Saudi Commission for Health Specialties

Reference and Master Data Management

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Purpose

To describe Reference and Master data management Process, Requirements, Data Hub design and conceptual architecture.

Contents

1- Introduction

1.1 Reference and Master Data Management (RDM):

In any organization, certain data is required across departments and applications. The whole organization and its departments benefit if this data is shared and all business units can access the same set of data lists like geographic location (city), country, regions, specialties, etc. these data used to run the business.

In SCFHS various project and initiatives, mergers and acquisition and other business activities result in multiple systems executing essential the same functions, which different from each other. These situations inevitably lead to inconsistence in data structure and data values between systems. This variability increase cost and risk. Both can be reduced through the management of Reference and Master Data.

Main goal of reference data to reduce redundancy, ensure high quality and effective use of analytics and reports in organizations. In addition, integration between different application make easier and each system would talk to each other.

Implementing RDM in SCFHS to make sure, the ability to leverage core transactional data is highly dependent on the availability and quality of Reference and Master Data and it would dramatic impact on overall quality of the data and business confidence in data.

1.2 Reference Data Identification and Prioritization:

In SCFHS identified 28 Reference data across around 40 different data sources.

The following are list of Reference data and its preference:

# No	Data Entity	Data Source	Preferred Source	Internal/External
1	Case Status	Mumaris Plus	Mumaris Plus	Internal
2	Cities	1. Academy 2. Appointments Booking 3. Assessment 4. Collaboration 5. Committees 6. Financial Compensation 7. Health Academy 8. Health Academy Nomination 9. HLS 10. HR 11. HRSD 12. Law Affairs 13. Leadership Academy 14. LMS 15. Matching 16. Matching Fellowship 17. MOE 18. MOH	Mumaris Plus	Internal

		19. Mumaris Plus 20. Mustamir 21. One45 22. Portal 23. Training 24. Well Being		
3	Classification Rank	1. Mumaris Plus 2. Mustamir 3. Portal	Mumaris Plus	Internal
4	Committees	1. Committees 2. Mumaris Plus	Committees	Internal
5	Councils	Committees	Committees	Internal
6	Countries	1. Academy 2. Appointments Booking 3. Assessment 4. Collaboration 5. Financial Compensation 6. Hadir 7. Health Academy 8. Health Academy Nomination 9. HR 10. HRSD 11. LMS 12. Matching 13. Matching Fellowship 14. MCS 15. MOE 16. MOH 17. Mumaris Plus 18. Mustamir 19. NGHA 20. One45 21. Portal 22. Training 23. Well Being	Mumaris Plus	Internal
7	Exam Status	Mumaris Plus	Mumaris Plus	Internal
8	Exam Result Types	1. Mumaris Plus 2. Training	Mumaris Plus	Internal
9	Exam Sections	Integration		External
10	Exams	1. Matching 2. Mumaris Plus 3. Portal	Mumaris Plus	Internal
11	Gender	1. Appointments Booking 2. Health Academy 3. HR 4. HRSD	Mumaris Plus	Internal

		5. Leadership Academy 6. Matching 7. Matching Fellowship 8. MOE 9. Mumaris Plus 10. Mustamir 11. NGHA 12. One45 13. Portal 14. Statistics 15. Training		
12	Health Association	1. Association Sheets 2. Portal	Health Association	Internal
13	Marital Status	1. Health Academy 2. HR 3. Mumaris Plus	Mumaris Plus	Internal
14	Medical Fields	1. Appointments Booking 2. Internship Capacity Sheet 3. Matching 4. MLSD 5. Mumaris Plus 6. Mustamir 7. Nurse Visa 8. Portal 9. Training	Mumaris Plus	Internal
15	Organization Sites	1. Appointments Booking 2. Committees 3. GL 4. Hadir 5. HR 6. Portal	HR	Internal
16	Organization Units	1. Collaboration 2. Committees 3. GL 4. Hadir 5. HR 6. Portal 7. Service Desk 8. TAWASOL	HR	Internal
17	Regions	1. Appointments Booking 2. Elham 3. Health Academy 4. HLS 5. HRSD 6. Mustamir 7. Statistics	Training	Internal

		8. Training		
18	Religions	1. HR 2. Mumaris Plus	Mumaris Plus	Internal
19	Saudi Colleges Branches	Portal	Portal	Internal
20	Specialties	1. Elham 2. Health Academy Nomination 3. Matching 4. Matching Fellowship 5. MOE 6. Muetamid 7. Mustamir 8. One45 9. Portal 10. Press Ganey Survey 11. Training 12. Well Being	Training	Internal
21	Specialties Mumaris	Mumaris Plus	Mumaris Plus	Internal
22	State Code	Mumaris Plus	Mumaris Plus	Internal
23	Training Center	1. Health Academy 2. Matching 3. Matching Fellowship 4. Muetamid 5. One45 6. Portal 7. Press Ganey Survey 8. Training 9. Well Being	Muetamid	Internal
24	Training Exam Type	1. Portal 2. Training	Training	Internal
25	Training Sector	1. Health Academy Nomination 2. Matching 3. Matching Fellowship 4. Muetamid 5. One45 6. Training	Muetamid	Internal
26	Universities	1. Health Academy 2. Health Academy Nomination 3. HRSD 4. Matching 5. Matching Fellowship 6. MOE 7. Mumaris Plus	Mumaris Plus	Internal

# No	Data Entity	Data Source	Preferred Source	Internal/External
		8. Portal 9. Training		
27	University Branches	Mumaris Plus Portal	Mumaris Plus	Internal
28	Work Place	1. Academy 2. Committees 3. Health Academy Nomination 4. HLS 5. HRSD 6. Internship Capacity Sheet 7. LMS 8. Matching 9. Matching Fellowship 10. MCS 11. MLSD 12. MOE 13. MOH 14. Mumaris Plus 15. NGHA 16. Portal 17. Public Relations 18. Training 19. Well Being	MOH	External

1.3 Master data Identification and Prioritization:

# No	Data Entity	Data Source	Preferred Source	Internal/External
1	Unique Profile(Practitioners)	1. Mumaris Plus 2. E Service 3. Training 4. Matching 5. One45 6. Oracle HR 7. Majales-Committee 8. Health Academy	Mumaris Plus	Internal

2- Reference and Master Data Requirements

Application and data evolve organically resulting in multiple systems executing similar functions isolated from each other, leading to inconsistencies in data structure and values, and increased costs and risks. Both can be reduced through the management of reference and master data

In addition to that, the following are main goal:

1. Sharing of same unified data to all applications within an organization
2. Reference and Master data enable accurate values and reduce duplicate from same or multiple data sources
3. Reduce the complexity of Integration and data models

2.1 Reason for Reference and Master Data

Consider the Country table from different application has more than one standards and following different coding system and description.

The following are example from SCFHS country table from more than 30 application including internal and external data.

The data structure describe as follows:

1. **Data Entity** - describe the reference entity name
2. **ID** - Primary Key of country Reference master data
3. **Name** - unique name country
4. **Data Source** -describe about the list of application name from where the data is populated
5. **Old Record Id** – source data primary key
6. **Old Record Name** – Source data description
7. **Old Extra Info1** – Additional information
8. **Map Id** – each source has unique Map Id and configuration about mapping between source and Reference Master data
9. **Mapping Title** – Describe source application name from where the data is arrived

The following sample describe the same country name"Saudi Arabia" has referred as different code in each system and even different formations.

