Integrated Design and Assurance System (IDAS)

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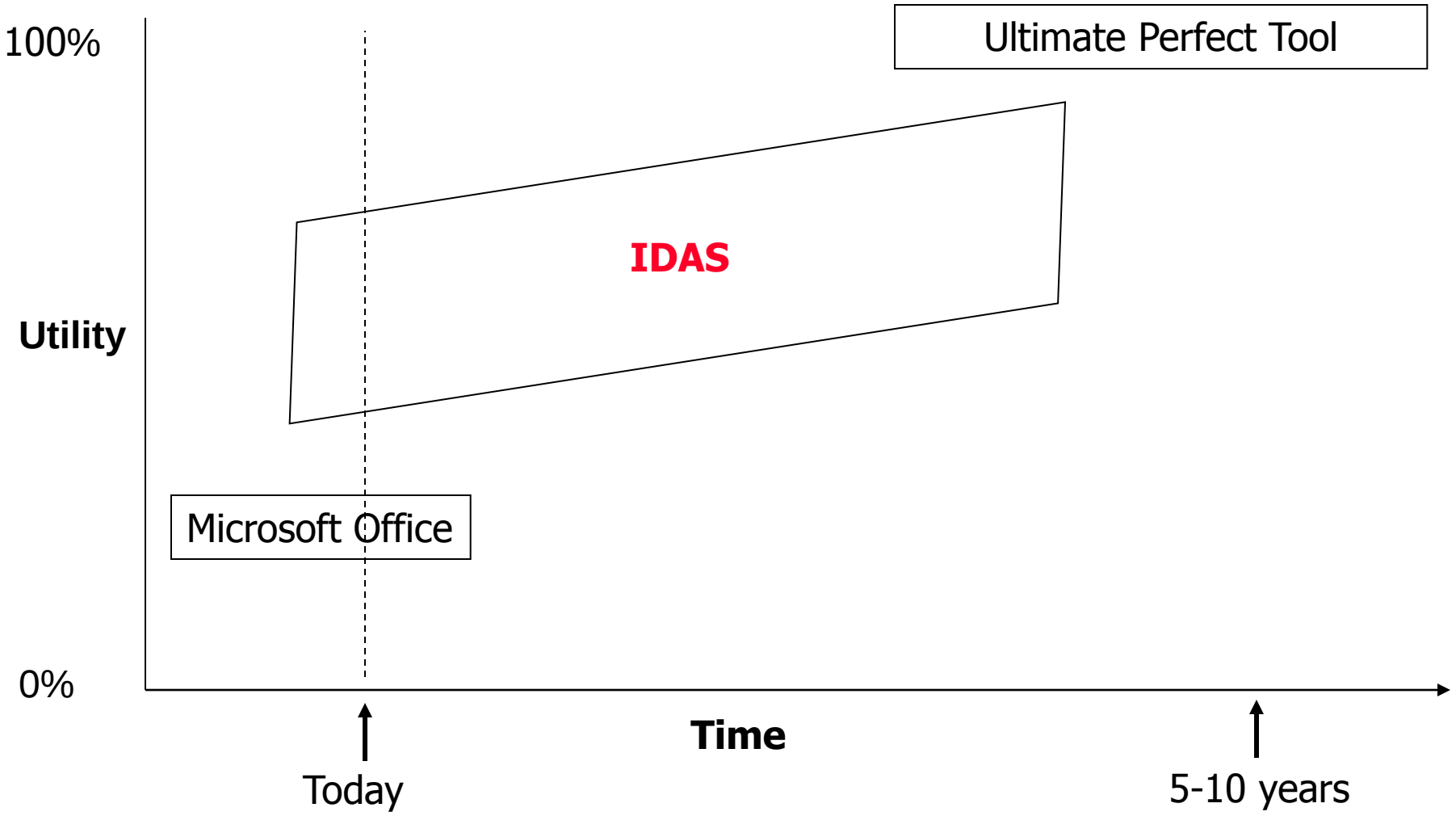
Integrated Design & Assurance System (IDAS), What is it?

