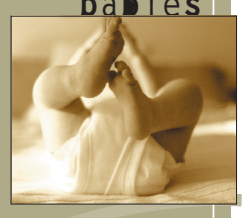
INFORMATION INTEGRATION TECHNOLOGY

nukes

cars

babies



What do nukes, cars, and baby diapers have in common?

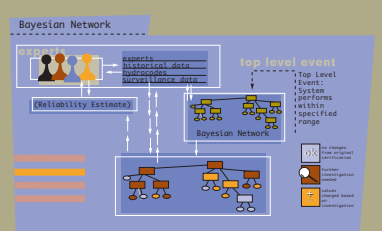
The answer is information integration technology (IIT), which solves complex performance and reliability problems for all three. Initially developed in the Statistical Sciences Group to predict the performance of an aging weapons stockpile under nuclear test bans, IIT now brings together the data, information, and knowledge of different scientific disciplines to provide problem-solving capabilities for decision makers in widely different fields. Contributing disciplines include statistical analysis, uncertainty quantification, knowledge representation, expert judgment, graph theory, fuzzy rule-based logic, and probability theory.

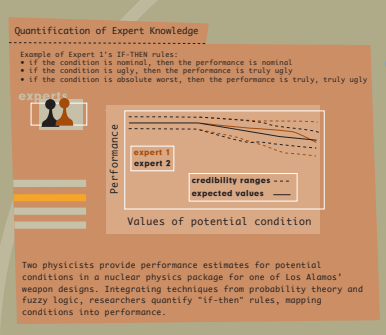
"Working with Los Alamos National Laboratory to gain production supremacy" — Procter & Gamble in Business Week (July 10, 2000)

Decision Applications Division

Nukes: Reliability of the Nuclear Weapons Physics Package

Because test data are lacking, researchers calculate weapons performance and reliability by combining all relevant information. Sources include historical Nevada Test Site data, expert knowledge, complex computer models (hydrocodes), surveillance data, and experimental results. IIT is an important tool that will help ensure the continued safety and reliability of the United States nuclear deterrent.





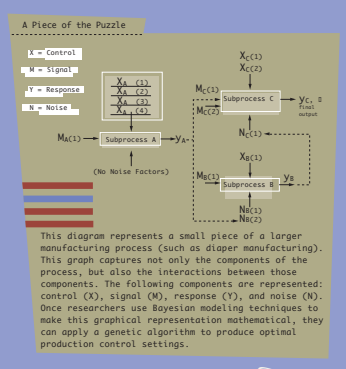
Cars: Product Development for Concept Automotive Systems

PREDICT (Performance and Reliability Evaluation with Diverse Information Combination and Tracking) is an IIT application for the automotive industry. PREDICT evaluates performance uncertainty at the concept stage by gathering, quantifying, and analyzing expert knowledge. Designers can identify flaws before manufacturers make production decisions. As testing or design changes produce new information, researchers statistically update reliability estimates and map system development from concept to design and from production to use.

PREDICT was a joint R&D 100 Winner between Los Alamos and Delphi Automotive Systems. It was used to develop reliability characterizations of a Delphi Automotive fuel rail assembly before the parts were built. According to James Jeffers, a Delphi manager, "PREDICT is one of the most important and useful tools that I have used in new product definition and development."

Baby Diapers: Production Reliability for Procter & Gamble

In diaper production, more than a dozen types of papers and other materials are joined at lightning speed. The IIT methods needed to predict production reliability are the same as those used in nuclear weapons reliability assessments. Procter & Gamble engineers are using IIT methods to gain production supremacy.



Information Integration Technology

DECISION APPLICATIONS

STATISTICAL SCIENCES

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Decision Applications

Statistical Sciences

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