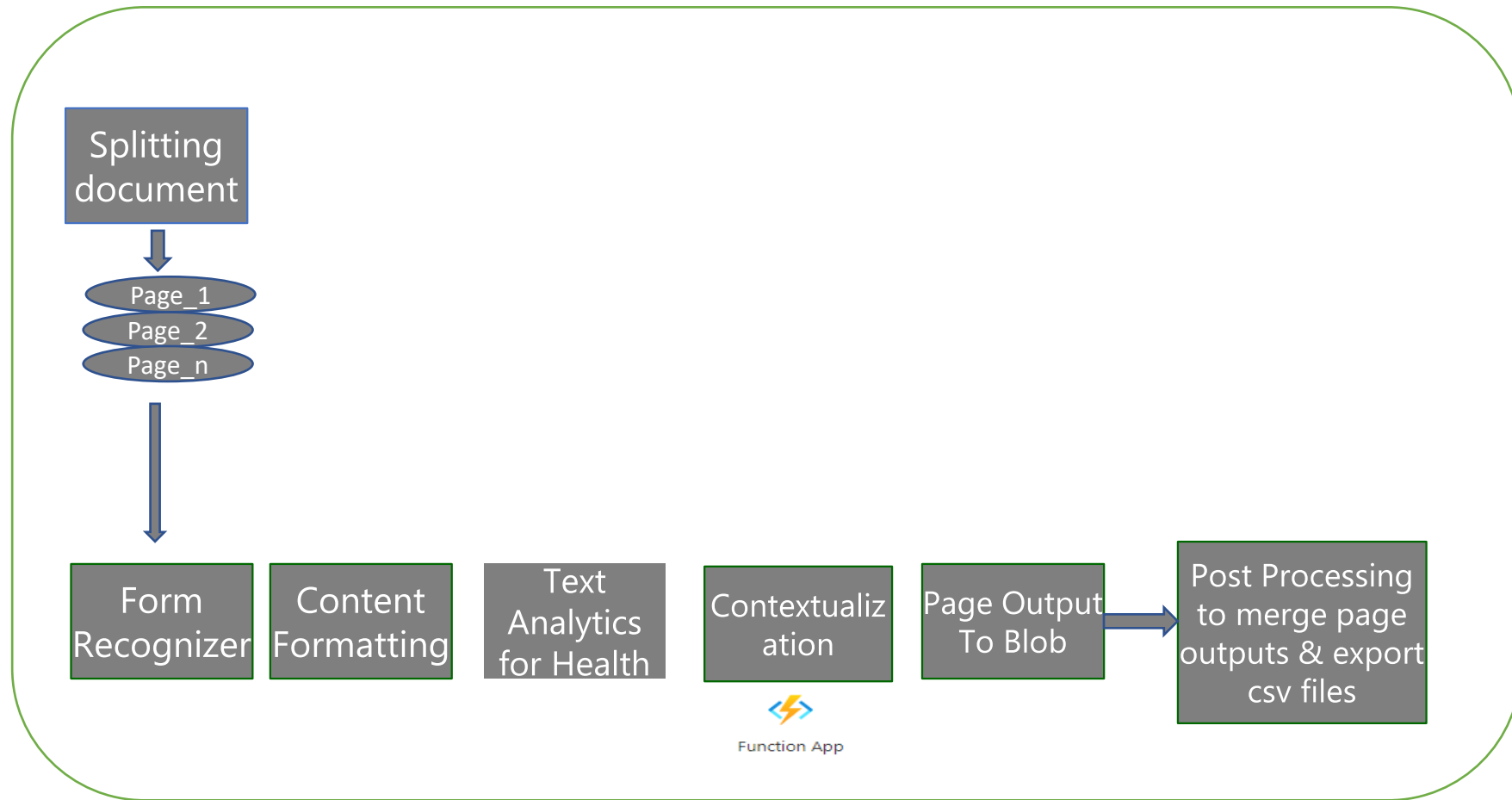




UC3 Contextualization KT

UC3 : Contextualization Components within the overall flow



Pre-processing for TA4H – Content Formatting

Gaps in Form Recognizer Output

The Form Recognizer service doesn't handle tables as we expected
New line for each cell causes

