

Analyses and Management of Healthcare Data for Cancer Care

Agastya Silvina

Front-End



Visualisation
Reporting Service
Dashboard

Back-End



Migration
API Gateway

Toxicity Predictor
(1,2,3,4,...)
ML, NLP, DL

Issues...
Issues...

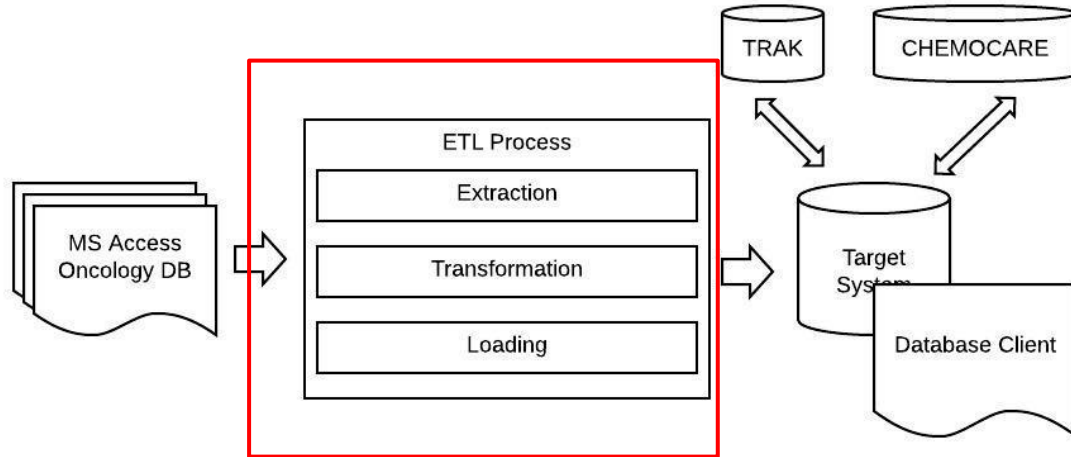
