

Monitoring changing risks

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Overview

- Why monitor risks
- How to monitor risks
- Risk Monitor
- Demonstration

Why monitor risks

- Risks are not static
- Likelihoods and consequences of unwanted incidents may be influenced by changes in the target or its environment
- If we are unaware of these changes our risk picture may become invalid
 - Not reacting to high risks
 - Reacting to low risks
- By monitoring the changes we may update our risk picture without redoing the risk analysis
- Monitoring also provides more reliable data
- More timely and precise decision support

How to monitor risks

- Monitoring risks directly is often difficult
- Often a gap between the description of a risk and what we can monitor
- Risks must be broken down to variables that we are able to monitor
 - Key indicators
- And risk levels aggregated from key indicators
- This is done by building a risk model as part of the risk analysis

Risks and risk functions

- A risk is a function of the likelihood and the consequence assigned to an unwanted incident

- $R = f(L,C)$

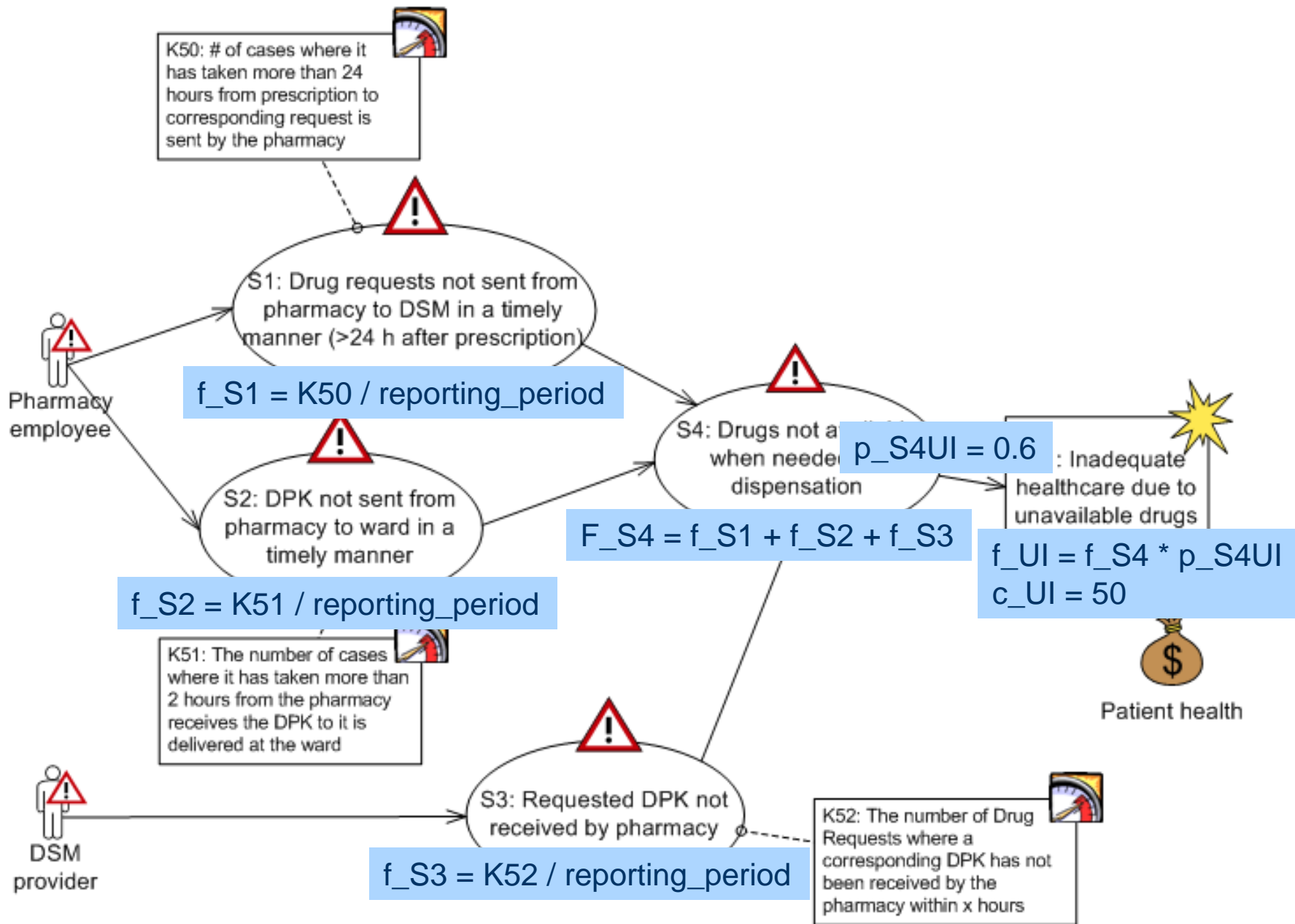
- Examples:

$$R = L \times C$$

		Consequence				
		<i>Insignificant</i>	<i>Minor</i>	<i>Moderate</i>	<i>Major</i>	<i>Catastrophic</i>
Frequency	<i>Rare</i>					
	<i>Unlikely</i>					
	<i>Possible</i>					
	<i>Likely</i>					
	<i>Certain</i>					

