machine learning algorithms can be tested with proven measures such as root-mean-square error (RMSE) and ranking of the recommendation item can be tested by mean average precision (MAP) as well as normalized discounted cumulative gain (NDCG).

While measurement of statistical algorithm will do good for data scientists, the business performance indicators will be value for money to customer, increased sales conversion & modularity of engine along with effectiveness in overall lead to cash cycle.

Following are indicative key business performance indicators for Telco Offer Recommendation Engine for enterprise

Financial Portfolio:

- **Increase in margin/net profit %** - calculated as increase in telco's enterprise/B2B portfolio net profit after introduction of telco offer recommendation engine for enterprise

- **Increase in revenue %** - calculated as increase in telco's enterprise/B2B portfolio revenue after introduction of telco offer recommendation engine for enterprise

- **Early revenue realization %** - calculated as revenue realized early in telco's enterprise/B2B portfolio over the revenue which would be realized in total commitment period

Sales and Marketing:

- **Reduction in Sale interactions %** - calculated as optimized sales touchpoints for price negotiations, solution fitment after introduction of offer recommendation engine for enterprise

- **Improved efficiency of marketing campaign %** - calculated as number of qualified leads generated using telco solutions for marketing after introduction of offer recommendation engine for enterprise

- Accuracy of recommended telco solution % - calculated as number of leads converted to customers using telco recommended proposals as against entire product catalogue view

- **Increased sell of high hanging products %** - calculated as number of remote, special service, options, VAS sold using telco recommended proposals as against entire product catalogue view

Customer Delight:

- **Increase in NPS %** - calculated as increase in NPS score after introduction of telco offer recommendation engine for enterprise

- **Reduction in Modify, change orders %** - calculated as reduction in modify, change orders to adapt market trends for the solutions proposed by telco offer recommendation engine for enterprise

- **Increase in customer loyalty %** - calculated as reduction in termination, contract closure, churn orders after introduction of telco offer recommendation engine for enterprise

Conclusion

In the highly competitive market scenario, Communication Service Providers (CSPs) need to commercially innovate in order to increase their market share and win customers. Enterprise customers need to be convinced on how they will get best value for their money from Telco and this need to be demonstrated using the data insight. Telco must consider investing to creating data driven insights for their existing and prospect customer to give best offers as per customer current need and also future needs. In order to gain competitive advantage on large deals and upsell to existing customers, it is imperative to use invoice simulation capabilities so that customers can foresee upcoming expenditure and allocate budget to quickly sign the deal. As the insight led recommendation & simulation engine should foster sales efficiency, the quicker ROI should be justified with early revenue realization, significant reduction in churn & faster lead conversion.

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He is a seasoned consultant and a management professional with an engineering background. Onkar has more than 16 years of experience in global organizations. He has been involved in Domain & Process Consulting & Advisory Services, Business Transformation, and Channel Sales & Marketing areas of the Information & Telecommunications industry. He has extensive experience in Configure Price Quote Consulting, CPQ Vendor Evaluation, CPQ Interface Management, Product Consulting, Product Portfolio Planning, New Product Launch, Product Rationalization, Product Catalog Solution Implementation and Product Lifecyle Management with multiple service providers. He is a certified CPQ and CLM consultant on mulitple COTS applications. He is an ASQ certified Six Sigma Black Belt. Onkar holds a Bachelor of Engineering degree (Mechanical) from Maharashtra Institute of Technology, Pune. He can be reached at onkar_gosavi@infosys.com

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