PoC

Synthetic Data

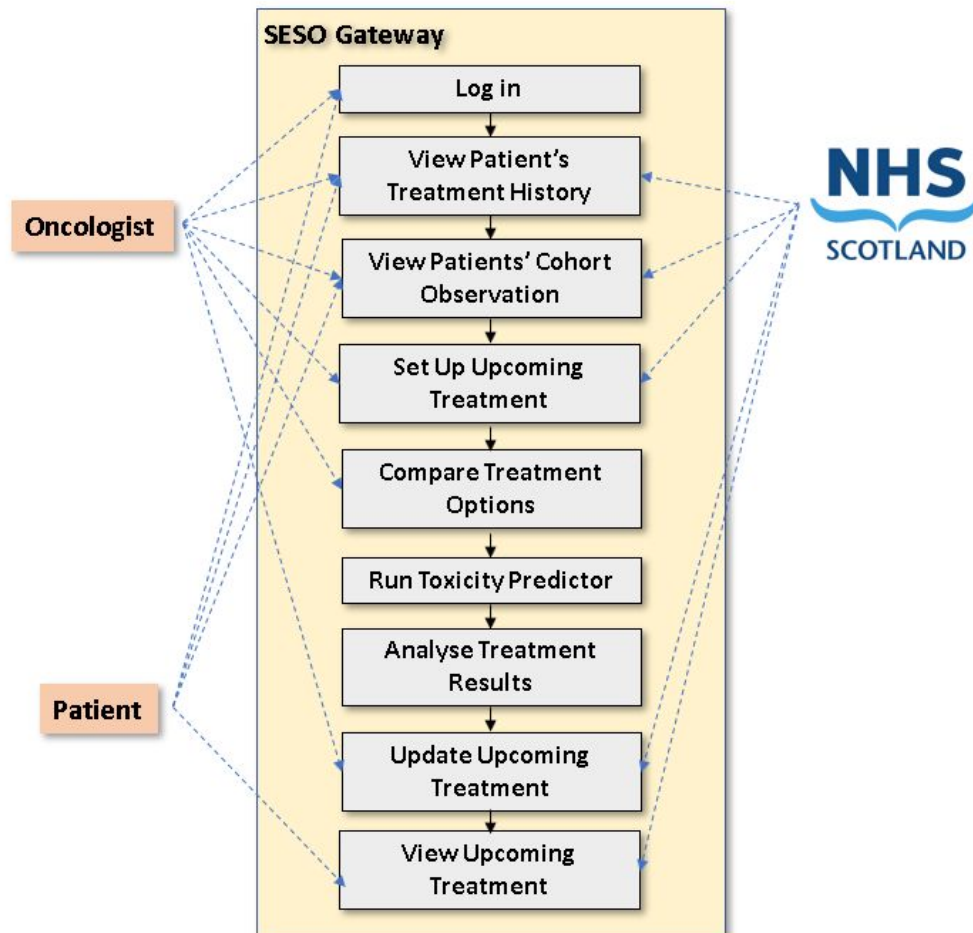
IBM

Oncology Migration

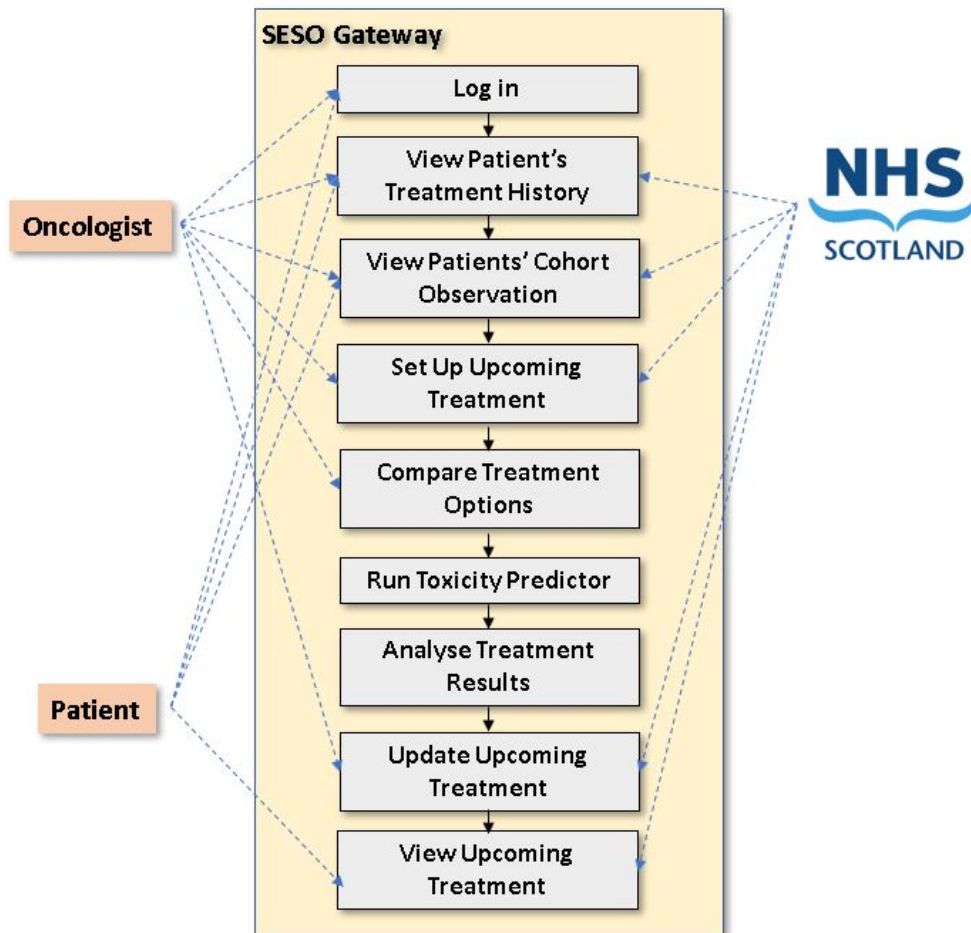
- We have performed the latest UAT migration.
- We are going to migrate the database to the production server in January.



