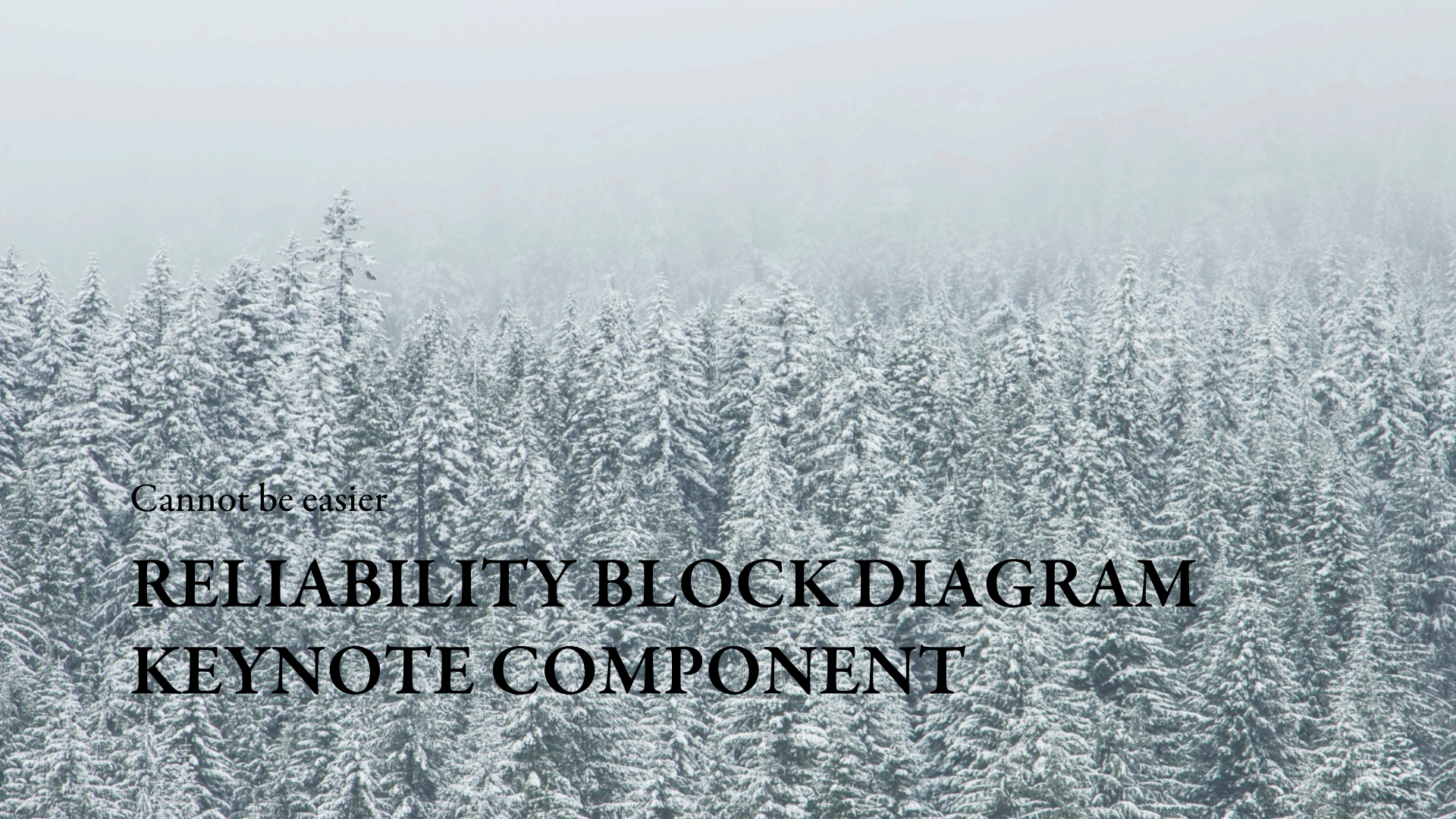
ASQ CRE Prep course

Lesson IV. A. 2. e.