Data Entity	ID	Name	Data Source	Old Record Id	Old Record Name	Old Extra Info1	Map Id	Mapping Title
Countries	1	Saudi Arabia	Mumaris Plus	883470F7-5DF9-E811-B80F-005056AD2FD8	السعودية	Saudi Arabia	3	Countries From Mumaris+
			Academy	SA	SA	......	92	Countries From Academy
			Appointments Booking	Saudi Arabia	Saudi Arabia	......	125	Nationalities From Appointments Booking
			Training	1	السعودية	Saudi Arabia	4	Nationalities From Training
			Appointments Booking	المملكة العربية السعودية	المملكة العربية السعودية	......	125	Nationalities From Appointments Booking
			Assessment	Saudi Arabia	Saudi Arabia	......	79	Countries From Assessment Testing Centers Excel
			Collaboration	37	Saudi Arabia	......	99	Countries From Collaboration
			Collaboration	59	Saudi	......	102	Nationality From Collaboration
			Financial Compensation	SA	المملكة العربية السعودية	Saudi Arabia	169	Nationalities From Financial Compensation

2.3 Rules for mapping Reference and Master Data:

The definition of creating rules to construct reference data would be as follows:

1. Identification of Reference data
2. Matching Method and Types
3. Considerations
4. Authority Strategy
5. Consolidation

2.3.1 Identification of Reference Data:

Data is typically **replicated in multiple silos** (databases, Excel spreadsheets, etc.) the same set of data spread across the enterprise with different coding and descriptions. This affects the quality**,** consistency, and availability of data. Data quality issues lead to failures in business processes and transactions. Hence, identify the entity, which requires Reference data treatment.

2.3.2 Matching Method and Types:

There are different types of matching that can be accomplished from automated rules to match data together, or have it gone through a review process.

There are variety of matching types possible, from exact matching and Similarity matching.

Exact Match: An exact match relies on being able to link two different sources of information based on the existence of a specific key that allows to match the information. This can be, for instance, a Country Name for country.

Similarity Match: Matching based on similar names of spellings to classify into same group When this happens, we need to be able to relax the matching algorithm to handle phonetically similar cases.

SCFHS follows both mentioned matching methods to create reference data

2.3.3 Reference Data Consideration:

There has to be multiple considerations to have when looking at the merging of data. Entities can have multiple names, languages can be impactful in the cases of names, places, or universities, data should be normalized, and data cleansing is usually necessary before matching the different attributes

When Name used to match one of the important factors has to take into consideration is that frequency of name. If the names are common should need special treatment by considering other columns to take proper merging either auto match or manually.

SCFHS follow these mentioned consideration while doing the merging of Reference data.

In addition to that match different text fields also requires some degree of data cleansing. From handling potential trimming of spaces, special characters, and punctuations to correcting misspellings, there are numerous steps to take to standardize the input and allow it to find an accurate match.

The SCFHS has more than 30 profile rules to do cleansing any kind of data based on data type and nature of the data.

2.3.4 Authority Strategy:

If the same set of data available and when conflicting information available in more than one application and database the Authority strategy help to define which source and field in the strategy should be considered as the authoritative source of information.

SCFHS follows preference order for taking certain types of information from different sources. The logic behind this type of strategy is that some sources of information should be considered as "**trusted sources**," while others have information of different qualities

2.3.5 Consolidation:

The consolidation rule describe how the records are merged. There are generally two different types of consolidation strategies hard merge and soft merge. The hard merge consolidate multiple records into one single record, while a soft merge strategy creates an association between the different records that, when read, should be grouped.

SCFHS handle the hybrid based on nature of data, sometimes there might by one row for more than one same set of names.

2.4 Consume Applications:

Most of the data-sharing request are utilized Reference and Master Data. In addition to that 1000+dashboards and reports are consuming Reference and Master data.

SCFHS Exchange database support other department to utilize the Reference and master data for various functions.

In addition to that public dashboard also using dimension and filter from Reference Master Data

2.5   Data quality requirements for Reference and Master Data:

In the data quality, one of the data quality dimension Accuracy is used to handle reference and transaction data integration.

The degree to which data correctly describes the "real world" object or event being described. Can be derived from whether a given value is the same as in the 'master' dictionary

Reference: Missing data is not included in this measurement. For example, does the university reflect the actual university name stored in the qualification data set. This accuracy is measured for fact data using dimensions
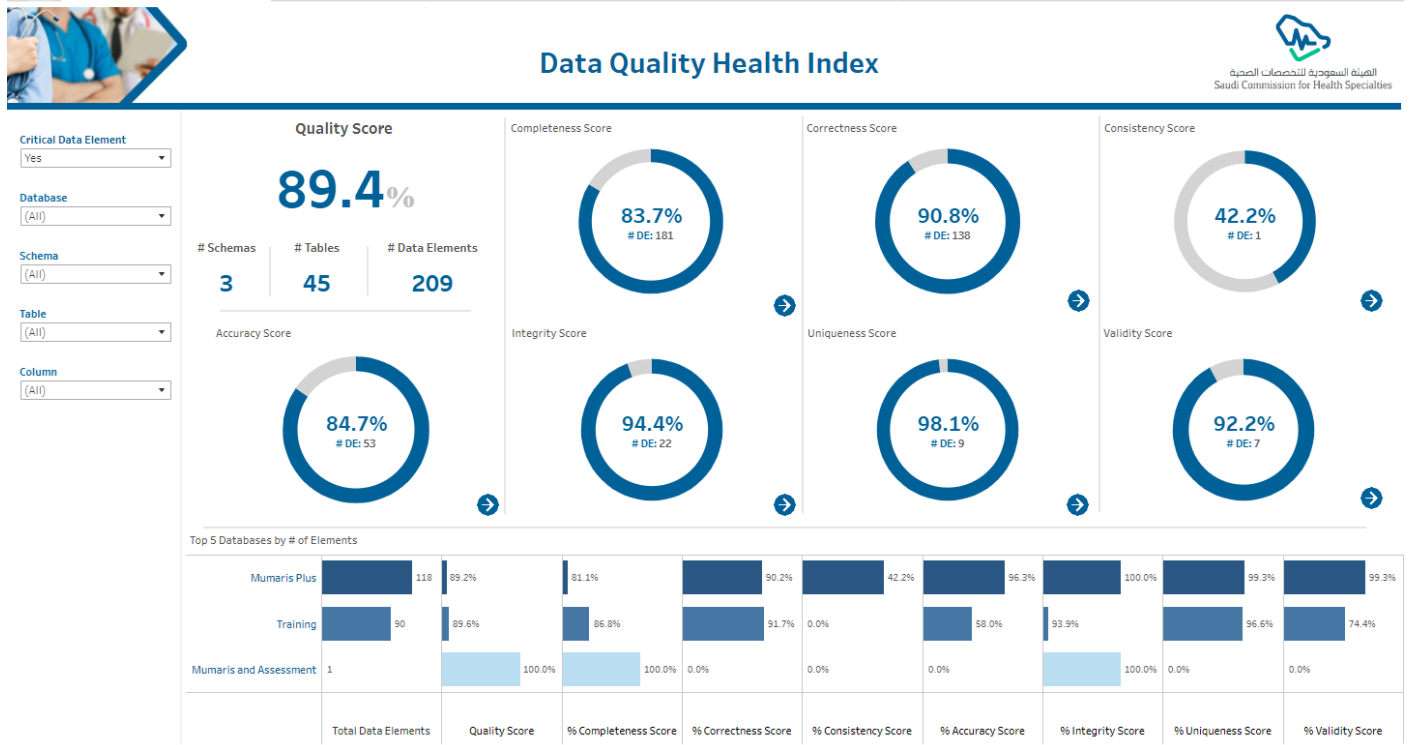
Dashboard shows data quality over all health index and accuracy dimension :

