Performance Assessment – Monitoring and Measurement

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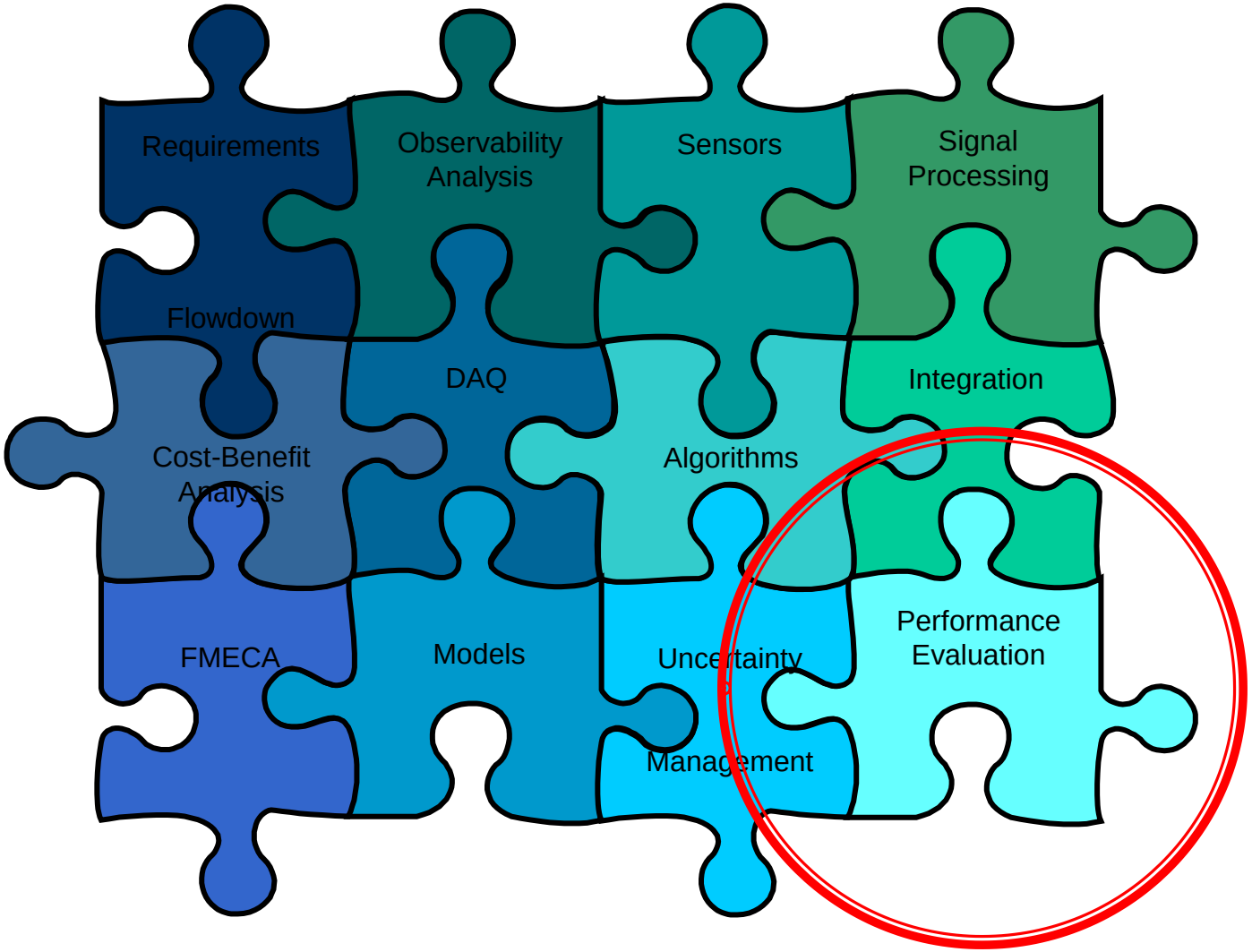
Prognostics Elements



Performance Evaluation

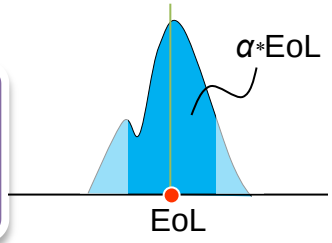
- Why Needed
  - Asses Utility of Current Algorithms
  - Compare Different Algorithms
  - Perform V&V
- Issues
  - RUL Post-hoc Evaluation
  - On-line Evaluation Difficult
  - Uncertainty Assessment Critical

Prognostic Performance Metrics

- Metrics Hierarchy

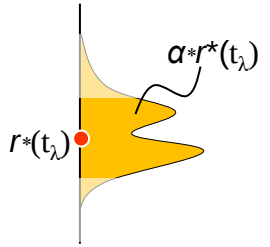
I. Prognostic Horizon

- Does the algorithm predict within desired accuracy around EoL and sufficiently in advance?