Toxicity Predictor



Toxicity Predictor

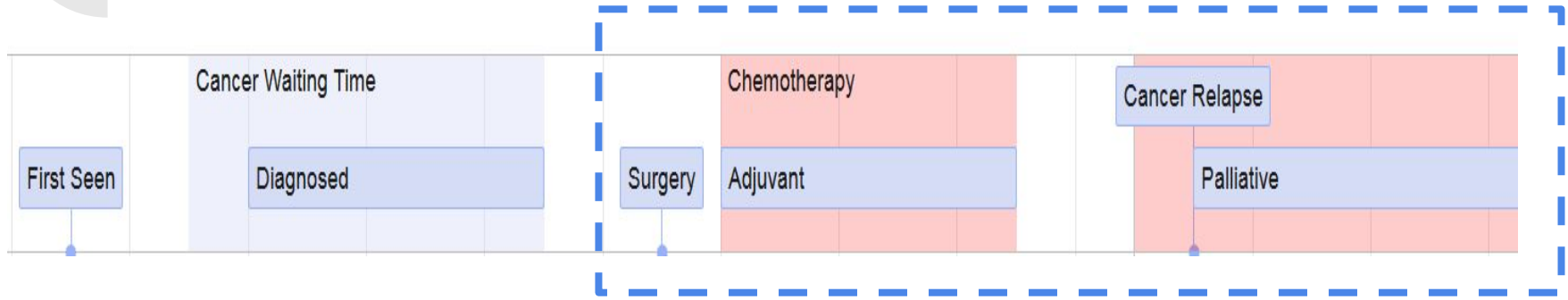




Synthetic Data

- We use IBM Constraint Solver
 - Determining the rules

Patients' Treatment Pathway



- A patient can only be treated with one intention at a time (e.g., Adjuvant)
- After a specific time has passed, the patient might be treated with other treatments with different intentions (e.g., Palliative, Curative)

Treatment Regimes

- Each intention has different regimes.
- Each regime has several different drugs.
- The treatment may last for several weeks or months
- A patient may be treated with several regimes at time.
- Each regime has one or more treatment cycles.
- Several different regimes may belong to one protocol.





How does the table represent the treatment?

CHI	APPOINTMENT DATE	INTENTION	REGIME	DRUG	CYCLE
patient1	1/12/2019	Adjuvant	Regime A	drug1	1
patient1	1/12/2019	Adjuvant	Regime A	drug2	1
patient1	7/12/2019	Adjuvant	Regime A	drug1	2
patient1	7/12/2019	Adjuvant	Regime A	drug2	2
patient1	14/12/2019	Adjuvant	Regime A	drug1	3
patient1	14/12/2019	Adjuvant	Regime A	drug2	3

- First Appointment Date

**`currentDate - (5*365) < first_appointment_date <=`
`currentDate - 250`**

- Unique CHI

`allDiff(from(general), chi)`

- Each regime may have more than one cycles


**`numOf(from(smr01),cycle.regime = regimen.regime) =`
`randomWeightedNumber(8)`**

last_toxicity_date	tumour_group	age_at_diagnosis	height	weight	surface_area	patient_type	consultant_code	intention	regime_code
2019-09-20	Other	30	1.95	63.2	1.84	D	MM	Palliative	GEM/FR-CIS NEO
2019-09-19	Breast	35.2	1.78	72.7	1.89	D	MM	Adjuvant	CAPOX LOW DOSE
2019-09-17	Lung and Chest	46.8	1.57	70.4	1.75	D	MM	Adjuvant	CISPLAT/ETOP LD
2019-09-24	Breast	88.8	1.85	69.2	1.88	D	AA	Palliative	CAPECITABINE
2019-09-16	Lung and Chest	26	1.4	57.4	1.49	D	XR	Curative	EP TESTICULAR
2019-09-07	Other	20.4	1.43	81.2	1.79	I	KU	Neo-Adjuvant	CARBO/PAC 3W EC/
2019-09-17	Breast	64.2	1.66	78.9	1.9	O	IR	Palliative	CISPLATIN&GEM
2019-09-23	Other	30.2	1.4	61.8	1.54	D	MM	Palliative	CIS/GEM BILIARY
2019-09-19	Other	33.6	1.04	79.6	1.51	D	CI	Palliative	RALOX 28DAYS
2019-09-14	Breast	24.5	1.91	83	2.09	D	HL	Adjuvant	CARBO/PAC 3W EC/
2019-09-19	Lung and Chest	31.9	1.73	71.4	1.85	D	WR	Palliative	PAZOPANIB RCC
2019-09-21	GI Lower	22.4	1.03	72.3	1.43	I	NO	Curative	CAPECITABINE XRT
2019-09-12	Other	29.1	1.76	63.8	1.76	D	AB	Palliative	ERIBULIN
2019-09-14	Breast	58.3	1.58	68.2	1.72	D	VI	Adjuvant	BILCAP TRIAL
2019-09-19	Other	78.2	1.71	80.5	1.95	D	AB	Palliative	AFLIB IRMDG IP



Synthetic data validation

- How to differentiate real and fabricated data?
- We need **tools to differentiate between the real and fabricated data.**
- We are working with the researchers from UCL to determine the quality of our fabricated data.



Solution:
ML?

