

# Data Quality and Integrity Management for Telecom Operators

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## ABSTRACT

Telecom operators across the globe face the challenge of improving and maintaining data quality to reduce revenue leakage and process failures. On the basis of the latest predictions on gross spend from the Telecommunications Industry Association, which is set to amount to a staggering USD 215,000,000,000 of lost business in 2014 alone. In any business, a 215 billion loss is scandalous – especially if it's essentially down to the administration of back office databases.

In current circumstances, where Average Revenue Per User (ARPU), is one of the most important Key Performance Indicator (KPI) for any Telco, it becomes vital to curb revenue losses while retaining customer.

Telecom industry as such, struggles to maintain its data quality due to sheer complexity of the systems and functions involved and volume of data to be managed. The problem gets accentuated with stiff competition, frequent induction of offers by service providers, regulatory institutions in different countries for telecom industry, advancement of technology (such as number portability, IPTV, 3G services, etc.) In these days, where ARPU is monitored to the extent of one paisa/cent/pence, no telecom operator could afford to lose its share of money due to poor data quality.

Data quality and data integrity (DQ & DI) management market landscape is fast evolving. With the spurt of COTS and free ware, DQ & DI is getting most hit, forcing operators to look for solutions. There are plenty of DQ tools available in the market, but there isn't any framework available which can ensure 100% data integrity across the system landscape. Telecom operators expect from DQ & DI solution providers that they will 1) leverage the experience gained in this domain 2) bring automation 3) build reusable and easily deployable components and 4) Ensure reduced costs of DQ & DI engagements

Clearly, there is significant business potential in this space.

**Keywords:** Data Quality Management, Data Integrity, KPI, Revenue Leakage Prevention, Enhancing Profitability and Customer Satisfaction

## 1. INTRODUCTION

Last decade has witnessed exponential growth in telecom sector. In India alone, there are 791 Million mobile phone users\*\*! Advancement of technology has triggered introduction of new services e.g. IPTV, 3G services, applications on mobile, etc. Telcos have evolved their IT estate over the years through series of internal changes, implementing Components off The Shelves (CoTS) and improving business processes. This resulted in a stack of applications, working in silos and thus corrupting data during its journey through them.

For any telecom operator, the holistic data quality scenario would be to witness the data travel from its origin application to destination without getting changed, unless intended for. The key is to devise a data management

strategy which tracks data through the entire journey and minimizes human intervention.

The business challenges posed by data quality and integrity issues for Telcos can be summarized into three main areas. Minimizing revenue leakage, maintaining and delivering on their Service Level Agreements (SLA), and retaining their existing customers. To address these challenges, the Telco has to systematically approach the problem and find answers to many things including the following:

1. Understand what are the key drivers to approach data quality and integrity issues
2. Get a thorough understanding on reasons for data discrepancy and poor data quality
3. Identify which product and service lines have major issues with data quality

4. Which applications are having major data quality issues
5. What percentage of revenue is lost due to poor data quality
6. What are end customer expectations on fulfillment and assurance SLA
7. Which best practices in data quality management can be incorporated
8. How to execute a major data cleanse and transformation program

making data quality management challenges increasingly alarming

**Traditional development methods and stove pipe applications:** The end user’s desire to build new functionality and add stove pipe applications results in an information mess.

**Hidden data quality issues:** Data quality issues can exist unnoticed for some time. This data flows to other systems as more interfaces are built thereby increasing the risk of data corruption.

**Data quality is a mindset:** A front user may not have the same interest and incentive to maintain the data quality as a business decision maker. Poor data can be curbed at its point of entry only if the user keeps a vigil.

### 1.1. Reasons for Poor Data Quality

While tremendous expenditure is being made on data quality issues, most Telcos still struggle to address this. The primary reasons for this cost of failure can be summarized as below.

**Silos and short time project focus:** Most of the projects are funded at business unit level hence the impact of data across the organization is not analyzed. Data flow between systems and interface design poses severe constraints

**System complexity:** Organizations are maintaining more information and larger number of integrated systems than that in the past. With increasing customer demands and regulatory compliances, M&A and globalization are

In short, usually when data is integrated, summarized, standardized and used to arrive for a business decision, data quality issues begin to surface.