II. α-λ Performance

- Further does the algorithm stay within desired performance levels relative to RUL at a given time?



III. Relative Accuracy

- Quantify how well an algorithm does at a given time relative to RUL

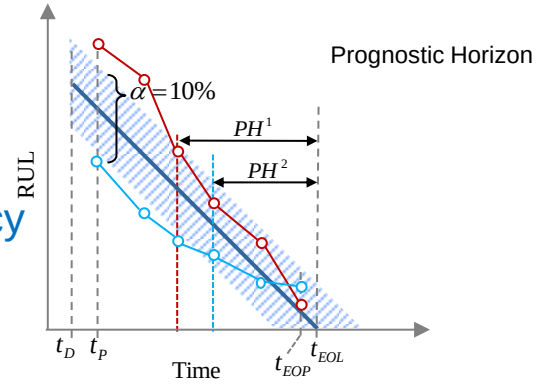
IV. Convergence Rate

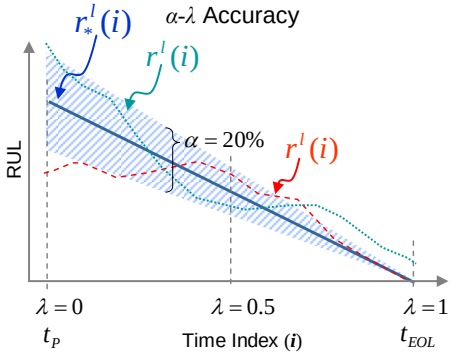
- If the performance converges (i.e. satisfies above metrics) quantify how fast does it converge

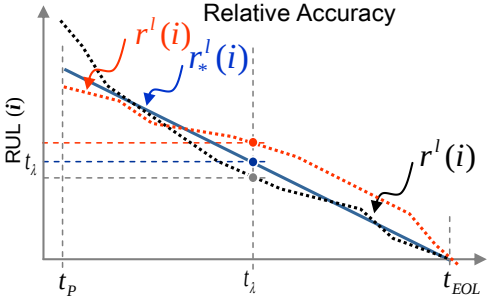
Prognostic Performance Metrics

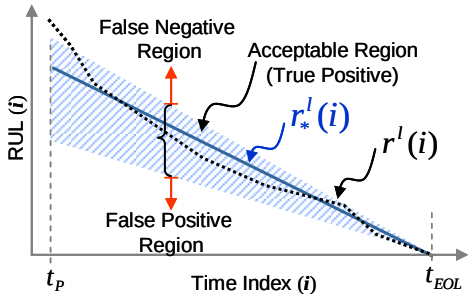
- Metrics have been developed specific to Prognostics

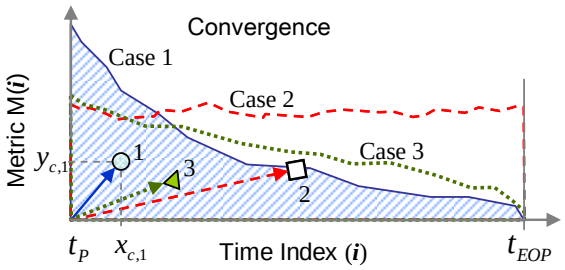
- Prognostic horizon
- *α-λ* performance
- Relative accuracy
- Cumulative relative accuracy
- Convergence











For details and equations, see: A. Saxena, J. Celaya, E. Balaban, K. Goebel, B. Saha, S. Saha, and M. Schwabacher (2008*). Metrics for evaluating performance of prognostic techniques. International Conference on Prognostics and Health Management*, PHM 2008. 6-9 Oct. 2008 Page(s): 1-17.