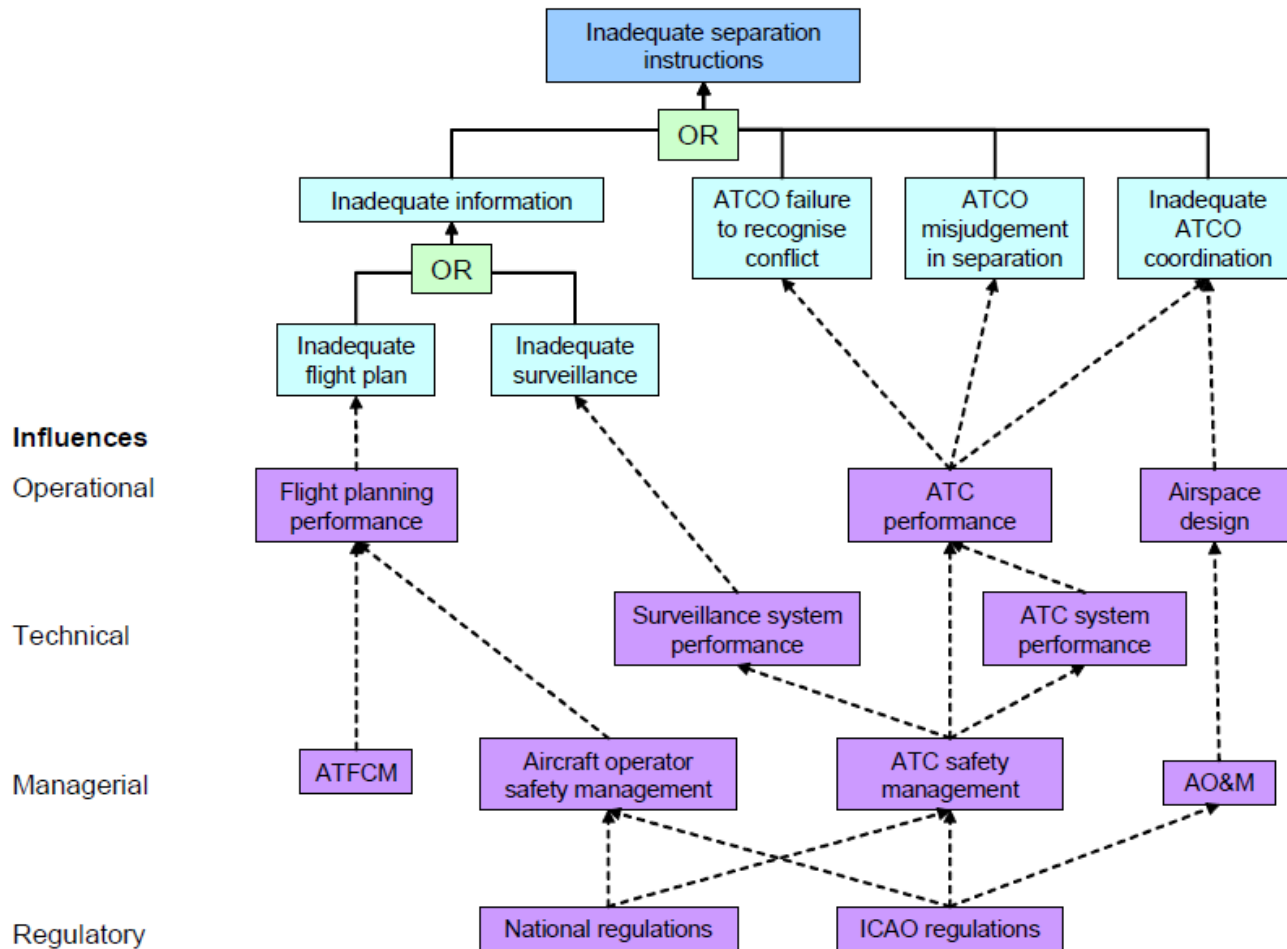
Risk modelling

- Risk modelling is used to break down and identify the sources of unwanted incidents
- The resulting risk model shows what contributes to the unwanted incidents
- The basic parts of the risk model are more easily related to key indicators
- Likelihood (and consequence) of basic parts are defined using key indicators
- The structure of the model helps defining the aggregation of likelihood values



Same principle using Fault Trees

Figure 5.1 Influences on Selected Bottom Events of Fault Tree for Mid-Air Collisions



(METHODOLOGY REPORT FOR THE 2005/2012 INTEGRATED RISK PICTURE FOR AIR TRAFFIC MANAGEMENT IN EUROPE)

The Risk Monitor

- Application for specifying dynamic risk models
- Application for monitoring risks derived from provided key indicators and updating the dynamic risk models
- (Web service providing the dynamic risk models)

- Developed in the MASTER project

How does it work?

- Key indicator values from monitoring the target are stored in a database
- An Expert User specifies risk models (based on a risk analysis of the target) where risk values are derived from key indicator values
- The Risk Monitor updates the risk models
 - Interprets the risk model specification
 - Fetches the key indicator values from the database
 - Calculates the risk values from key indicator values

Risk model specifications

- Specification of what indicators to use
- Definition of variables
- Definition of risk models
 - Likelihood, consequence and risk level scales (common for the risk models)
 - Risk picture (diagram)
 - Specification of variables to be overlaid in the picture
 - Specification of risks

Demo

Summary

- Risks can be monitored by relating observable key indicators to a risk model
- A dynamic risk picture reduce the need reassessment
- And provides more timely and accurate decision support

- The idea of monitoring risks based on key indicators is demonstrated by Risk Monitor
- Prototype tool for
 - Specifying dynamic risk models
 - Updating dynamic risk models based on key indicator values