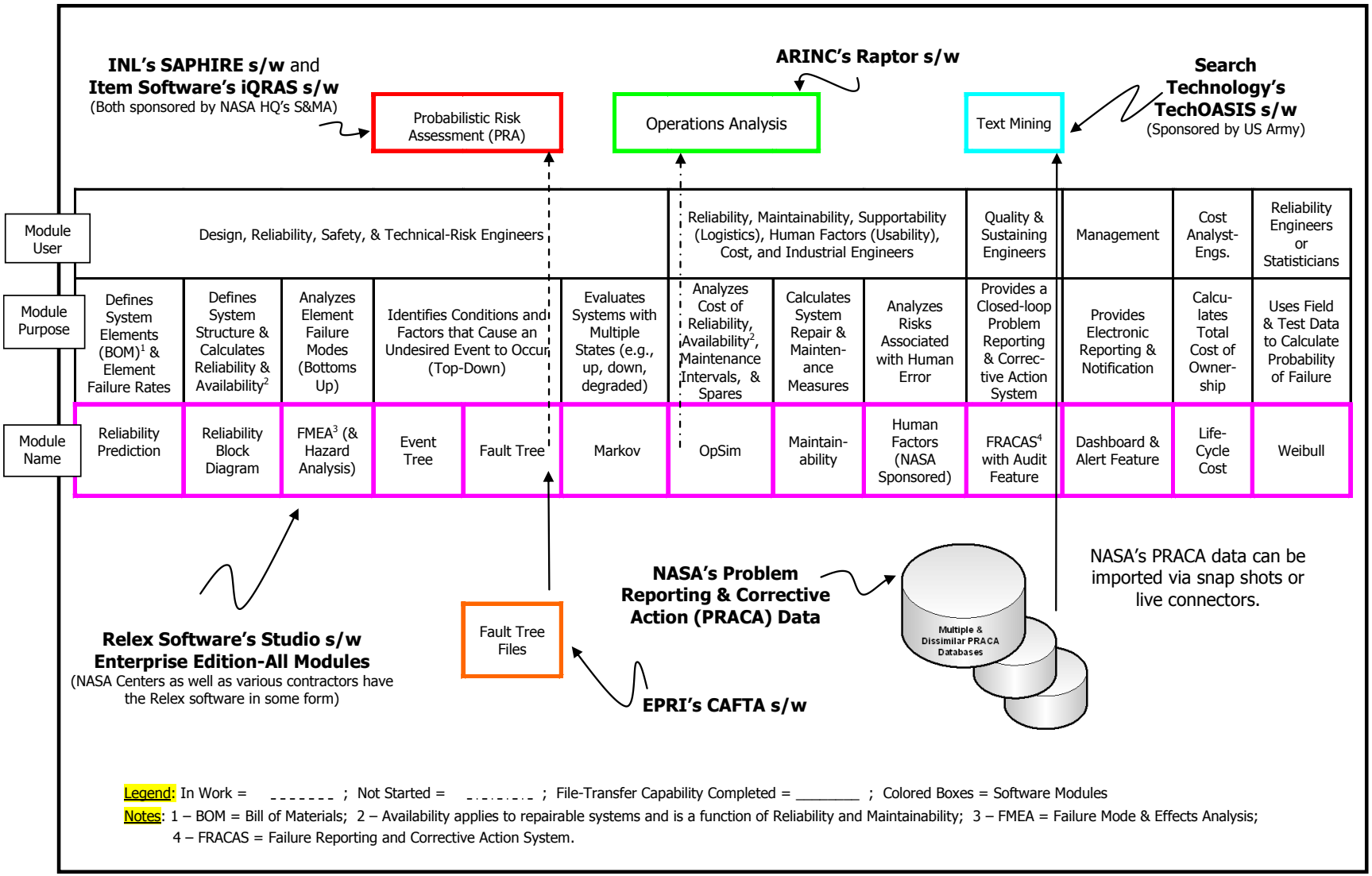
- In brief, IDAS is an operational system that provides a capability for a community to learn and perform analytical work related to technical risk. This capability is flexible and can range from being a:
  - **Tool**
  - **Collection of tools**
  - **Reporting system**, and ultimately to
  - An integrated and **comprehensive system**.
- IDAS is a government owned, developed, and managed system that immediately and electronically provides proven, integrated, modern, and supported tools that collect, analyze, share, and report (if desired) qualitative and quantitative work pertaining to the assurance and risk of complex systems over their life cycle.
- IDAS uses commercially-off-the-shelf (COTS) software modules and are located and maintained on a secure KSC network server.