- Lack of context
- Missing relations
- Wrong NER predications

Hemoglobin A1c

COLLECTION DATE	02/11/2021
Order Date	01/01/2000
Result Date	02/15/2021
Ordering Physician	Jay C Stine
Hemoglobin A1c	5.5

HEMOGLOBIN A1c
COLLECTION DATE
02/11/2021
Order Date
01/01/2000
Result Date
02/15/2021
Ordering Physician
Jay C Stine
HEMOGLOBIN A1c
5.5

Result Date
02/15/2021
TIME
Ordering Physician
HEALTHCARE_PROFESSION
Jay C Stine
HEMOGLOBIN A1c UMLS: C0202054
EXAMINATION_NAME
5.5
MEASUREMENT_VALUE

GLUCOSE 93 (65-99 mg/dL)

93
GLUCOSE
(65-99 mg/dL)

93
MEASUREMENT_VALUE
GLUCOSE UMLS: C0337438
EXAMINATION_NAME
(65 - 99 mg/dL)
MEASUREMENT_VALUE MEASUREMENT_VALUE MEASUREMENT_UNIT

Pre-processing for TA4H – Content Formatting

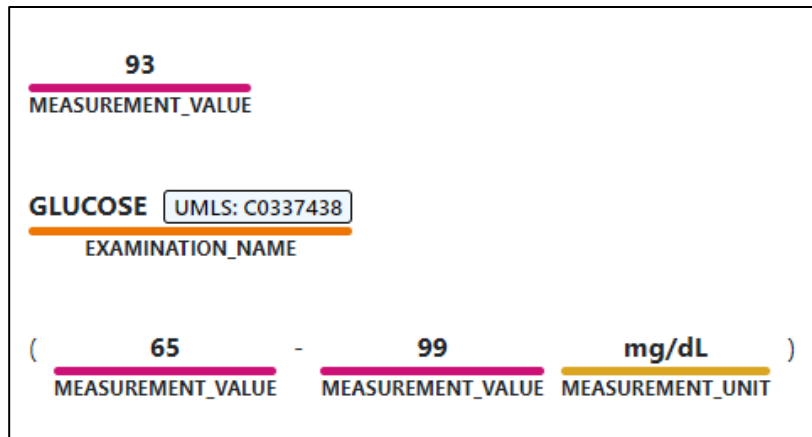
Approach

3 Stages post-processing

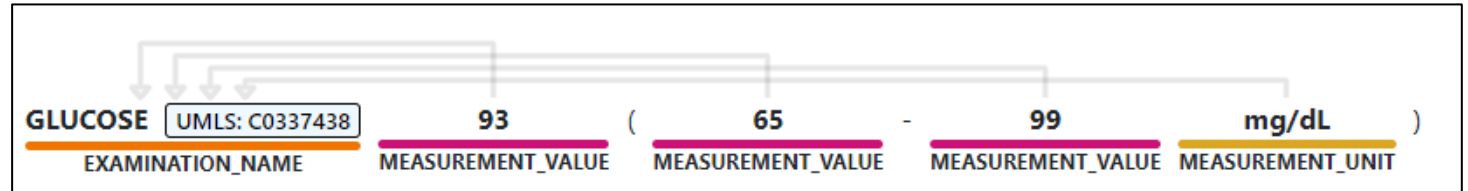
1. Span Detector – words to spans
2. Line Merger – spans to lines
3. Table Detector – handle special cases in the table

The idea is to split the FR output and build the form bottom-up

Before



After



Contextualization – Ta4H Scenarios

Expected Output

Text Analytics for Health is used to extract all variants of recorded **Hemoglobin A1C** and **Control Blood Pressure (CBP)** events.

Required data per event include

- Examination name
- Test Value
- Event Date

Other columns

- Confidence score per variable
- Event confidence level

Events with no or incorrect date is considered invalid. However there are multiple edge case scenarios such as:

- Events with only page level administrative date
 - visit date
 - encounter date
- laboratory date
- collection date
- Column level date
- Date in close proximity

Progress Notes (continued)

Nose: Nose normal.