Reliability Block Diagrams and Models – Keynote



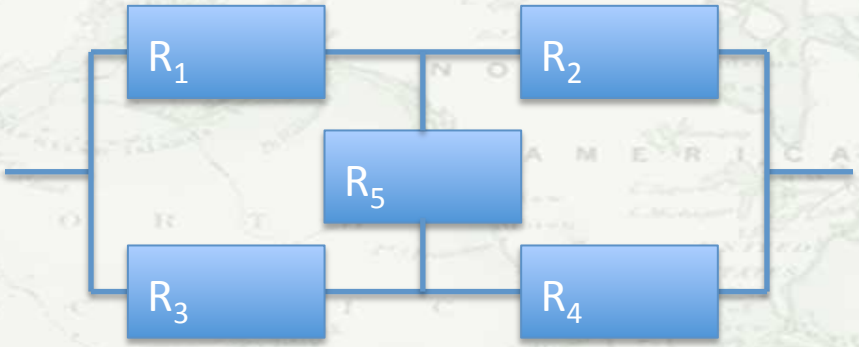
Cannot be easier

RELIABILITY BLOCK DIAGRAM KEYNOTE COMPONENT

Bayes' Theorem Approach

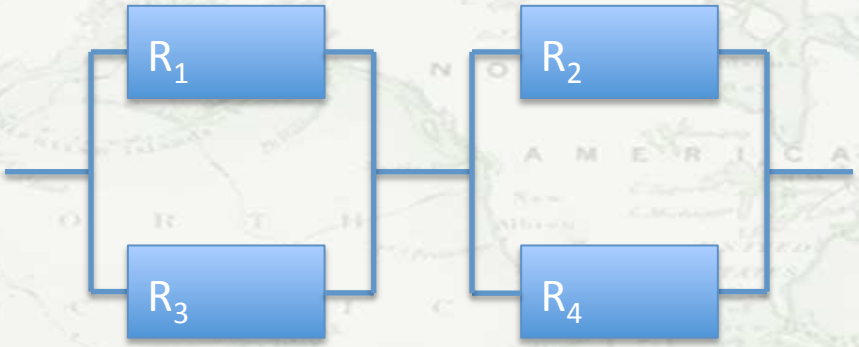
What if R_5 is good?

What if R_5 is Bad?



Bayes' Theorem Approach

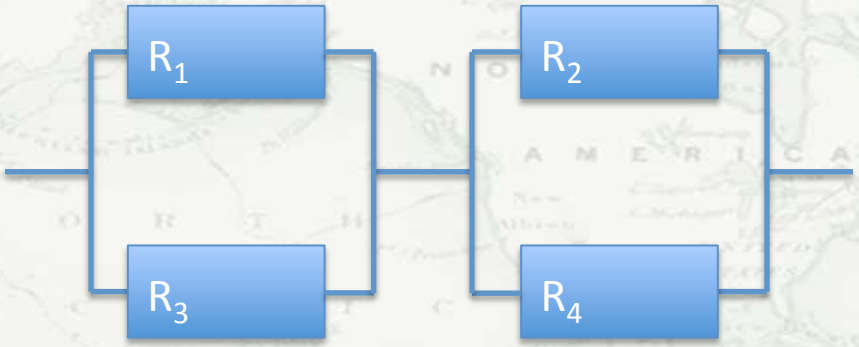
What if R_5 is good?



Probability of two parallel elements in series and R_5 good

Bayes' Theorem Approach

What if R_5 is bad?



Probability of failure with two series elements in parallel and R_5 bad

Truth Table Approach

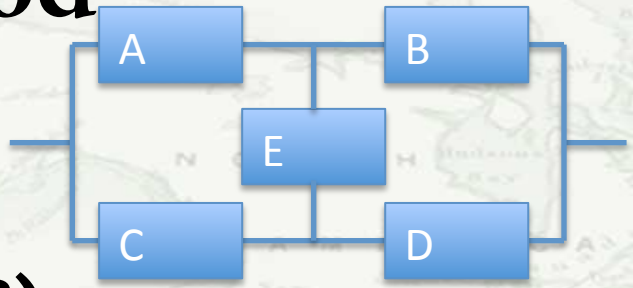
Work out all the possibilities

Calculate all successful options

For this simple example there are 32 permutations (2^5)

Each row that works is product of good and bad probabilities

Tie Set Method



R_{sys}

$= P(AB \cup CD \cup AED \cup CEB)$

$= +P(AB) + P(CD) + P(AED) + P(CEB)$

$= -P(ABCD) - P(ABED) - P(ABCE) - P(ACED)$

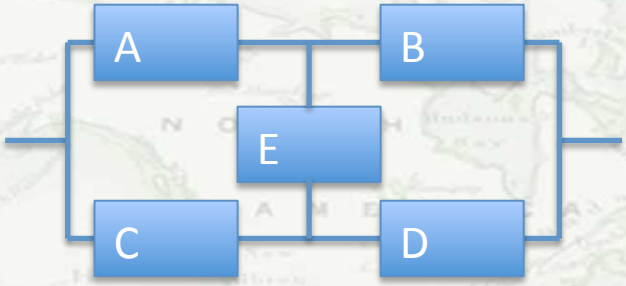
$\quad -P(CDEB) - P(ABCDE)$

$= +P(ABCDE) + P(ABCDE) + P(ABCDE)$

$\quad +P(ABCDE)$

$= -P(ABCDE)$

Cut Set Method



R_{sys}

$= 1 - P(\overline{A}\,\overline{C} \cup \overline{B}\,\overline{D} \cup \overline{A}\,\overline{E}\,\overline{D} \cup \overline{C}\,\overline{E}\,\overline{B})$

$= +P(AC) + P(BD) + P(AED) + P(CEB)$

$= -P(ACBD) - P(ACED) - P(ACEB) - P(BDAE)$
$\quad -P(BDCE)$

$= -P(ABCDE) - P(ABCDE)$

$= +P(ABCDE) + P(ABCDE) + P(ABCDE)$
$\quad +P(ABCDE)$

+1, -2, +3, -4 (use unreliability)

What is the limiting assumption with RBD?

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Lesson IV. A. 3.

Physics of Failure Models