Know, Predict, Control: A Case Study in Services Management

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Outline

- Background - Rolls-Royce Services
- The theory and practice of services management
- RAMS-centric forecasting
- Considerations in forecasting
- An example of forecasting as a decision-support tool
- Summary
Rolls-Royce Global Services

Travel
- 5.5M flights
- 12bn miles
- Take-Off / Landing every 2.5s

Security
- 160 armed forces
- Front line commitment

Power
- 25 countries
- 60 major pipelines

Trade
- 30 000 vessels
- 7M cargo tonnes
The KPC Model - Theory and Practice

Know
the current fleet status

Balance System Values
Exploit Opportunities
Manage Threats

Control
the future fleet status

Predict
the future fleet status
RAMS Forecasting in Support of Planning

- Forecast
- Recommend
- Analyze
- Optimize
- Validate

KPC

Know, Predict, Control
Considerations in Forecasting

Noise Factors
- Random Uncertainty
- Parameter Uncertainty
- Scenario Uncertainty
- Iterative Uncertainty
- Error
- Systemic Uncertainty

Signal Factors
- Nominal Utilization
- Nominal Operating Environment

Control Factors
- Modelled System Structure

Response Factors
- Risked Values

Stochastic Simulation Model
Modular Contribution to Engine Removals over 25 years

Module

Contribution

- (0.60) M15
- (0.18) M14
- (-0.38) M13
- (0.14) M12
- (0.16) M11
- (0.36) M10
- (0.08) M09
- (0.21) M08
- (0.15) M07
- (0.12) M06
- (0.10) M05
- (0.12) M04
- (0.05) M03
- (0.01) M02
- (0.06) M01
Summary & Conclusions

- Started with a customer need
- Developed through theory - Know, Predict, Control
- Realised in practice by Rolls-Royce Services

- Explored the role of RAMS-centric forecasting in support of the Predict principle

- Illustrated an example of forecasting’s significance in decision-support for Services Management