Neck: Normal range of motion. Neck supple. No JVD present. No tracheal deviation present. Thyroid enlarged.

Nodules palpable and unchanged.

Cardiovascular: Normal rate, regular rhythm and intact distal pulses. Exam reveals no gallop and no friction rub. No murmur heard.

Pulmonary/Chest: Effort normal and breath sounds normal.

Musculoskeletal: Normal range of motion. She exhibits no edema. minimal tremor

Skin: Skin is warm. No rash noted. No erythema. + tattoos present. NO STRIAE

Psychiatric: She has a normal mood and affect.

Data reviewed 01/27/21

Lab Results

Component	Value	Date
HGBA1C	7.1	12/18/2019
HGBA1C	6.8	06/12/2019
HGBA1C	6.7	02/27/2019

```
{
  "contextualizationoutput": {
    "results": [
      {
        "hba1c_results": [
          {
            "hba1cTestName": "HGBA1C",
            "hba1cTestValue": "7.1",
            "hba1cTestDate": "2019-12-18"
          },
          {
            "hba1cTestName": "HGBA1C",
            "hba1cTestValue": "6.8",
            "hba1cTestDate": "2019-06-12"
          },
          {
            "hba1cTestName": "HGBA1C",
            "hba1cTestValue": "6.7",
            "hba1cTestDate": "2019-02-27"
          }
        ]
      }
    ]
  }
}
```


Contextualization – Other Scenarios

Page level date

Patient Name	SMITH, JOHN R	Patient DOB	02/11/1933
Gender	Male	Appointment Date	01/08/2020,02:50 PM
Provider	AUDREY E KEEN, PA	Type of Visit	
Referring Provider	FIRTH-BLACKBURN LINDA, PA-C	Location	SPRINGFIELD OFFICE

REVIEW OF SYSTEMS

There is Abdominal Pain (+), Diarrhea (+).
There is no No Fever., No Weight Loss., No Sore Throat., No Ear Discomfort., No Nasal Congestion., No Cough., No Shortness of Breathe., No Chest Pain., No Palpations., No Dizziness., No Rash., No Headache., No Back Pain., No Neck Pain., No Arthragia., No Nausea., No Visual Change., No Change in Urination.

VITALS

Height	5 Feet 6 Inches	66 in	167.64 cm
Weight	300.4 lbs	136.26 kgs	300 lbs
BMI/BSA	48.49 / 2.51		
Temp	98.5 °F		
BP	Sitting: 156/82 ,		
Pulse Rate	117 bpm		
Resp Rate	16 rpm		
Pulse O ₂	98 %		
	16		

Column level date

	10-08-2019	01-03-2020	01-28-2020
Wt	84 lbs 6 oz With clothes (38.27 kg)	94 lbs (42.64 kg)	104 lbs 0 oz With clothes (47.17 kg)
Ht	5 ft 5 in Stated (165.1 cm)	5 ft 5 in (165.1 cm)	5 ft 5 in Stated (165.1 cm)
BMI	14	15.6	17.3
RR	20	16	16
O2Sat	Room Air at Rest	97 % Room Air at Rest	96 % Room Air at Rest
T	97.5 °F oral (36.39 C)	97.6 °F oral (36.44 C)	98 °F oral (36.67 C)
BP	88 / 58	102 / 52	116 / 70
Pulse	regular	73 bpm regular	94 bpm regular
Pain Scale	Numeric		

Contextualization – Other Scenarios

Date in Close Proximity

Review of Systems

as of 11/03/2020:

Constitutional: sleeps well, good energy level.

Eye: no double/blurred vision

ENMT: no thyroid enlargement, no difficulty with swallowing, no hoarseness

Respiratory: No c/o shortness of breath

Gastrointestinal: No c/o nausea, vomiting, no diarrhea, no constipation.

