X3 - Predictive Transport Process Monitoring

# Summary of the innovation

# Predictive business process monitoring aims at forecasting potential problems during process execution. Predictive business process monitoring thereby facilitates handling these problems proactively before they occur. We adapt and tune three main classes of predictive monitoring techniques to the problem of forecasting transport process instances. In particular, we show that machine learning, constraint satisfaction, and Quality-of-Service (QoS) aggregation can be used for transport prediction and that we can consistently achieve a prediction accuracy of more than 70%. To improve the prediction process, we exploit the characteristics of the individual techniques and define an ensemble of these techniques. Evidence indicates that this may, for instance, improve precision by 14% or recall by 23%.

# Key features / capabilities

* Prediction of completion time of running transport process instances
* Ensemble prediction to fine-tune prediction accuracy depending on application situation

# Maturity level (TRL - Technology Readiness Level)

* TRL 4 – technology validated in lab

# Availability

* Research paper
  + A. Metzger, P. Leitner, D. Ivanovi c, E. Schmieders, R. Franklin, M. Carro, S. Dustdar, and K. Pohl, “Comparing and combining predictive business process monitoring techniques,” IEEE Trans. on Systems Man Cybernetics: Systems, vol. 45, no. 2, pp. 276–290, 2015. <http://dx.doi.org/10.1109/TSMC.2014.2347265>
  + A. Metzger, R. Franklin, and Y. Engel, “Predictive monitoring of heterogeneous service-oriented business networks: The transport and logistics case (best paper award: service engineering innovation & quality),” in Service Research and Innovation Institute Global Conference (SRII 2012), ser. Conference Publishing Service (CPS), R. Badinelli, F. Bodendorf, S. Towers, S. Singhal, and M. Gupta, Eds. IEEE Computer Society, 2012, pp. 313–322. <http://dx.doi.org/10.1109/SRII.2012.42>
* Other
  + Industry data set of transport processes (Cargo 2000); <http://www.s-cube-network.eu/c2k>

# Licensing

* Public domain (algorithms described in research papers; industrial data set)

# FIspace partner(s) that own innovation & contact points

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