- **Core Values**: Inclusion; Make Operational; Provide Top-notch Support; Facilitate Learning And Networking; Encourage , Exploration (Test Don't Guess); Continuously Improvement; Capture Successes (Document for knowledge management).
- Leverage ideas on **innovation acceleration** (ref. NextDesign Leadership Institute), namely:
  - **Generative research** provides insight into unmet needs, identifies new product opportunities, and provides inspiration to the design development team.
  - **Evaluative research** determine how potential users respond to a concept or a prototype and gather input needed for design refinement.
  - **Experiential research** investigates what happens to the product once it is introduced and is being used by real people in real settings. It can reveal what value the product actually brings to people—and it may also lead to new ideas.

IDAS Reduces Our Productivity Gap



IDAS Modules Make An Integrated and Multi-Level System



➢ IDAS contractors:

- **SAIC**
  - **Provides KSC unique application engineering support**
  - **Team**
    - ✓ Jeff Gernand, Supervisor, 321-868-5740 (part time)
    - ✓ Wayne Fowler, Relex & db Administrator, 321-867-7334 (full time)
    - ✓ Charles Wilson, Application Engineer, 321-867-4430 (part time)
- **Relex**
  - **Provides software updates and help-desk and training support**
  - **Team**
    - ✓ George Gross, Account Manager & CRE, 724-836-8800, 104
    - ✓ Technical Service Engineers, 724-836-8800, 2, 1

➢ IDAS civil servants:

- ✓ Tim Adams, Project Manager & CRE, **SA-G**, 321-867-2267 (part time)
- ✓ David Armstrong, Systems Engineer, **NE-D**, 321-861-3976 (part time)

IDAS Customers (Target Audience)

- IDAS currently is provided as an option to any KSC civil servant and contractor.
- IDAS is especially suited for personnel doing design, safety, reliability, risk, maintainability, logistics, human factors, cost, quality, and corrective action (sustaining) functions.
- IDAS allows KSC personnel to work individually or in teams any time without face-to-face meetings, e-mail, or paper. IDAS can be used at any computer on the KSC network.
- IDAS provides automatic updates, news, and has the capability to provide alert notices if the problem-reporting-and-corrective module is set up and used.
- IDAS reduces the learning demand since many of the skills learned in one module are transferable to another module.

IDAS History And An Opportunity

- As a "turnkey" system, IDAS began in October 2006 with the objective to immediately provide KSC the "production" capability and Structured Query Language (SQL) database to support life-cycle tasks such as design, model, simulate, analyze, forecast, cost, and sustain spacecraft and support elements.
- Since year 2002, KSC has provided and used the Relex tool suite. Relex has been used around the world since 1986. Relex is *currently* IDAS' backbone and serves to *complement and supplement* other existing and future development tools.
- Currently, the Relex module that provides a closed-loop-problem-reporting-and-corrective-action system is an undeveloped and untapped resource. Non-NASA users who have set up and tailored this module give positive reviews in regards to providing robust tracking, trending, and disposition capability. NASA could use this module as a benchmark and "breadboard" to identify and test PRACA-type requirements.