Reference and Master Data Management

DM: Data Quality Health Index ... | DM: Completeness Quality Das... | DM: Completeness Quality Rep... | DM: Correctness Quality Dash... | DM: Correctness Quality Repor... | DM: Consistency Quality Dash... | DM: Con

Data Quality Health Index

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Critical Data Element
Yes

Database
(All)

Schema
(All)

Table
(All)

Column
(All)

Quality Score
89.4%

# Schemas	# Tables	# Data Elements
3	45	209

Accuracy Score

Completeness Score
83.7%
DE: 181

Correctness Score
90.8%
DE: 138

Consistency Score
42.2%
DE: 1

Accuracy Score
84.7%
DE: 53

Integrity Score
94.4%
DE: 22

Uniqueness Score
98.1%
DE: 9

Validity Score
92.2%
DE: 7

Top 5 Databases by # of Elements

	Total Data Elements	Quality Score	% Completeness Score	% Correctness Score	% Consistency Score	% Accuracy Score	% Integrity Score	% Uniqueness Score	% Validity Score
Mumaris Plus	118	89.2%	81.1%	90.2%	42.2%	96.3%	100.0%	99.3%	99.3%
Training	90	89.6%	86.8%	91.7%	0.0%	58.0%	93.9%	96.6%	74.4%
Mumaris and Assessment	1	100.0%	100.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%

Accuracy Dimension:

Accuracy Quality

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Critical Data Element
Yes

Database
(All)

Schema
(All)

Table
(All)

Column
(All)

Accuracy Score
84.7%
DE: 53

Total Data Elements
42

Accuracy Score by Database

Mumaris Plus: 96.3%
Training: 58.0%

Accuracy Score by Table

Table	Score
Specialty	100.0%
Service Request	100.0%
Pre Assessment Exam Results	100.0%
Exam Result	100.0%
Classification	100.0%
Awarded Classification	100.0%
Case	100.0%
Classification Registration	99.9%
Case Specialty Qualification	99.9%
Contact	99.8%
Exam	99.7%
Education	91.4%
Tbl All Exams	88.4%
Faculty	86.7%
Certificate Type	78.5%
Exam Assessment	75.8%
Tbl Trainingcenter	72.5%

Accuracy Dimension Detail Report:

Accuracy Quality Details

Critical Data Element
Yes

Database
(All)

Schema
(All)

Table
(All)

Column
(All)

Download Data

Database	Schema	Table	Column	Total Non-Blank	Total Accurate	Total Non-Accurate	% of Accuracy	
Mumaris Plus	Mumaris Plus Main	Awarded Classification	Classification Rank	1,286,707	1,292,916	0		100.0%
Mumaris Plus	Mumaris Plus Main	Case	Classification Rank	3,964,940	3,991,574	0		100.0%
Mumaris Plus	Mumaris Plus Main	Case	Country Of Residence	4,422,257	4,454,474	345		100.0%
Mumaris Plus	Mumaris Plus Main	Case	Medical Professional Field	4,265,306	4,295,543	0		100.0%
Mumaris Plus	Mumaris Plus Main	Case	Religion	2,218,012	2,250,565	0		100.0%
Mumaris Plus	Mumaris Plus Main	Case	Speciality	4,289,759	4,314,593	5,231		99.9%
Mumaris Plus	Mumaris Plus Main	Case	Specialty Medical Field	4,287,826	4,312,662	5,230		99.9%
Mumaris Plus	Mumaris Plus Main	Case Specialty Qualification	Speciality	2,649,728	2,658,461	3,017		99.9%
Mumaris Plus	Mumaris Plus Main	Certificate Type	University	45,656	35,926	9,865		78.5%
Mumaris Plus	Mumaris Plus Main	Classification	Medical Professional Field	64	65	0		100.0%
Mumaris Plus	Mumaris Plus Main	Classification Registration	Medicalprofessionalfield	2,245,469	2,353,339	0		100.0%
Mumaris Plus	Mumaris Plus Main	Classification Registration	Registered Rank	2,227,563	2,333,592	0		100.0%
Mumaris Plus	Mumaris Plus Main	Classification Registration	Speciality	2,357,750	2,461,008	2,779		99.9%
Mumaris Plus	Mumaris Plus Main	Classification Registration	Specialty Medical Field	2,356,414	2,459,605	2,777		99.9%
Mumaris Plus	Mumaris Plus Main	Contact	City	808,121	798,645	9,477		98.8%
Mumaris Plus	Mumaris Plus Main	Contact	Country Of Residence (Lookup)	1,234,614	1,239,562	315		100.0%
Mumaris Plus	Mumaris Plus Main	Contact	Country Of Study	727,175	726,884	292		100.0%
Mumaris Plus	Mumaris Plus Main	Contact	Countryofbirth(Lookup)	1,221,892	1,226,330	758		99.9%
Mumaris Plus	Mumaris Plus Main	Contact	Evaluator Specialty	13	13	0		100.0%
Mumaris Plus	Mumaris Plus Main	Contact	Gender	1,234,628	1,239,891	0		100.0%
Mumaris Plus	Mumaris Plus Main	Contact	Nationality(Lookup)	1,234,527	1,238,455	1,335		99.9%
Mumaris Plus	Mumaris Plus Main	Contact	Professional Medical Field	1,023,632	1,026,076	0		100.0%
Mumaris Plus	Mumaris Plus Main	Contact	Religion	1,234,628	1,239,891	0		100.0%
Mumaris Plus	Mumaris Plus Main	Education	Country Of Study	2,295,385	2,303,572	1,862		99.9%
Mumaris Plus	Mumaris Plus Main	Education	Speciality	1,576,051	1,574,971	1,095		99.9%
Mumaris Plus	Mumaris Plus Main	Education	University	2,268,105	1,693,303	584,742		74.3%
Mumaris Plus	Mumaris Plus Main	Exam	Classification Rank	161	163	0		100.0%
Mumaris Plus	Mumaris Plus Main	Exam	Specialty	161	162	1		99.4%

3- Reference Data HUB Design

SCFHS Hub Design support Centralized management of Reference Data - the Hub acting as single source provider for entire Reference Data to create and modify exclusively in the Hub. All dashboard, data sharing, and exchange database users utilize the Reference Data.

In SCFHS Hub design is maintained in EDW layer with full functionality of Reference data which read all the data sources from Hub layer.

3.1   Reference Data Design

Reference data has been follows typical methodology to create accurate data from different data source.