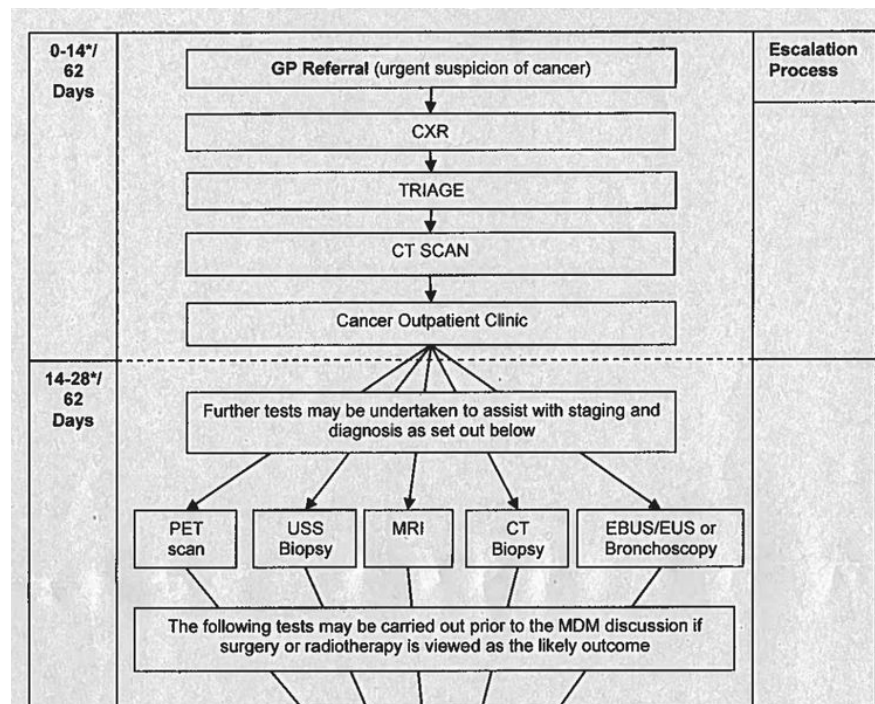
Cancer Waiting Time

- Created the first version query to flag and observe the cancer waiting time.

	SOURCE	START_WAITING_DATE	END_WAITING_DATE	WAITING_TIME	E_START_DATE	E_END_DATE	PREV_ADMISSION_END_DATE	EVENT_WAITING_TIME	ADN
1	IP	14-MAR-16	03-JUN-16	81	21-MAR-16	23-MAR-16	(null)	(null)	
2	OP	14-MAR-16	03-JUN-16	81	29-MAR-16	29-MAR-16	23-MAR-16	6	
3	OP	14-MAR-16	03-JUN-16	81	07-APR-16	07-APR-16	29-MAR-16	9	
4	IP	14-MAR-16	03-JUN-16	81	13-APR-16	16-APR-16	07-APR-16	7	
5	OP	14-MAR-16	03-JUN-16	81	28-APR-16	28-APR-16	16-APR-16	12	
6	OP	14-MAR-16	03-JUN-16	81	17-MAY-16	17-MAY-16	28-APR-16	19	
7	OP	14-MAR-16	03-JUN-16	81	23-MAY-16	23-MAY-16	17-MAY-16	6	
8	OP	14-MAR-16	03-JUN-16	81	14-MAR-16	27-MAY-16	23-MAY-16	-69	
9	OP	14-MAR-16	03-JUN-16	81	31-MAY-16	31-MAY-16	27-MAY-16	5	
10	OP	14-MAR-16	03-JUN-16	81	03-JUN-16	03-JUN-16	31-MAY-16	3	
11	OP	15-JUN-18	15-JUN-18	0	15-JUN-18	15-JUN-18	03-JUN-16	743	