## 2. IMPACT OF POOR DATA QUALITY IN REAL WORLD

Due to poor data quality, Operators lose revenue at every stage of the end-to-end process. The table below depicts the challenges faced by Operator at each stage of the journey.

### End-to-End Process and Impact on Service Journeys

<i>Marketing and Sales</i>	<i>Service Delivery (Lead to Cash/ L2C)</i>	<i>Fault Management (Trouble to Resolve/ T2R)</i>	<i>Billing and Revenue Assurance</i>	<i>Information Management and Reporting</i>
<ul style="list-style-type: none"> <li>• Cannot contact relevant customers</li> <li>• No information for analysis, e.g. Customer Segmentation</li> <li>• No or incorrect information on customer behavior and what products the customers already have, to drive marketing and targeted sales activities</li> </ul>	<ul style="list-style-type: none"> <li>• Waste of efforts and time</li> <li>• Weak Customer Experience Management due to delays and errors</li> <li>• Employee frustration due to rework and under information</li> </ul>	<ul style="list-style-type: none"> <li>• Waste of time</li> <li>• Poor Customer experience due to delays and mistakes</li> <li>• Employee frustration</li> <li>• Downstream knock on effects on inventory , T2R,billing &amp; reporting</li> <li>• SLA breach and penalty cases</li> </ul>	<ul style="list-style-type: none"> <li>• Lost \$\$ due to under charging</li> <li>• Fine \$\$ due to regulatory non compliance</li> <li>• Overcharging \$\$ by suppliers</li> </ul>	<ul style="list-style-type: none"> <li>• Waste of time in data cleansing</li> <li>• Inadequate reporting and impaired decisions</li> <li>• Derive wrong decisions due to incorrect data</li> </ul>

\*Some of the real life examples of data quality and integrity issues are listed below:

### 2.1. Example 1: Network Inventory data Misalignment Across Service Delivery, Assurance and Billing Systems

The misalignment of data between the network and inventory may lead to huge revenue losses. This may be due to inadequate use of the ports available in the network thus preventing reuse of the ports thus additional revenue being spent on new ports. Also, improper utilisation of available circuits and Penalty paid to the customer due to SLA breach, T2R issues and customer dissatisfaction may lead to revenue loss.

### 2.2. Example 2: Incorrect Supplier Invoicing Leading to Revenue Leakage

There may be instances where there are discrepancies between the Supplier charged value (\$\$) and customer billing (\$\$). In such cases, the supplier charges the operator for a circuit which is ceased/inactive at the customer site but the operator's system reflects it as inactive because of which the customer is not billed thus incurring unnecessary loss of revenue.

## 3. DQ & DI FOR TELECOM

For a Telecom operator, DQ & DI function would include functions depicted in picture 1 below:

**Inventory Cleanse** – This can be categorised into Operational and Commercial Inventory.

### 3.1. Operational Inventory (Customer & Network)

This information is required by the operations teams to service and manage Operator's contractual commitments to the customer, site addresses network, CPE, etc.

**Customer-** Customer refers to the physical customer as in legal entity and appearance in the tracker, spread sheets. Customer data items include Customer name, Cus ID, Sites, Address, Location, etc .

**Network** - All network devices and circuits

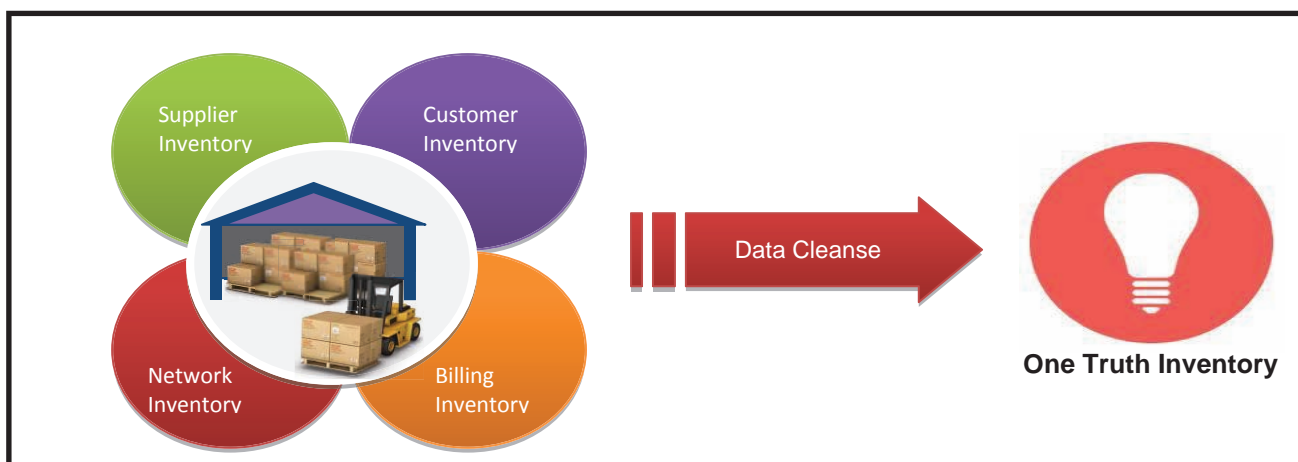
### 3.2. Commercial Inventory (Billing & Supplier)