1. Identify the reference data
2. Entry in MDM(Master data management) configuration table which requires mapping manually by defining the source schema and table name to map with reference table, which is start with "lkp_un".

    For ex. Countries Reference table name is lkp_un_Country" and the source mapping table name is (old table) "mpd_scfhs_countryBase", old id is scfhs_CountryId (Primary key from source) and old name is scfhs_CountryNameInArabic (country name from source) which is going to link with lkp_un_country table

Map_Id	System_Desc	Entity_Des	New_Table	New_Id	New_Name	Mapping_Column	Old_Table	Old_Id	Old_Name	Mapping_Title	Dim_Table	Dim_Id
3	Mumaris Plus	Countries	lkp_un_Country	Country_Id	Country_Arabic_Name	Map_mpd_Mumaris_CountryId	mpd_scfhs_countryBase	scfhs_CountryId	scfhs_CountryNameInArabic	Countries From Mumaris+	Dim_Country	Country_Id
4	Training	Countries	lkp_un_Country	Country_Id	Country_Arabic_Name	Map_trd_Trainees_CountryId	trd_tbl_NationalityName	intNationalityID	strNationalityName	Nationalities From Training	Dim_Country	Country_Id
5	Mumaris Plus	Countries	lkp_un_Country	Country_Id	Country_Arabic_Name	Map_mpd_Mumaris_NationalityId	mpd_scfhs_nationalitiesBase	scfhs_nationalitiesId	scfhs_NationalityNameInArabic	Nationalities From Mumaris+	Dim_Country	Country_Id
16	Portal	Countries	lkp_un_Country	Country_Id	Country_Arabic_Name	Map_src_Prof_Assesment_NationalityID	src_professionalLicenseTestNationalitie:	ID	Title	Countries From Portal Exams	Dim_Country	Country_Id
28	Portal	Countries	lkp_un_Country	Country_Id	Country_Arabic_Name	Map_src_Scfhs_NationalityID	src_Nationality	Nationality_ID	NationalityName_AR	Nationalities From Portal	Dim_Country	Country_Id
29	Matching	Countries	lkp_un_Country	Country_Id	Country_Arabic_Name	Map_mtl_Lookups_NationalityID	mtl_Nationality	NationalityID	NameAR	Nationalities From Matching	Dim_Country	Country_Id
30	Matching	Countries	lkp_un_Country	Country_Id	Country_Arabic_Name	Map_mtl_Lookups_CountryID	mtl_Country	CountryID	NameAR	Countries From Matching	Dim_Country	Country_Id
56	HR	Countries	lkp_un_Country	Country_Id	Country_Arabic_Name	Map_ohr_CountryId	V_ohr_countries	Country_Code	Country_AR	Countries From HR	Dim_Country	Country_Id
59	HR	Countries	lkp_un_Country	Country_Id	Country_Arabic_Name	Map_ohr_NationalityId	V_ohr_nationality	Nationality_Code	Nationality_AR	Nationalities From HR	Dim_Country	Country_Id
75	MOE	Countries	lkp_un_Country	Country_Id	Country_Arabic_Name	Map_exd_moe_Country	V_exd_extr_MOE_Countries	Country_Name	Country_Name	Countries From MOE	Dim_Country	Country_Id
76	One45	Countries	lkp_un_Country	Country_Id	Country_Arabic_Name	Map_eon_CountryId	eon_countries	countryId	countryName	Countries From One45	Dim_Country	Country_Id
78	One45	Countries	lkp_un_Country	Country_Id	Country_Arabic_Name	Map_eon_NationalityId	V_eon_Nationality	Nationality_Id	Nationality_Name	Nationalities From One45	Dim_Country	Country_Id
79	Assessment	Countries	lkp_un_Country	Country_Id	Country_Arabic_Name	Map_exd_rec_amt_Country	V_exd_rec_amt_Country	Country_Id	Country_Name	Countries From Assessment Testing Centers Exce	Dim_Country	Country_Id
86	HR	Countries	lkp_un_Country	Country_Id	Country_Arabic_Name	Map_ohr_Establishment_Country	V_ohr_Establishment_Country	Country_Id	Country_Name	Establishments Countries From HR	Dim_Country	Country_Id
92	Academy	Countries	lkp_un_Country	Country_Id	Country_Arabic_Name	Map_Academy_Country	V_eac_Country	Country_ID	Country_Name	Countries From Academy	Dim_Country	Country_Id
96	LMS	Countries	lkp_un_Country	Country_Id	Country_Arabic_Name	Map_Lms_Country	V_elm_Country	Country_ID	Country_Name	Countries From LMS	Dim_Country	Country_Id
99	Collaboration	Countries	lkp_un_Country	Country_Id	Country_Arabic_Name	Map_ecl_Country	ecl_Country	Country_ID	Country_Name	Countries From Collaboration	Dim_Country	Country_Id
102	Collaboration	Countries	lkp_un_Country	Country_Id	Country_Arabic_Name	Map_ecl_Nationality	ecl_Nationality	ID	Nationality	Nationality From Collaboration	Dim_Country	Country_Id
106	MCS	Countries	lkp_un_Country	Country_Id	Country_Arabic_Name	Map_exd_mcs_Nationality	V_exd_extr_mcs_Nationality	Nationality_Id	Nationality_Name	Nationalities From MCS	Dim_Country	Country_Id
115	Hadir	Countries	lkp_un_Country	Country_Id	Country_Arabic_Name	Map_hdr_Country	hdr_Country	CountryId	ArName	Countries From Hadir System	Dim_Country	Country_Id
120	MOE	Countries	lkp_un_Country	Country_Id	Country_Arabic_Name	Map_exd_moe_Nationality	V_exd_extr_MOE_Nationalities	Nationality_Id	Nationality_Name	Nationalities From MOE	Dim_Country	Country_Id
125	Appointments Book	Countries	lkp_un_Country	Country_Id	Country_Arabic_Name	Map_ato_Nationality	V_ato_Nationality	Nationality_Id	Nationality_Name	Nationalities From Appointments Booking	Dim_Country	Country_Id
131	Mustamir	Countries	lkp_un_Country	Country_Id	Country_Arabic_Name	Map_mud_CountryId	V_emu_Countries	Country_Id	Country_Ar	Countries from Mustamir	Dim_Country	Country_Id
141	Health Academy	Countries	lkp_un_Country	Country_Id	Country_Arabic_Name	Map_had_Country	had_Country	Country_ID	CountryName_AR	Countries From Health Academy	Dim_Country	Country_Id
151	HRSD	Countries	lkp_un_Country	Country_Id	Country_Arabic_Name	Map_exd_HRSD_Nationality	V_exd_hrsd_Nationality	Nationality_Code	Nationality_Name	Nationalities From HRSD	Dim_Country	Country_Id
161	Health Academy Nc	Countries	lkp_un_Country	Country_Id	Country_Arabic_Name	Map_han_Country	V_han_country	ID	Name_EN	Countries From Health Academy Nomenation	Dim_Country	Country_Id
169	Financial Compnsat	Countries	lkp_un_Country	Country_Id	Country_Arabic_Name	Map_ofw_Nationality	ofw_CMN_NATIONALITY	Code	NAME_AR	Nationalities From Financial Compnsation	Dim_Country	Country_Id
177	Well Being	Countries	lkp_un_Country	Country_Id	Country_Arabic_Name	Map_Wellbeing_Country	V_Wellbeing_Country	Country_Id	Country_Name	Countries From Wellbeing	Dim_Country	Country_Id
181	Matching Fellowshi	Countries	lkp_un_Country	Country_Id	Country_Arabic_Name	Map_mfl_Lookups_CountryID	mfl_Country	CountryID	NameAR	Countries From Matching Fellowship	Dim_Country	Country_Id
183	Matching Fellowshi	Countries	lkp_un_Country	Country_Id	Country_Arabic_Name	Map_mfl_Lookups_NationalityID	mfl_Nationality	NationalityID	NameAR	Nationalities From Matching Fellowship	Dim_Country	Country_Id
186	Portal	Countries	lkp_un_Country	Country_Id	Country_Arabic_Name	Map_src_Scfhs_Country_ID	src_Country	Country_ID	CountryName_AR	Countries From Portal	Dim_Country	Country_Id
196	NGHA	Countries	lkp_un_Country	Country_Id	Country_Arabic_Name	Map_NGHA_Nationality	V_exd_rec_NGHA_Data_Nationality	Nationality_ID	Nationality_Name	Nationalities From NGHA	Dim_Country	Country_Id
199	MOH	Countries	lkp_un_Country	Country_Id	Country_Arabic_Name	Map_MOH_Nationality	V_moh_Nationalities	Nationality	Nationality	Nationalities From MOH	Dim_Country	Country_Id