Cardiovascular: Denies chest pain

Genitourinary: no complaints

Musculoskeletal: no c/o back pain and no c/o joint pain

Neurologic: no c/o headaches, no weakness, no dizziness

Psychiatric: Denies depression, no anxiety

Endocrine: no heat or cold intolerance

Physical Exam

Vitals & Measurements

Pulse Rate: 103 **BP:** 139/86

HT: 170.12 cm **WT:** 93.2 kg **BMI:** 32.2

Collection / Lab Date

Specimen Information

ID	Type	Source	Collected By
20-181-006410	Blood	—	Melissa C Hundley, RN 06/29/20 1242

CBC w/ Differential (Abnormal)

Resulted: 06/29/20 1255, Result status: Final result

Ordering provider: Matthew Stoddard White, MD 06/29/20 1229

Order status: Completed

Filed by: Interface, Lab Results In 06/29/20 1255

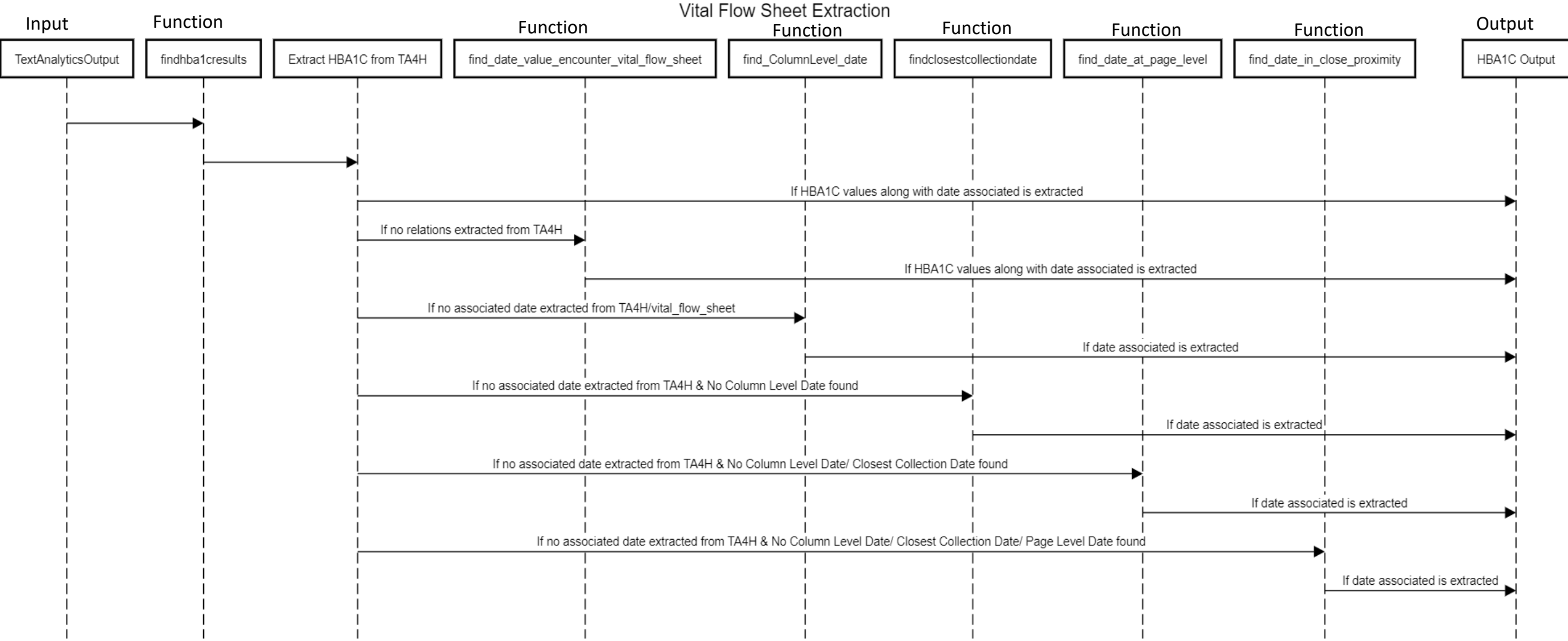
Collected by: Melissa C Hundley, RN 06/29/20 1242