IDAS Reflections

- In a May-2008 survey, 41 of 69 (59%) responses from 113 KSC civil servant and contractor Relex account holders provided a "yes" response to the question, "Do you need the KSC Relex software to effectively and efficiently perform your work?"
  - Many others indicated there was no need (work) for a tool suite like Relex.
- Although Relex modules are partially customizable and adaptable to our specific needs and style, Relex is not enough—and probably never will be or should be—thus, the reason for IDAS. It is IDAS that includes and embraces "competing" software in order to provide a "complete" system.
- IDAS' pay back is immediate. In regards to process, the primary goal of assurance-analysis community is to provide and use a capability that delivers decision-support products as quickly as possible and at the appropriate quality level. Searching for or building the "perfect" tool though important for improving the process is secondary to productivity.

> "At Toyota, we get brilliant results from average people managing a brilliant process. Others get average results from brilliant people managing broken processes."

➢Other IDAS tasks and initiatives include:

- Importing and exporting fault-tree files between Relex and SAPHIRE.
- Promoting concepts and principles related to Availability (i.e., the function of both "R&M") modeling. (Ref. CxP Ground Ops)
- Supporting flight analyses upon request; for example:
  - Predicted the likelihood of Orbiter fuel cell pump motors failing during STS-118 and STS-120.
  - Determined the quantitative risk pertaining to flight crews not receiving adequate exercise on ISS. Other words, determined the reliability and availability of the Crew Health Care System (CHeCS) in regards to providing the minimum health benefit.
- Using the Internet to provide a collaborative means to access, review, and update FMEAs (and preliminary hazard analyses).
- **Text-mining** of PRACA narratives.

Clearing The Path: Text Mining For The Sub-System Engineer

- "Somebody is going to have to suffer, either the reader [IDAS user] or the writer [IDAS application engineer]."
  - Tom Murawski, writing consultant
- IDAS reduces the "suffering" many of us face with operating unfamiliar software. Recently, IDAS cleared a path to help the NASA community explore and test the benefits of Search Technology's TechOASIS software, a text mining tool that is free to ".gov" users.
- Charles Wilson-SAIC (321-867-4430), IDAS Application Engineer, is KSC Lead's on **Text Mining** via TechOASIS.
- The embedded file below provides more information on IDAS' work with TechOASIS. (To open the embedded PowerPoint file, click the icon once if in the Slide Show mode; double click the icon if not in the Slide Show mode.)