3. Create mapping column in respective reference table which is used as mapping column(Map_mpd_Mumaris_CountryId) between source and target in lkp_un_country table

4. Auto match algorithm is used to fill the mapping data automatically if the names are similar between reference table and source table

5. Finally the mapping configuration procedure (dq_store_map_data) will collect all the matching records and keep it in valid map record table

6. Manually has to maintain the mapping for those records not matched automatically

3.2 Reference Data Structure:

Any reference data should normally describe about pairs a code value with description. The code value is Primary Key and description states definition

Country Id	Name_En	Name_Ar
0	Unknown	غير معرف
1	Saudi Arabia	السعودية
2	Egypt	مصر
3	Germany	ألمانيا

Dashboard shows country entity data mapping details, so far 33 different data sources are   mapped with Country reference data and around 4800 records are mapped.
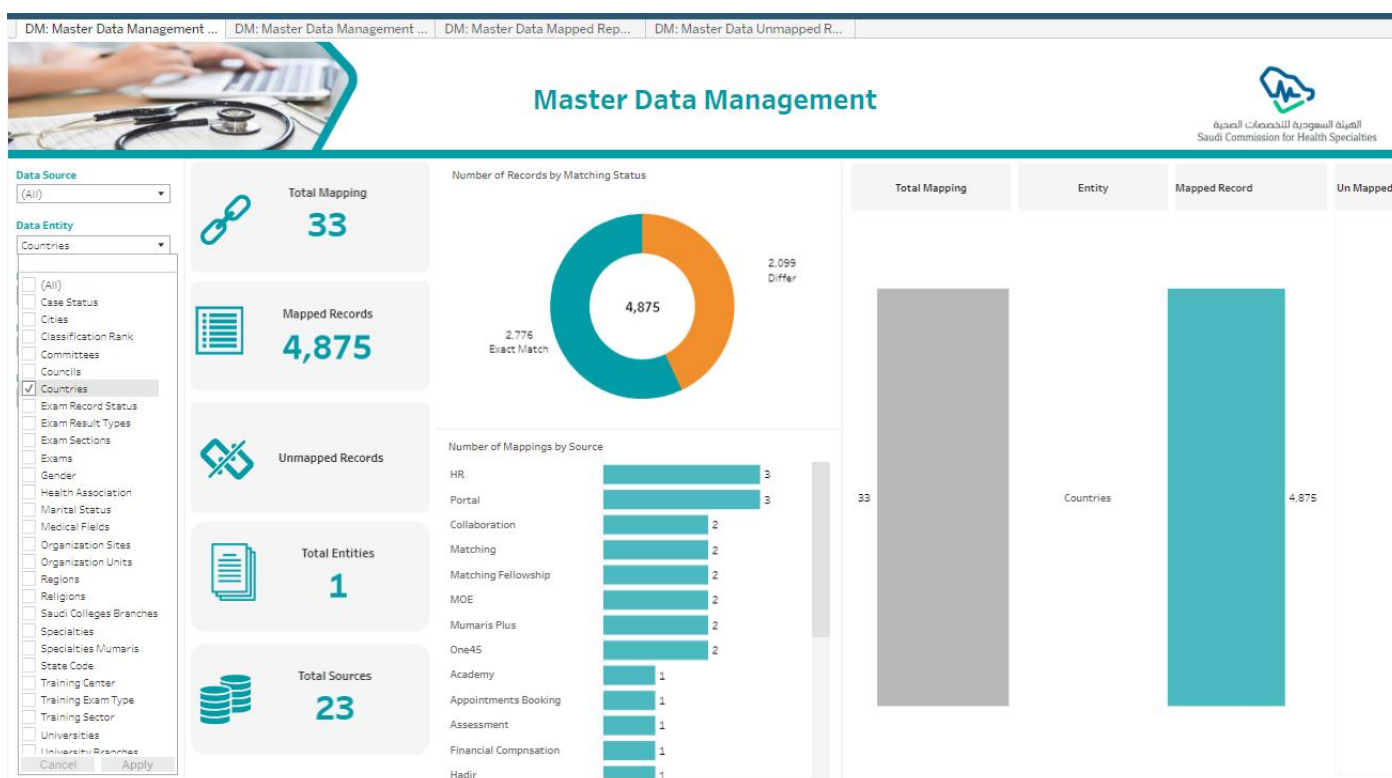
Dashboard shows how many records are mapped to country Reference data from each data source:

DM: Master Data Management ... | DM: Master Data Management ... | DM: Master Data Mapped Rep... | DM: Master Data Unmapped R...

Master Data Mapped

Data Entity	Data Source									
	Academy	Appointments Booking	Assessment	Collaboration	Financial Compensation	Hadir	Health Academy	Health Academy Nomenation	HR	
Countries	[92] 3	[125] 163	[79] 94	[99] [102] 55 80	[169] 247	[115] 248	[141] 246	[161] 85	[56] [59] [86] 214 39 69	[151] 160

Mapping between different source to Country Reference data for Saudi Arabia :

DM: Master Data Management ... | DM: Master Data Management ... | DM: Master Data Mapped Rep... | DM: Master Data Unmapped R...