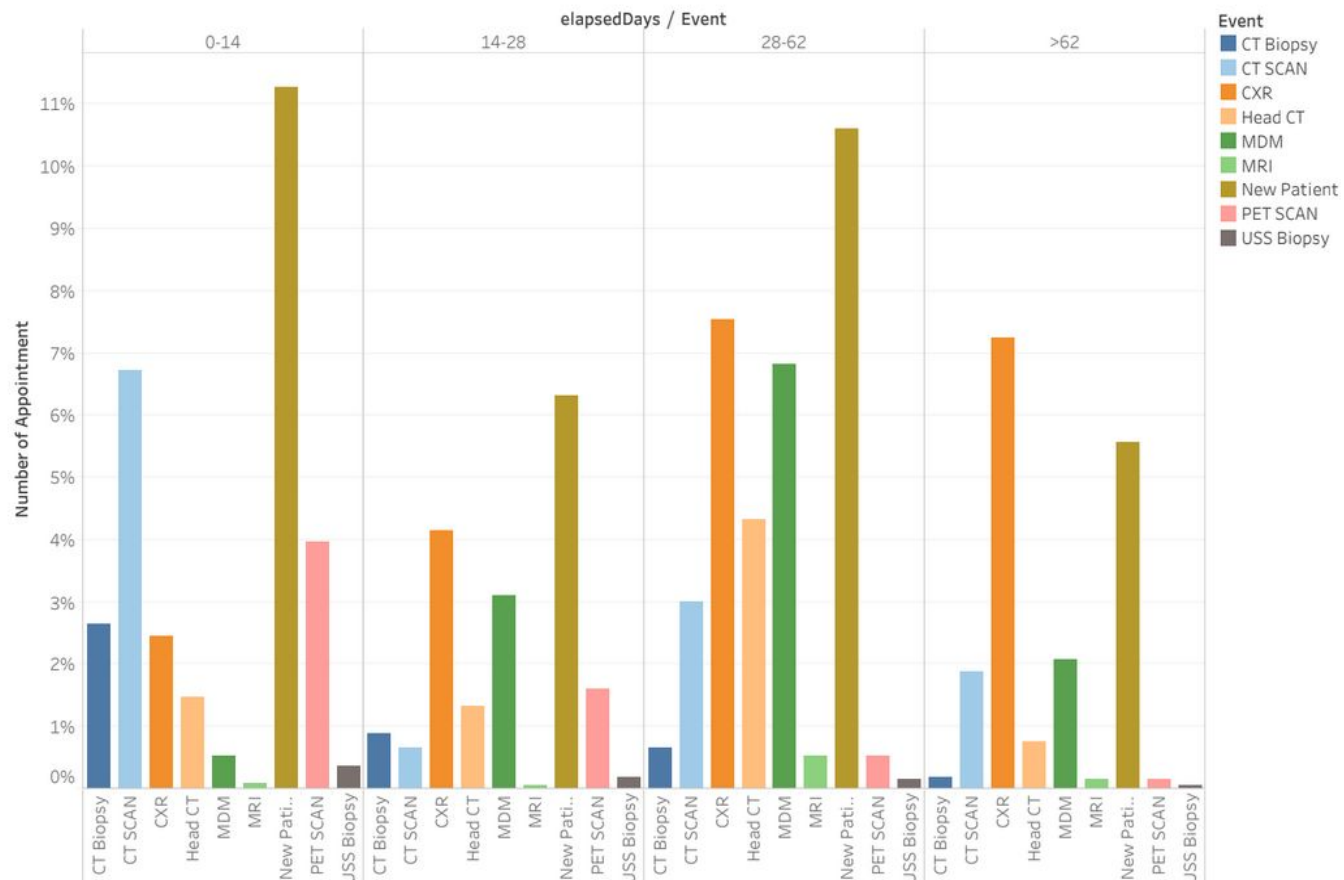
- Waiting for Christina/Dave to re-categorised event.

TOTAL_EVENTS	EVENT
1 (null)	
1	General Surgery Return Patient
2	CT Chest/Abdo With Contrast,CT Chest/Abdo With Cont
1 (null)	
1	RIE Respiratory Physiology New Patient
2	NM Lung Perfusion Scan (Q),NM Lung Perfusion Scan (
1	WGH TTE New Patient
3	Thoracic Surgery Consultant Return Patient,Thoracic
1	WGH TTE New Patient
1	Discussion - MDM - Lung
1	Respiratory Consultant Return Patient



	concise_pathway	total_patients
0	Further tests->Others	13
1	CT SCAN->Further tests->MDM->Others	11
2	CT SCAN->MDM->Others	7
3	Further tests->CXR->Others->MDM->CXR	6
4	Others	6
5	CT SCAN->Further tests->MDM->Others->CXR	5
6	CT SCAN->Further tests->MDM->Others->HEAD CT	5
7	CT SCAN->Further tests->MDM->Others->HEAD CT->CXR	5
8	Further tests->MDM->Others	5
9	Others->MDM	5
10	CT SCAN->Further tests->CXR->MDM->Others	4
11	CT SCAN->Further tests->CXR->MDM->Others->HEAD CT->CXR	4
12	CT SCAN->MDM->Others->CXR	4
13	Further tests->Others->MDM->CXR	4
14	CT SCAN	3
15	CT SCAN->CXR->Others->MDM->CXR	3
16	CT SCAN->Further tests->CXR->MDM->HEAD CT->Others->HEAD CT->CXR	3
17	CT SCAN->Further tests->CXR->MDM->Others->CT SCAN->CXR->CT SCAN	3
18	CT SCAN->Further tests->CXR->MDM->Others->CXR	3
19	CT SCAN->Further tests->Others	3
20	CT SCAN->Further tests->Others->MDM->CXR	3

Appointment/OrderItem Waiting Time



THANK YOU