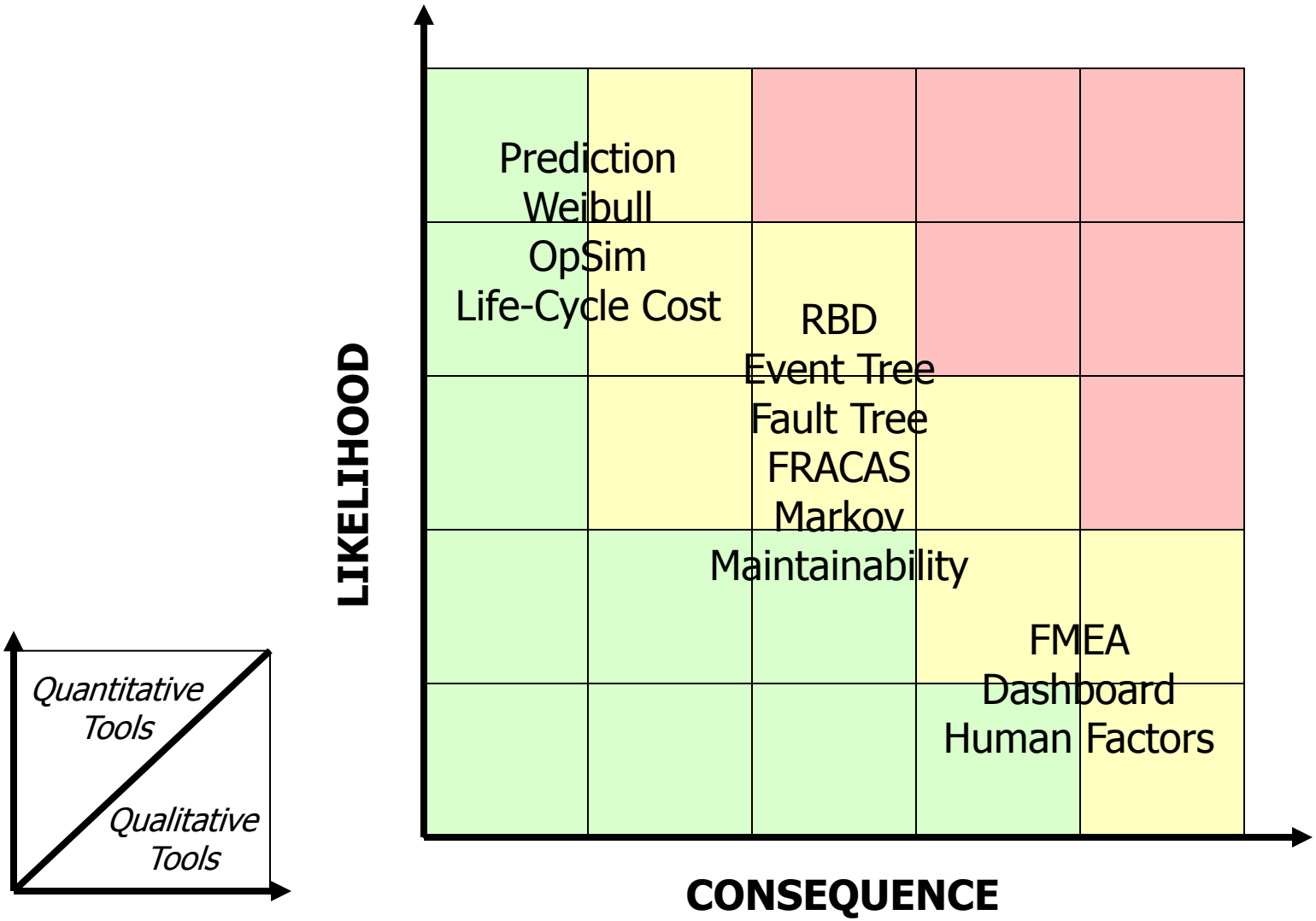
Back Up

Benefits Common To All IDAS Modules

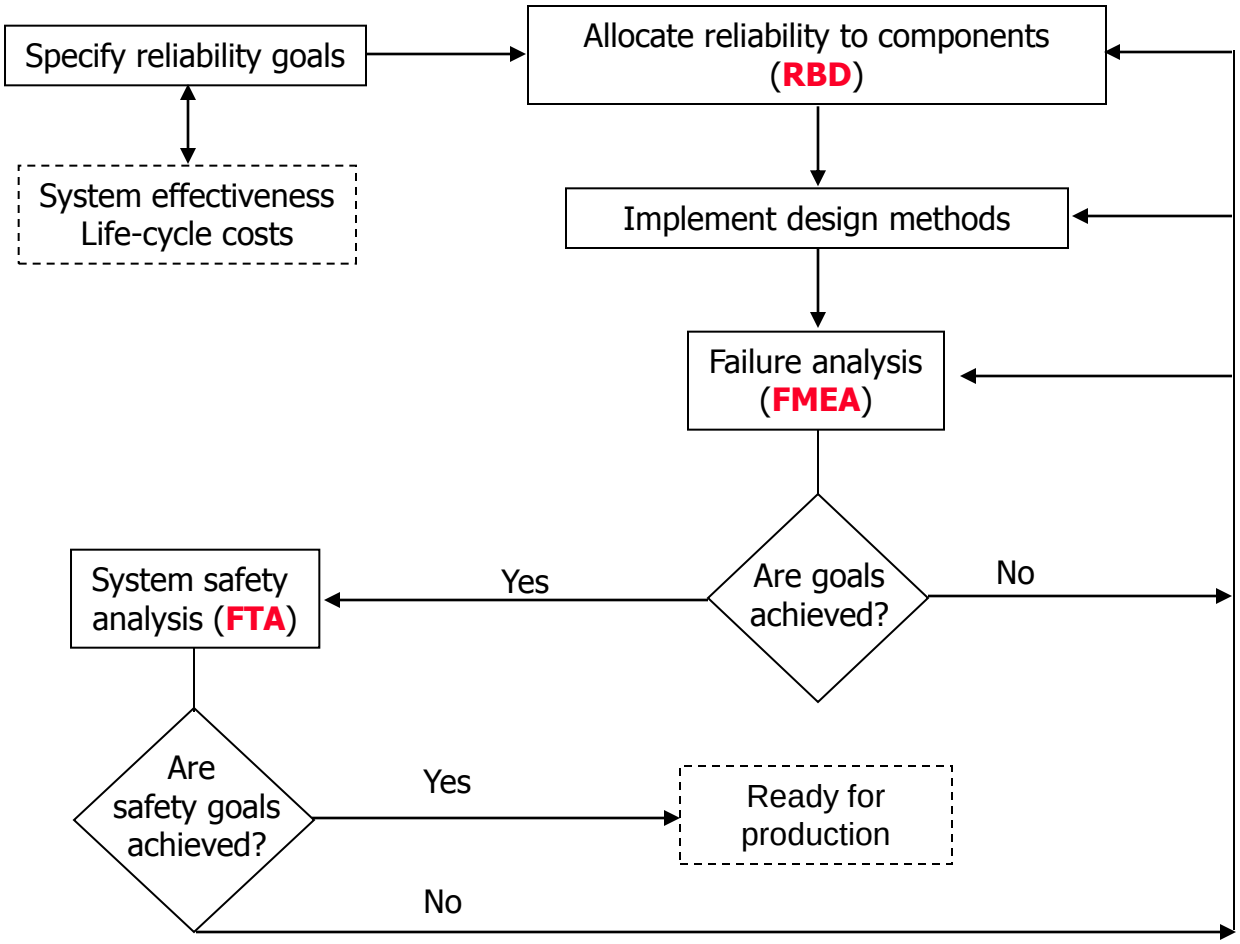
- **Training**
  - Documentation
  - Tutorial provided by the software
  - Online Training (Interactive With A Live Instructor)*
  - Help Desk via Telephone
  - Help Desk via E-mail
  - Newsletter*
  - Instructor-led Classroom Training
- **User Support**
  - Contracted Help Desk*
  - On-site application engineering support*
  - Rapid initial access*
- **Data linkages***
- **Growing experience base**
- **No software development risk** (except tailoring of Relex FMEA & FRACAS)
- **Error resistant**
- **Collaboration, availability, and security**