Master Data Management Summary

New Record Id	New Record Name	New Extra Info1	New Extra Info2	Old Record Id	Old Record Name	Old Extra Info1	Old Extra Info2	Download Data
		(All)	......			(All)	(All)	

Data Entity	New Record Id	New Record Name	New Extra Info1	New Extra Info2	Data Source	Old Record Id	Old Record Name	Old Extra Info1
						اخرى	اخرى	......
	1	السعودية	Saudi Arabia	......	Academy	SA	SA	......
					Appointments Booking	Saudi Arabia	Saudi Arabia	......
						المملكة العربية السعودية	المملكة العربية السعودية	......
					Assessment	Saudi Arabia	Saudi Arabia	......
					Collaboration	37	Saudi Arabia	......
						59	Saudi	......
					Financial Compnsation	SA	المملكة العربية السعودية	Saudi Arabia
					Hadir	SA	المملكة العربية السعودية	Saudi Arabia
					Health Academy	244	السعودية	Saudi Arabia
						285	السعودية	Saudi
					Health Academy Nomenation	3	Saudi Arabia	Saudi Arabia
						المملكة العربية السعودية	المملكة العربية السعودية	المملكة العربية السعودية
						حائل	حائل	حائل

مجتمع صحي بكفاءة

Contd.,

New Record Id	New Record Name	New Extra Info1	New Extra Info2	Old Record Id	Old Record Name	Old Extra Info1	Old Extra Info2	Download Data
		(All)	......			(All)	(All)	

Data Entity	New Record Id	New Record Name	New Extra Info1	New Extra Info2	Data Source	Old Record Id	Old Record Name	Old Extra Info1
					HR	KSA	KSA	......
						PQH_SA	سعودي	Saudi
						Riyadh	Riyadh	......
						SA	المملكة العربية السعودية	Saudi Arabia
						Saud	Saud	......
						saudi	saudi	......
						Saudi Arabia	Saudi Arabia	......
						أبها	أبها	......
						ألرياض	ألرياض	......
						الرياض	الرياض	......
						السعودية	السعودية	......
						القريات	القريات	......
						المملكة العربية السعودية	المملكة العربية السعودية	......

Contd.,

Data Entity	New Record Id	New Record Name	New Extra Info1	New Extra Info2	Data Source	Old Record Id	Old Record Name	Old Extra Info1
						500	المملكة العربية السعودية	Saudi Arabia
					MCS	المملكة العربية السعودية	المملكة العربية السعودية	......
						Saudi	Saudi	......
						السعوديه	السعوديه	......
						سعودي	سعودي	......
					MOE	المملكة العربية السعودية	المملكة العربية السعودية	......
					MOH	سعودي	سعودي	......
					Mumaris Plus	883470F7-5DF9..	السعودية	Saudi Arabia
						BD02F5A9-5EF..	السعودية	Saudi Arabia
					Mustamir	187	المملكة العربية السعودية	Saudi Arabia
					NGHA	Saudi Arabia	Saudi Arabia	......
						Saudi Resident	Saudi Resident	......
					One45	187	Saudi Arabia	......
						alqassim	alqassim	......

List of un mapped records from University Reference which need to map: Using this dashboard all unmapped records are mapped to Reference table as daily operational work.

Master Data Unmapped

Old Record Id	Old Record Name	Old Extra Info1	Old Extra Info2
		(All) ▼	(All) ▼

Download Data

Data Entity	Data Source	Old Record Id	Old Record Name	Old Extra Info1	Old Extra Info2	Map I
Universities	Health Academy Nomenation	Suffolk University	Suffolk University	الولايات المتحدة الأمريكية	United States	164
		2022	2022	المملكة العربية السعودية	Saudi Arabia	164
		(جامعة الملك عبد العزيز)	(جامعة الملك عبد العزيز)	المملكة العربية السعودية	Saudi Arabia	164
		Al Faisal University	Al Faisal University	المملكة العربية السعودية	Saudi Arabia	164
		Al-Ghad International College of Applied Medical Sciences	Al-Ghad International College of Applied Medical Sciences	المملكة العربية السعودية	Saudi Arabia	164
		Alfarabi college	Alfarabi college	المملكة العربية السعودية	Saudi Arabia	164
		Alghad international college	Alghad international college	المملكة العربية السعودية	Saudi Arabia	164
		Alghad international college for medical applied scince	Alghad international college for medical applied scince	المملكة العربية السعودية	Saudi Arabia	164
		alghad international colleges	alghad international colleges	المملكة العربية السعودية	Saudi Arabia	164
		alghad iternatoinal college	alghad iternatoinal college	المملكة العربية السعودية	Saudi Arabia	164
		Alqassim university	Alqassim university	المملكة العربية السعودية	Saudi Arabia	164
		Anglia Ruskin	Anglia Ruskin	المملكة المتحدة	United kingdom	164
		Auckland university of technology	Auckland university of technology	New Zealand	New Zealand	164
		Bay Path University	Bay Path University	الولايات المتحدة الأمريكية	United States	164
		Bisha University	Bisha University	المملكة العربية السعودية	Saudi Arabia	164

3.3   Master Data Hub Design:

SCFHS has beneficiary master data derived from different data sources. Beneficiary could be practitioners, trainee, license exam student,etc.,

The design phase consists of three steps ;

1. Integrate master records using **Identity Number** (National Id) from different sources the SCFHS has dm profile table to keep all the similar beneficiary records

2. Based on data source preference the golden records are generated and stored in unique profile mart

3. In addition to that collect and keep the transaction about the beneficiary from all the preferred data sources.

The master data preference is about to ordering based on trusty source, in this case Mumaris plus is the first preference and other data source preference and order as follows:

a. Mumaris-Profile
b. Portal-Profile
c. Training-Profile
d. Matching-Profile
e. One45-Profile

f. OracleHR-Employee
g. Majales-Member
h. Health-Academy-Trainee

3.4   Dm Profile Structure:

The structure of dm profile master data consists of all the similar data set from different data source as follows. More than one record for the same beneficiary from different sources.

#No.	Column Name	Description
1	Hash_Column	Hash column for the table
2	Data_From	Mumaris+/E-Services/Training/ Matching/One45/HR/Majales/Health Academy
3	System_Id	PK of source table
4	Identity_Number	National Id
5	Profile_Id	Profile Id
6	Profile_Link	Describe source data from
7	Full_Name_En	Full name of beneficiary in Latin
8	Full_Name_Ar	Full name of beneficiary in Arabic
9	Mobile_Number	Mobile Number
10	Email	Email
11	Birth_Date	Date of Birth
12	Gender_Code	Gender Code
13	Gender_Name_En	Gender Name in Latin
14	Gender_Name_Ar	Gender Name in Arabic
15	Nationality_Code	Nationality Code
16	Nationality_En	Nationality Name in Latin
17	Nationality_Ar	Nationality Name in Arabic
18	Nationality_Type_En	Nationality Type in Latin
19	Nationality_Type_Ar	Nationality Type in Arabic
20	Speciality_Id	Speciality Code
21	Speciality_Name_En	Speciality Name in Latin
22	Speciality_Name_Ar	Speciality Name in Arabic
23	Medical_Field_Id	Medical Field Code
24	Medical_Field_Ar	Medical Field Name in Latin
25	Medical_Field_En	Medical Field Name in Arabic
26	University_Id	University Code
27	University_Name_En	University Name in Latin
28	University_Name_Ar	University Name in Arabic
29	College_Id	College Code
30	College_Name_En	College Name in Latin
31	College_Name_Ar	College Name in Arabic
32	Other_University_Name	Other University Name
33	University_Branch_Id	University Branch Code
34	University_Branch_Name_Ar	University Branch Name in Latin
35	University_Branch_Name_En	University Branch Name in Arabic
36	Graduation_Year	Graduation Year

37	Dwh_Id	Exam source ID
38	Loading_Date	Data of Last Refresh
39	Profile_Priority	Priority based on trust order
40	Profile_Column_Name	Data source table and column name
41	Profile_Status	Practitioner current registration status
42	Profile_Create_Date	Profile Creation Date

The following dashboard describe about name of the source system where the beneficiary data are extracted to keep all beneficiary data.