Information required by the Operator's team to support the finances of the contract, billing, supplier invoices, cost analysis etc.

**Invoicing-** Supplier invoices to Operator typically. Identification of 'billable' material that establishes an audit trail from supplier to bill

**Billing-** Billing includes individual components and services (including resources) that form part of the commercial contract between Operator and its customer.

Picture 1

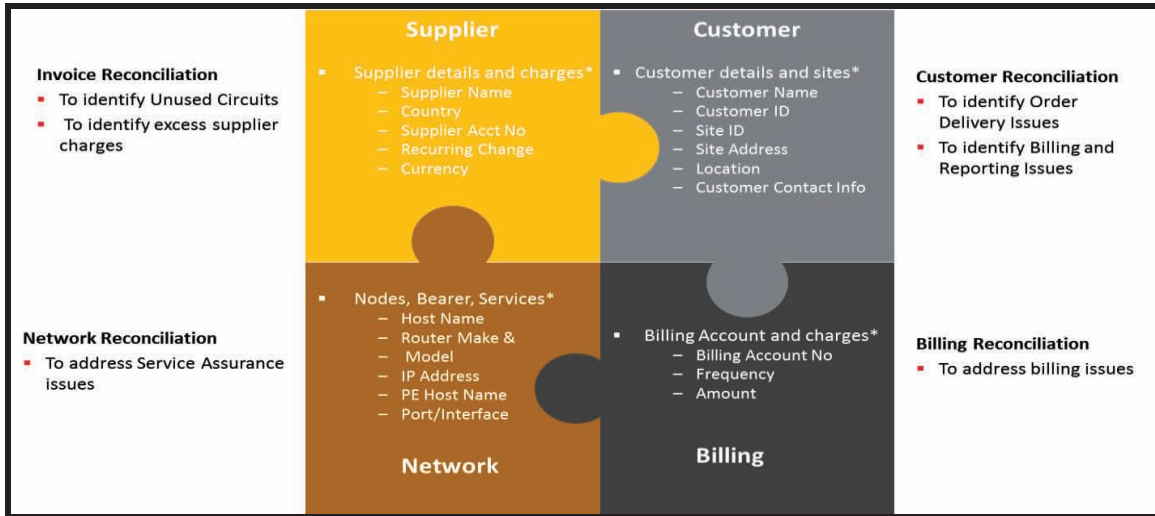


## 4. SAMPLE ENTITIES FOR DQ & DI IN TELECOM DOMAIN

Telecom domain is very complex and has numerous entities representing various features and functions. The

major entities for DQ & DI are as highlighted in this picture 2:

Picture 2

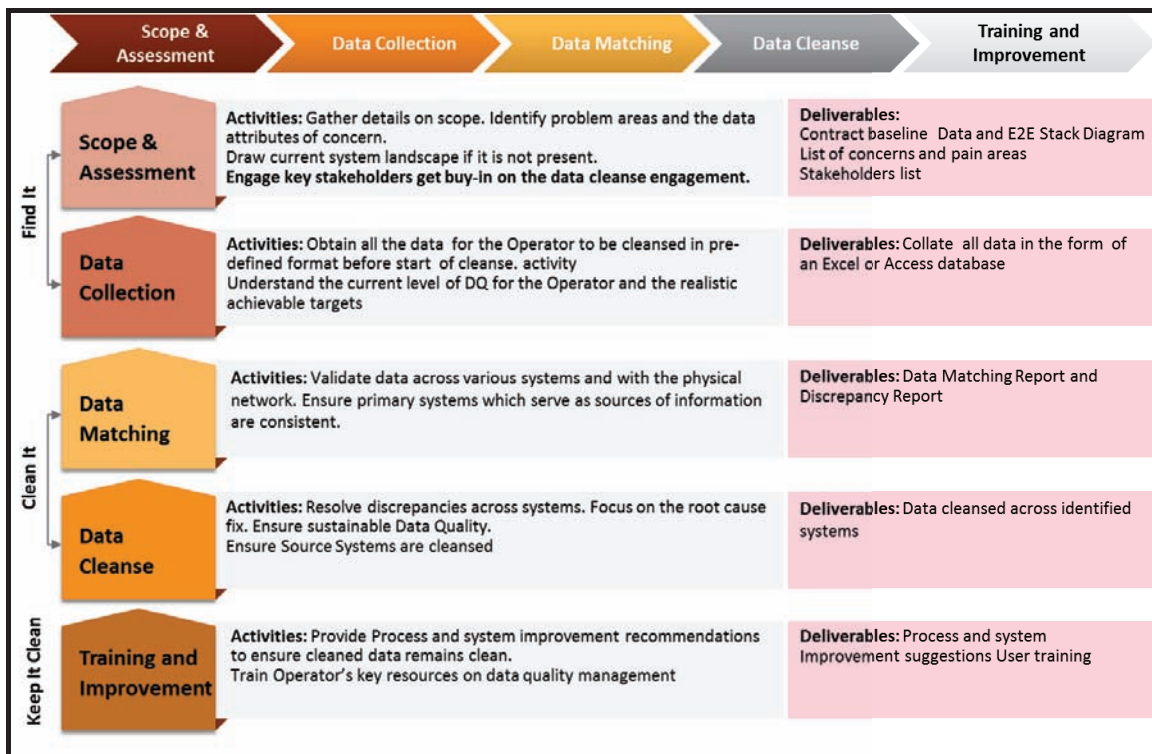


### 5. DATA QUALITY MANAGEMENT AND DATA CLEANSE FRAMEWORK

Data Quality Management is more than just addressing historical data quality issues through data profiling and re-engineering. It involves preventing these issues from occurring in the first place.

Picture 3 illustrates the framework for data quality and cleanse:

Picture 3



The Data Quality Management and Data Cleanse Framework (DQMDC-F) propose a multi-pronged approach to review and monitor data quality regardless of the application complexity and identify recommendations for simplification/optimization of the same.

This framework comprises of broadly five phases –

- (a) Scope and Assessment
- b) Data Collection
- c) Data Matching
- d) Data Cleanse
- e) Training & Improvement

### a) Scope and Assessment

#### Input

The primary input here is the list of stakeholders, applications and business users from the Operator and other specific requirements in the form of industry acceptable format that need to be addressed. The requirements should clearly define the area of cleanse.

#### 5.1. Procedural Steps

Step 1: Work with the Operator's team to identify the pain points and areas of cleanse. Confirm if the cleanse requirements provided to data cleanse team by the various stakeholders are valid and need to be included in cleanse scope.

Step 2: Engage with the designers and operations team to understand detailed requirement breakdown

Step 3: Establish the attributes and systems that need to be cleansed

Step 4: Prepare scope document and delivery plan based on discussions and send for sign-off

#### 5.2. Output/Deliverables

1. Signed off scope document with clear definition of scope and out of scope
2. Delivery plan / execution methodology
3. Issues, risks and dependencies (internal & external)

### b) Data Collection

#### Input

Scope document and execution plan for the contract

#### 5.3. Procedural Steps

Step 1: Establish the One Truth Inventory. Obtain the data from the various systems identified in the scope of data cleanse

Step 2: Gather the data in a pre-defined format and upload into a common repository for analysis (if applicable)

Step 3: Establish the current data quality (DQ) baseline for the areas agreed in data cleanse scope

Step 4: Share the established DQ baseline figures with the Operator and obtain a sign-off on the initial analysis with the stakeholder

#### 5.4. Output/Deliverables

Signed- off DQ baseline for the contract

### c) Data Matching

#### Input

Scope document and execution plan for the contract; Data extracts and baseline DQ percentage

