Novel Coronavirus (COVID-19)

Integrating Predictive Models (PMML), Clinical Quality Measures (CQL) and Knowledge Models with BPM+ Models

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Coronaviruses (CoV)

• Are zoonotic, meaning they are transmitted between animals and people.

• Is a large family of viruses that cause illness ranging from the common cold to more severe diseases such as:
  • Middle East Respiratory Syndrome (MERS-CoV)
  • Severe Acute Respiratory Syndrome (SARS-CoV)

• A novel coronavirus (nCoV) is a new strain that has not been previously identified in humans.
Globally, as of 10:37am CEST, 25 June 2020, there have been 9,277,214 confirmed cases of COVID-19, including 478,691 deaths, reported to WHO.
Introduction of PMML, CQL and Knowledge Models

We have three goals today:

• To introduce these seamlessly integrated within the BPM+ stack
• To provide separation of concerns best practices
• To showcase the art of the possible on these topics using COVID examples
Desired characteristics of our knowledge artefacts
(In a crisis context, these characteristics are must haves)

• To provide unambiguous:
  • Knowledge Models
  • Decision Models
  • Course of Action Models
• That are both human consumable and machine automatable
• That are rapidly modifiable and deployable

Some more COVID-19 examples available here:
https://www.trisotech.com/covid-19
Automation Marchitecture

seamlessly integrated within the BPM+ stack
# Separation of Concerns

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Decision Support

User acts based on the recommendation from the DMN decision

DMN: Decision Model and Notation
A standard from the Object Management Group

https://omg.org
COVID19 Adult Mortality Model Zhou

Zhou et al developed a simple model for predicting in-patient mortality of a patient with COVID-19. This can help to identify a patient who may benefit from more aggressive management. The authors are from multiple institutions in China.

References
Decision Automation

System acts based on the DMN decision

DMN provides the decision
BPMN acts upon the decision

DMN: Decision Model and Notation
A standard from the Object Management Group

BPMN: Business Process Model and Notation
A standard from the Object Management Group

https://omg.org
Asymptomatic Suggested Follow Up

A patient who is asymptomatic after a possible exposure to the novel coronavirus should be monitored for signs and symptoms during the possible incubation period (up to 14 days after the exposure).

References


WHO/bCoV/Clinical/2020.2
Prediction

System acts based on the PMML Prediction

PMML: Predictive Model Markup Language
A standard from the Data Mining Group
COVID Prediction

Risk of transmission on a plane
Making predictions requires historical or prior data.
We used SARS data for reference.

References

https://www.trisotech.com/blog/modeling-virus-transmission-on-an-airplane
Quality Measure

System acts based on the result of the CQL measure

CQL: Clinical Quality Language
A standard from HL7

https://HL7.org
COVID Measure

COVID19 Patient Risk for Fatal Disease simplified

The risk for mortality associated with a COVID-19 infection increases with age and comorbid conditions.

References

Disambiguation

A meaning-centric and unambiguous communications across the organization

Expression of meaning via:

• Business vocabularies containing terms with their exact meanings
• Concept maps for expressing knowledge
• Deontic (business) rules specifying what is obligated and permitted
• Logical information structures to relate to data in HIT systems

A knowledge model results in a semantically rich common business language that is reusable in narrative communications, business process, case and decision models, as well as in software applications specifications.
References

Surviving Sepsis Campaign: Guidelines on the Management of Critically Ill Adults with Coronavirus Disease 2019 (COVID-19) [ncbi.nlm.nih.gov/pubmed/32222812]
Conclusion

Today we presented:
• PMML and CQL seamlessly integrated within BPM+ stack
• Disambiguation knowledge models that permeates the BPM+ stack

Questions?