In this case we have around 9 applications where the data is extracted.

3.5   Unique Profile Structure:

Only one golden records from dm profile to treat as master records.

The structure of golden master data are as follows:

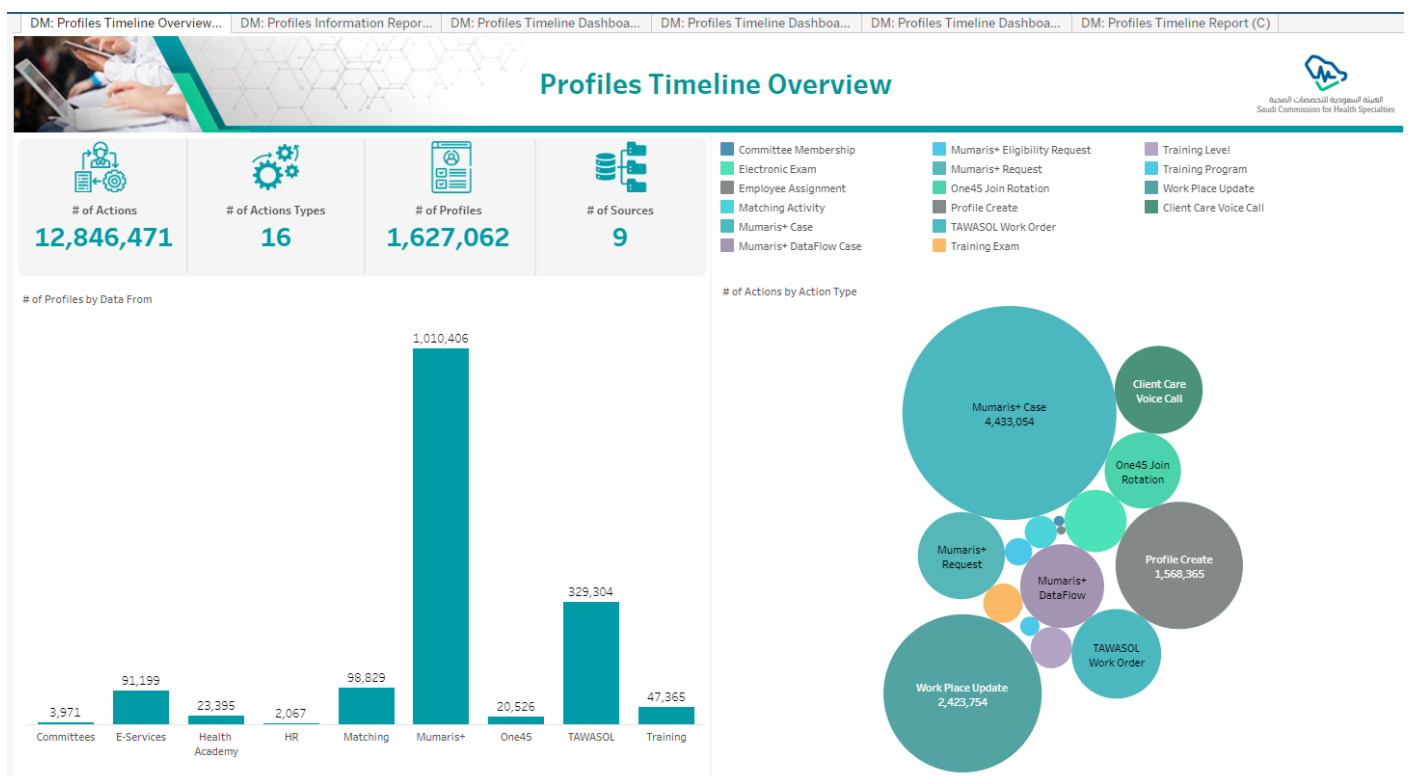| #No.	Column Name	Description
1	Hash_Column	Hash column for the table
2	Data_From	Mumaris+/E-Services/Training/ Matching/One45
3	System_Id	PK
4	Identity_Number	National Id
5	Profile_Id	Profile Id
6	Profile_Link	Data Source
7	Full_Name_En	Full name of practitioners in Latin
8	Full_Name_Ar	Full name of practitioners in Arabic
9	Mobile_Number	Mobile Number
10	Email	Email
11	Birth_Date	Date of Birth
12	Gender_Code	Gender Code
13	Gender_Name_En	Gender Name in Latin
14	Gender_Name_Ar	Gender Name in Arabic
15	Nationality_Code	Nationality Code
16	Nationality_En	Nationality Name in Latin
17	Nationality_Ar	Nationality Name in Arabic
18	Nationality_Type_En	Nationality Type in Latin
19	Nationality_Type_Ar	Nationality Type in Arabic
20	Speciality_Id	Speciality Code
21	Speciality_Name_En	Speciality Name in Latin
22	Speciality_Name_Ar	Speciality Name in Arabic
23	Medicalfield_Code	Medical Field Code
24	Medicalfield_Ar	Medical Field Name in Latin
25	Medicalfield_En	Medical Field Name in Arabic
26	Universityid	University Code
27	University_Name_En	University Name in Latin
28	University_Name_Ar	University Name in Arabic
29	College_Id	College Code
30	College_Name_En	College Name in Latin
31	College_Name_Ar	College Name in Arabic
32	Other_University_Name	Other University Name
33	University_Branch_Id	University Branch Code
34	University_Branch_Name_Ar	University Branch Name in Latin
35	University_Branch_Name_En	University Branch Name in Arabic

36	Graduation_Year	Graduation Year
37	Loading_Date	Data of Last Refresh
38	Profile_Column_Name	Data source table and column name
39	Profile_Status	Practitioner current registration status
40	Profile_Create_Date	Profile Creation Date

3.6 Profile Timeline Structure:

Keep all beneficiary transaction data collect from different sources; this would describe the journey of beneficiary how he travel so far over the period in SCFHS.

Profile Timeline chat:
This dashboard describe the journey of beneficiary

Contd.,

Action Date

Action Year

Action Result
- Not Applicable
- Positive
- Negative
- Aborted

Action Type
- Profile Create
- Mumaris+ Case
- Mumaris+ Request
- Electronic Exam
- Training Exam
- Training Level
- Training Program
- Matching Activity
- One45 Join Rotation
- TAWASOL Work Order
- Work Place Update

