

Power Management Technical Working Group: Status and Documentation

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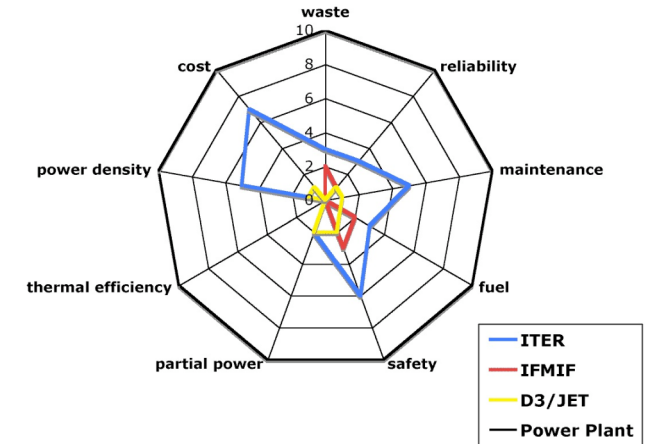
University of California, San Diego

**ARIES Meeting
Idaho Falls, Idaho
September 6-7, 2007**



How to Address DEMO Information Gap

- **DEMO: first commercial application of fusion with economic power production as primary goal, and cost of construction and operation born in some measure by the private sector and/or electric rate payers.**
- **Lack of test facilities that can reproduce prototypical fusion power plant conditions.**
- **ITER plays a critical role in the development of fusion energy, and contributes valuable information on most of the elements of a burning fusion facility.**
 - **However, ITER lacks essential features of an attractive power plant.**
 - **Substantial information gap for DEMO.**
- **In order to build and license a demonstration power plant, one or more facilities in addition to ITER will be needed – either in parallel or sequential with ITER.**
 - **Decision to move ahead with complementary fusion energy R&D depends on national priorities and funding.**
 - **R&D program must be designed carefully and executed in a manner that provides a high degree of confidence in the operation and survival of nuclear components in future fusion devices.**