#### 5.5. Procedural Steps

Step 1: Store data from various systems gathered as a part of the data collection phase into a repository

Step 2: Establish set of rules for data matching concurrence with Operator's business users

Step 3: Compare the data in as per business rules

Step 4: Present result of the analysis in form data discrepancy report

Step 5: Obtain sign-off on data discrepancy report

#### 5.6. Output/Deliverables

1. Signed-off data discrepancy report
2. Business rules for data matching

### d) Data Cleanse

**Input**

One Truth Inventory; Signed-Off data discrepancy report

**5.7. Procedural Steps**

Step 1: Work with the Operator’s team to resolve the discrepancies. Require their agreement to resolve the anomalies

Step 2: Present the correct values for the anomalies to the Operator team for sign-off before updated to the systems. The data first needs to be ideally updated and validated in a testing environment before it can be ported to production environment

Step 3: Obtain sign-off on the updated data from the Operator team

Step 4: While cleansing the data, carry out Root Cause Analysis (RCA) for data discrepancy

Step 5: Post data cleanse, implement continuous data monitoring mechanism in place and make data quality a ritual!

**5.8. Output/Deliverables**

1. Signed-off Data matching report
2. Clean data ready for upload

**e) Training and Improvements**

**Input:**

Root cause analysis done for data discrepancy

**5.9. Procedural Steps**

Step 1: Identify the changes that need to be done to the BSS/OSS (Business/Operations Support Systems) in order to address data discrepancy issues resulting from system issues. These shall be shared with the Operator teams

Step 2: Identify the changes to the existing process and work instructions in order to address the data discrepancy issues. These shall be shared with the Operator teams

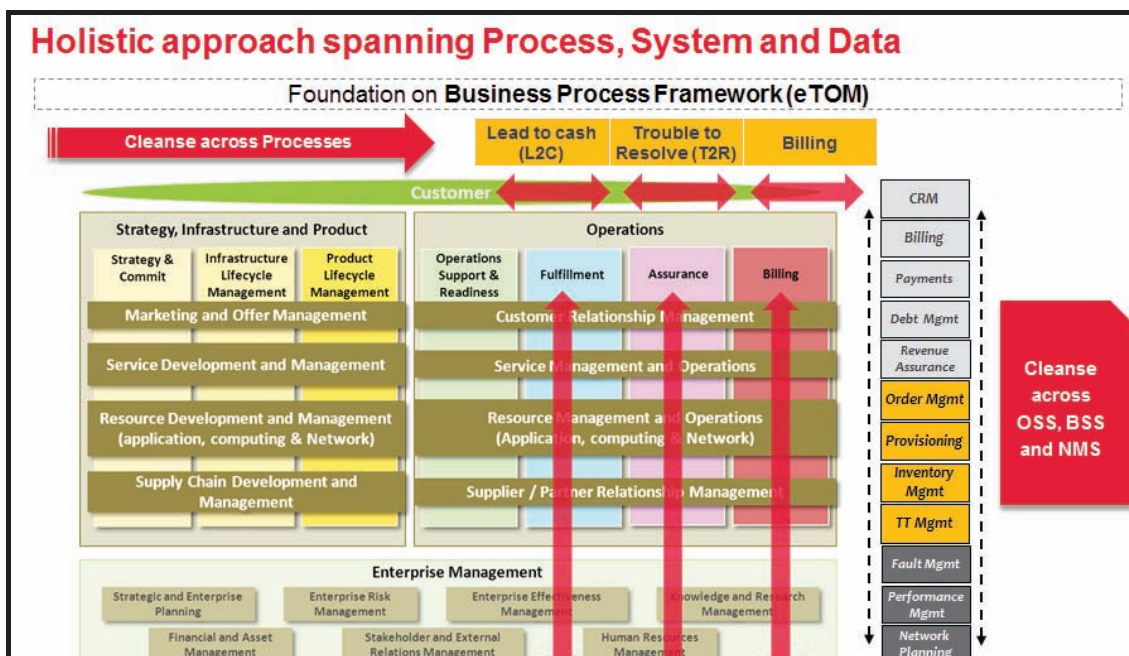
Step 3: Identify user training requirements and pass it to Operator teams

**5.10. Output/Deliverables**

1. RCA Register
2. Process improvement suggestions
3. User training suggestions

**6. HOLISTIC METHODOLOGY FOR DATA QUALITY MANAGEMENT**

Picture 4



An operator cannot overhaul all business systems to improve data quality. It has to adopt a systematic and consistent approach aligned with industry standard methodology. eTOM or enhanced Telecom Operations Manual (now Framework) is the set of guidelines which an operator can follow to enhance its data quality across processes, systems and service journeys.