Resulting lab: VUMC CERNER LAB

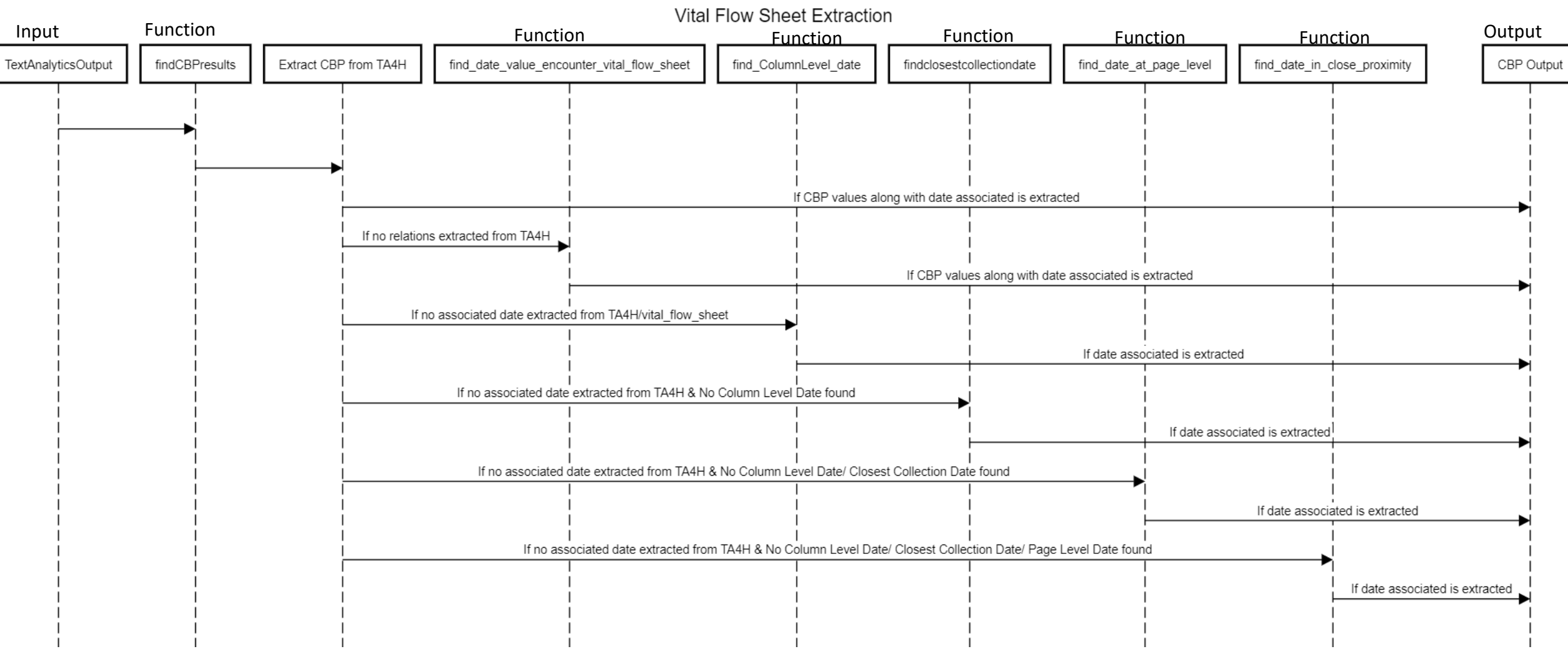
Components

Component	Value	Reference Range	Flag	Lab
White Blood Cells	4.5	3.9 - 10.7 x10(3)/mcL	—	Cerner
Red Blood Cells	4.50	4.50 - 6.00 x10(6)/mcL	—	Cerner
Hemoglobin	13.5	14.0 - 18.1 gm/dL	L ▾	Cerner
Hematocrit	39	41 - 49 %	L ▾	Cerner
Mean Cell Volume	86	81 - 98 fL	—	Cerner
Mean Cell Hemoglobin	30.0	27.0 - 32.0 pg	—	Cerner

Contextualization Sequence Diagram – HBA1C



Contextualization Sequence Diagram - CBP



Thank you

Any question?