* Applicable only to Relex

IDAS Modules, A Risk Perspective

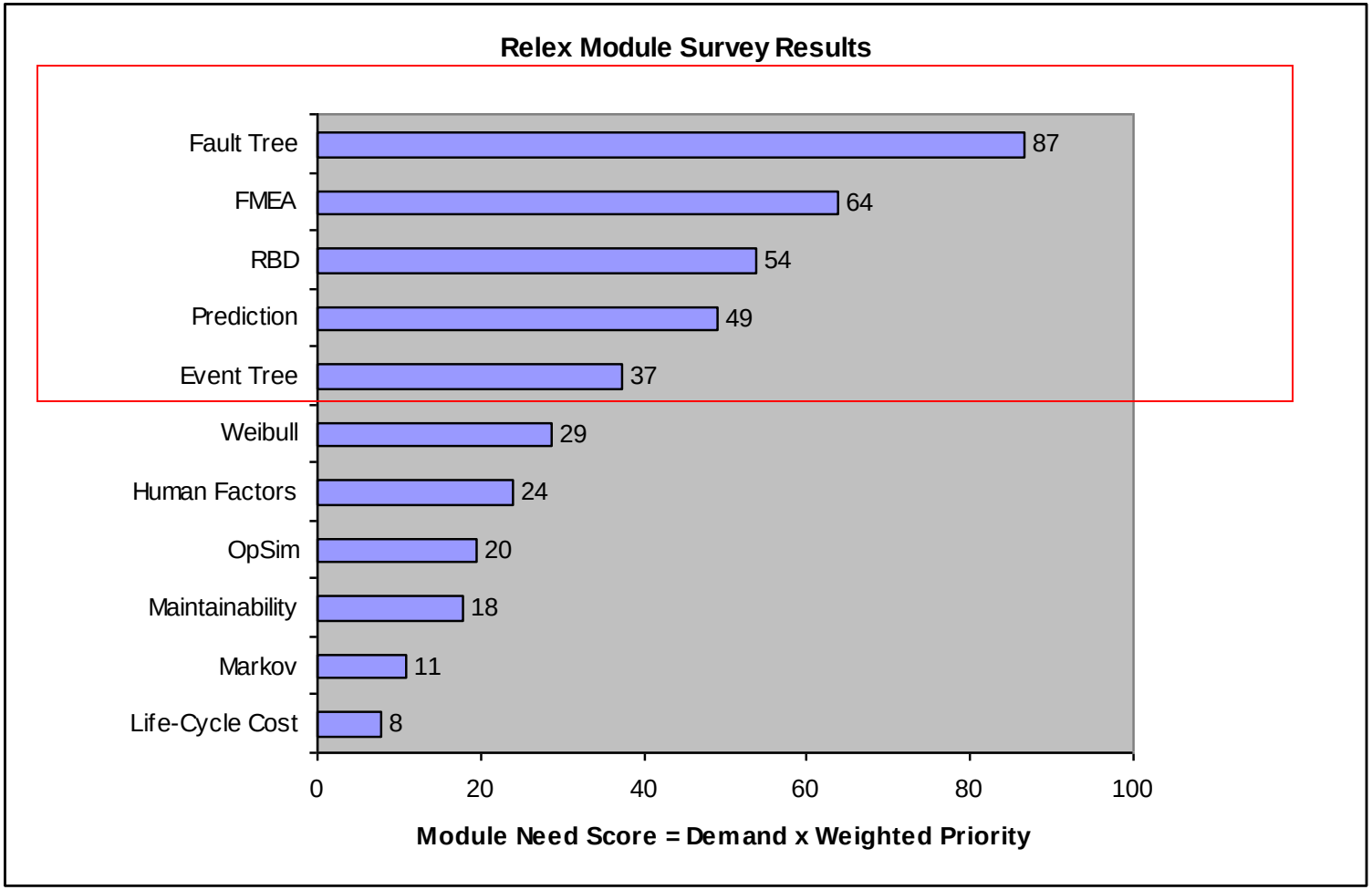


IDAS Modules, A Design-Engineering Perspective



Reference: An Introduction to Reliability and Maintainability Engineering, Figure 8.1, Charles Ebeling (RBD added)

Relex Modules, KSC-Users-Need Perspective



Note: The results above are from an August 2007 survey of 40 Relex users at KSC. Each user provided his/her demand and priority for each Relex module. Relex's PRACA (FRACAS) module was not included in the survey.

- The embedded file below provides:

  (To open the embedded Word file, depress "page down" if in the Slide Show mode; double click the icon if not in the Slide Show mode.)

  - The web link to each software vendor that supports IDAS.
  - A brief description of the capability and features of each IDAS module.

Microsoft Word Document

- **IDAS' web site…**
  - Is the last link under the "Tools" section found on KSC S&MA's Reliability web page at: http://kscsma.ksc.nasa.gov/Reliability/Default.html
  - Provides all KSC personnel immediate access to all IDAS resources (folders) except access to the Relex software.
  - Provides at the bottom of its web page a link to request a personal and secure Relex user account.
- **IDAS folders located on the KSC server (Kscapp002) are organized…**
  - Numerically to provide new users a suggested reader sequence, and in…
  - Alphabetical order to allow users to quickly find details on a specific Relex module.