For any operator, it is advisable to curb data quality errors at the inception itself. It should enforce rigorous checks to ensure that data quality is maintained at the source system. Enhancing data quality at master system ensures that half the battle is won! Thereafter, a robust data governance framework will ensure that the data integrity is kept intact.

## 7. DQ & DI BUSINESS BENEFITS

Data quality and data integrity results into many tangible and intangible benefits for the Telcos. These benefits mean substantial reduction in revenue leakage, customer churn and information loss. These benefits can be categorized into Organizational, Financials and Enhanced Customer Satisfaction and are covered in greater detail below

**Organization Benefits:** The most significant benefit for the organization on undertaking the DQ and DI initiative will be the availability of a Single version of truth for data. The key data elements will be in alignment across systems and the MIS staff can spend their time analyzing the data and not ‘verifying’ it. The exercise will also help the operator adhere to local and global regulatory and compliance requirements while also enjoying improved operational efficiencies. An quantitative knowledge of quality issues will also become available paving way for long term solutions. The standardization of data format used across the functions/applications will also help bring standardization across business operations. Benefits such as freed up network and other resources can be used for planning and resource assessment would provide vital inputs to decision making on technology adaptations, migration and product rollouts within a perceptible outlook period.

**Financial Benefits: The most obvious and immediate benefit of a DQ and DI exercise is the reduction in revenue leakage resulting in reduced Opex.** Reduction in spend on rework due to poor data quality and well informed and correct decisions enabling organization to expand/ retain business/customers are some of the other benefits that will also result in superior financials.

**Enhanced Customer Satisfaction:** While Organizational and financial benefits will abound, the enhanced customer

satisfaction to continue to deliver results far longer than the initial period. Unique customer records reflecting integrated view of customer across the organization paves way for improved customer retention and reduction in customer churn. Enhanced customer experience will naturally occur as their data is correct and update and there will be less errors in interaction, billing and other areas.

## 8. AUTOMATION AND INNOVATION

Complexity of the process and system involved and the huge size of data makes data quality and integrity a big and complex activity. Organizations offering DQ & DI solutions cannot reinvent the wheel every time they work with new operator. Cycle Time (CT) reduction, improved Right First Time (RFT), cost minimization and effort reduction are key parameters for any data quality engagement. Data quality and integrity services have to industrialize the offering by

1. Creating a framework for repeatable solution
2. Automation by adding tools to the framework
3. Getting the data quality offerings on a single platform to standardize deliverables
4. Standardization of KPI reports for DQ & DI

There are many examples where repeatable solutions can be incorporated such as Address Cleanse, Customer ID Cleanse etc. However, these tools, in isolation won't prove of much benefit because though these could improve data quality but data integrity across the system landscape will not get enhanced significantly. Unless a holistic framework is created which covers DQ & DI, operators would continue to struggle with revenue leakage and consumer dissatisfaction.

## 8. EMERGING TRENDS

Big data and social media are the latest transformation concepts that are shaping global technology. As per NASSCOM, the Big data market in India will grow at 83% annually to reach US\$1 billion by 2015. Over the next decade, digital information in India will grow from 40,000 petabytes of data to 2.3 million petabytes, twice as fast as the worldwide rate. With 900 million+ mobile connections, 100 million+ active mobile data users and increasing number of connected devices, the amount of consumer and enterprise data will grow exponentially.

Data complexity will continue to increase in future and

less than 10% of organizations are currently equipped to manage these unstructured data sources effectively.

The diversity of data sources, its integrity across systems and its usage across business reporting, presents a technological challenge in capturing, storing and analysing information between seemingly unrelated, large and complex data sources. Considering the sheer size of data that an organization has to deal with, it becomes imperative to plan for a robust and scalable framework for data quality management that could manage data across its life journey.

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