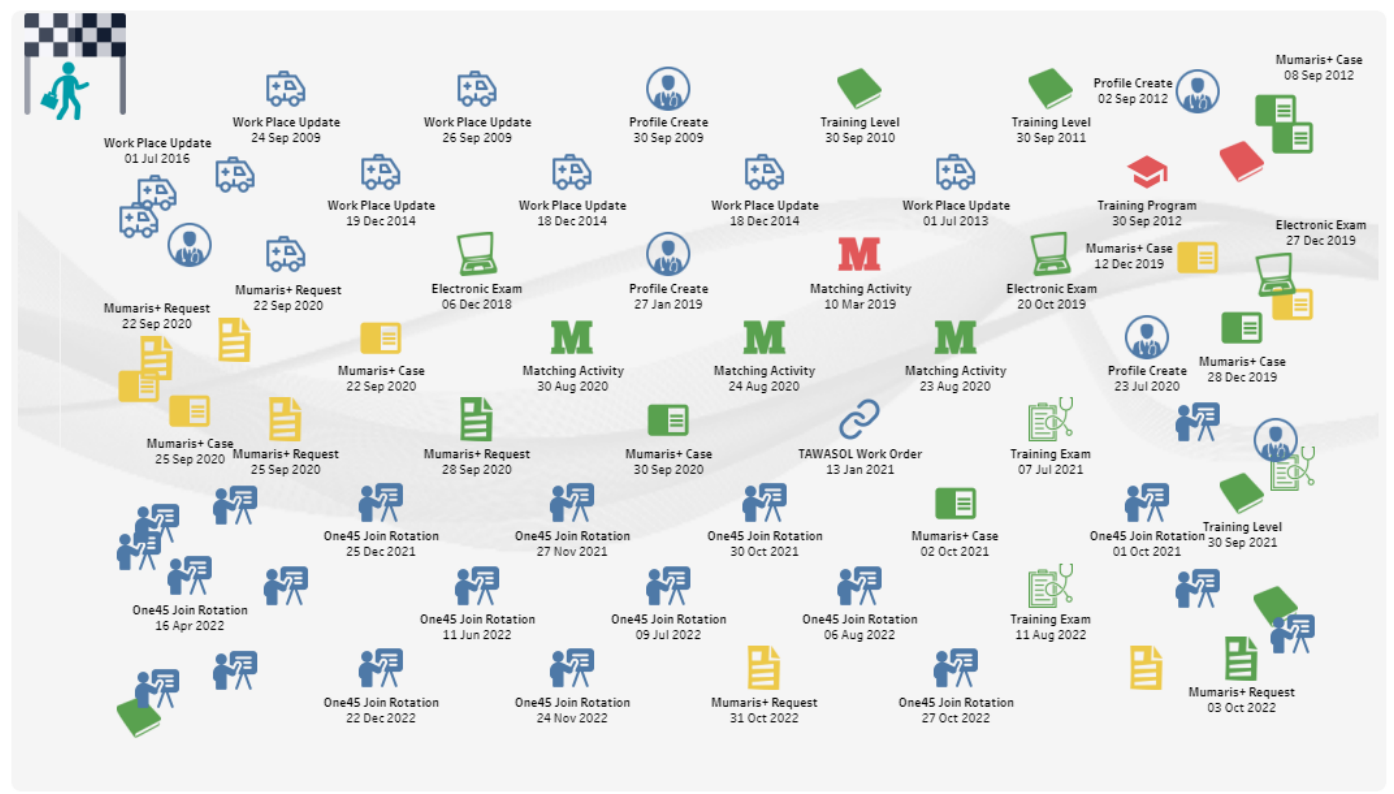| Data From	2009	2010	2011	2012	2013	2014	2015	2016	2018	2019	2020	2021	2022	2023
E-Services									●	●				
Matching										● M	● M M M			
Mumaris+	● ●			● ● ● ●	●	● ● ● ●		● ●	●	● ● ●	● ● ● ● ● ● ● …	●	● ● ●	
One45												● ● ● ● ● ● ● ●	● ● ● ● …	● ●
TAWASOL												⚯		
Training	●	●	●	● ●								● ● ●	● ●	●

Contd.,

Timeline entries:

- Work Place Update 01 Jul 2016
- Work Place Update 24 Sep 2009
- Work Place Update 26 Sep 2009
- Profile Create 30 Sep 2009
- Training Level 30 Sep 2010
- Training Level 30 Sep 2011
- Profile Create 02 Sep 2012
- Mumaris+ Case 08 Sep 2012
- Mumaris+ Request 22 Sep 2020
- Work Place Update 19 Dec 2014
- Work Place Update 18 Dec 2014
- Work Place Update 18 Dec 2014
- Work Place Update 01 Jul 2013
- Training Program 30 Sep 2012
- Electronic Exam 27 Dec 2019
- Mumaris+ Request 22 Sep 2020
- Electronic Exam 06 Dec 2018
- Profile Create 27 Jan 2019
- Matching Activity 10 Mar 2019
- Electronic Exam 20 Oct 2019
- Mumaris+ Case 12 Dec 2019
- Mumaris+ Case 22 Sep 2020
- Matching Activity 30 Aug 2020
- Matching Activity 24 Aug 2020
- Matching Activity 23 Aug 2020
- Profile Create 23 Jul 2020
- Mumaris+ Case 28 Dec 2019
- Mumaris+ Case 25 Sep 2020
- Mumaris+ Request 25 Sep 2020
- Mumaris+ Request 28 Sep 2020
- Mumaris+ Case 30 Sep 2020
- TAWASOL Work Order 13 Jan 2021
- Training Exam 07 Jul 2021
- One45 Join Rotation 25 Dec 2021
- One45 Join Rotation 27 Nov 2021
- One45 Join Rotation 30 Oct 2021
- Mumaris+ Case 02 Oct 2021
- One45 Join Rotation 01 Oct 2021
- Training Level 30 Sep 2021
- One45 Join Rotation 16 Apr 2022
- One45 Join Rotation 11 Jun 2022
- One45 Join Rotation 09 Jul 2022
- One45 Join Rotation 06 Aug 2022
- Training Exam 11 Aug 2022
- One45 Join Rotation 22 Dec 2022
- One45 Join Rotation 24 Nov 2022
- Mumaris+ Request 31 Oct 2022
- One45 Join Rotation 27 Oct 2022
- Mumaris+ Request 03 Oct 2022

4- RMD Conceptual Architecture

A conceptual reference model defines the terms and concepts used by the enterprise and the communities and business stakeholders in which the enterprise operates. Other strategic, operational, and architectural assets reference it as a way to federate and pivot between different processes, communities, schemas, and systems without coupling them together.

The conceptual reference model approach takes enterprise vocabularies and enterprise data models to a new level that enables federation and integration capabilities to be partially automated and validated

SCFHS follows centralized reference data model for an entire organization level data gathered from internal and external.

4.1   Components of Reference Data Model:

Components of RDM are Data source, Hub and Consume Applications.

Data Source:- SCFHS has more than 100 data sources from various applications which contains Reference and Master data. Some of the Data sources are listed as follows:

- Mumaris Plus
- Training
- Matching for Residency
- Matching for Fellowship
- HA Matching
- One45
- Tawasol
- HR
- Health Academy
- Portal
- Majales
- Supporting Service

Data Hub:- Data hub keeps all the data sources available at SCFHS organization in HUB layer and even from external data received from MOE, MCS and HRSD.

The EDW has all the reference and master data entity which is consolidated from different sources and cleansed and reliable source for dashboard and other applications.

Some of the Reference entity are :

- Country
- City
- Speciality

- University
- Exam
- Training Center
- Medical Fields
- Organization Units
- Region

4.2   Reference and Master Data Conceptual Model:

Conceptual model shows how the different data source are flow from HUB to EDW to PL and Mart.

Finally the dashboard, Exchange and data sharing are get benefitted from RDM.