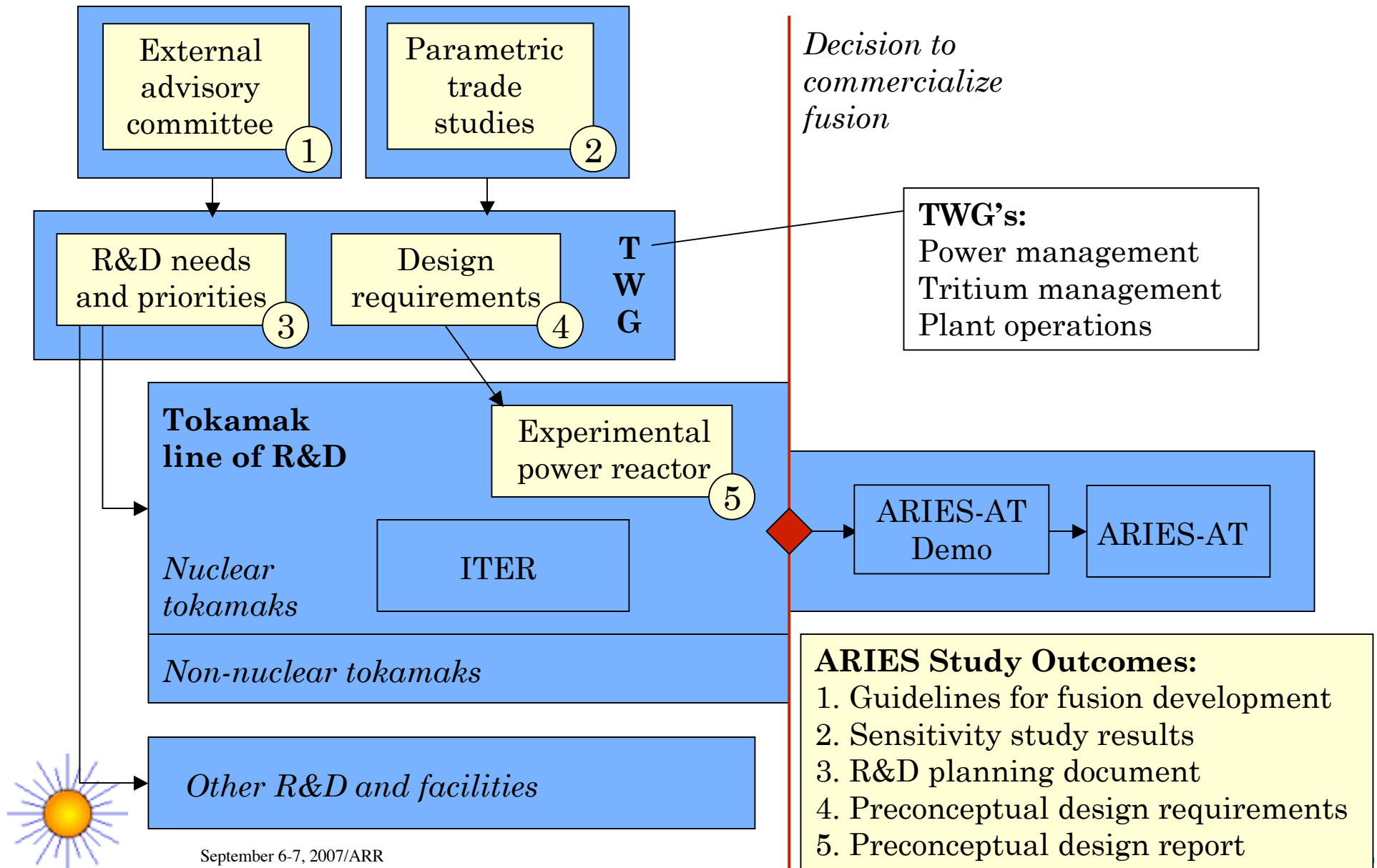


TWG's in ARIES Pathway Study

- **ARIES Study: Pathways to commercial fusion energy**
 - Characterization of facilities and R&D needs from the present time to a demonstration power plant.
- **Technical Working Groups formed:**
 - Power Management
 - Tritium Management
 - Operations
- **Function of TWG's**
 - Top-level goals for fusion energy are provided by the customer, represented in ARIES by the Industrial Advisory Committee.
 - TWG's translate the high-level customer-oriented inputs into technical goals that can then be used to determine research priorities.
 - Intent not to provide a comprehensive list of specific experiments or modeling activities, but rather to characterize the top-level challenges for the production of energy from fusion and the needed lines of R&D that will be required for successful development of fusion energy.
 - The intended audience of TWG's documentation includes:
 - decision makers from government and the US fusion community
 - scientists and designers engaged in the more detailed aspects of R&D definition and execution



The TWG's Play a Key Role in the ARIES Pathway Study Effort



Power Management TWG

Mission Statement

- **Demonstrate fusion energy production and utilization, including:**
 - power and particle handling
 - extraction of power core high-grade heat
 - power conversion
 - nuclear performance of in-vessel and ancillary equipment

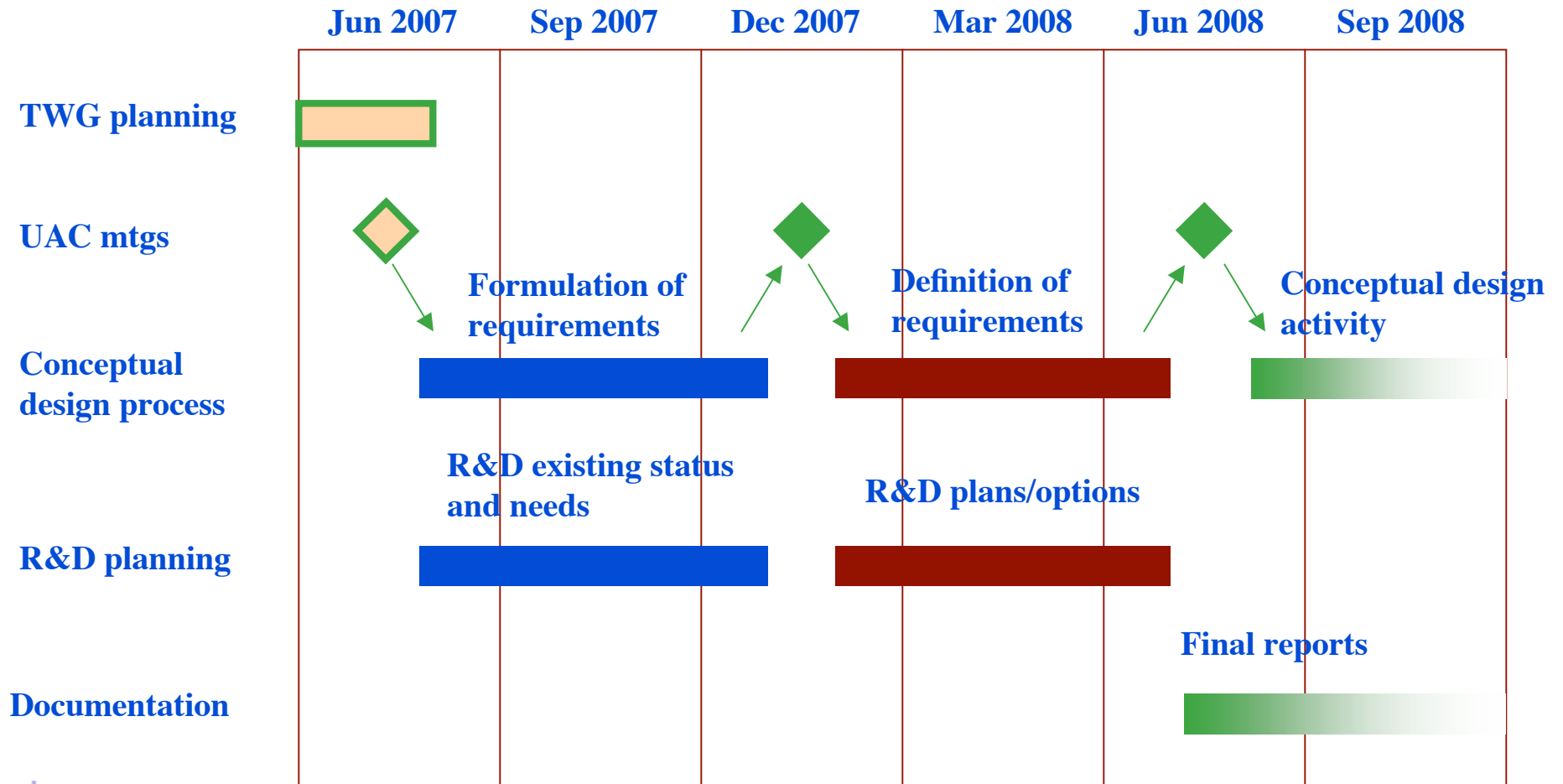
Members

- **Mark Tillack (R&D plan leader)**
- **René Raffray (design requirements leader)**
- **Said Abdel-Khalik**
- **Siegfried Malang**
- **Don Steiner**
- **Alan Turnbull**



September 6-7, 2007/ARR

TWG Schedule



Outline of Power Management TWG Interim Report (to be written by December 2007)

Power Management R&D for Commercial Fusion Energy

Preface (Tillack)

I. Introduction (Tillack)

II. Program Goals (Steiner)

(what level of knowledge and performance is needed to proceed to Demo? What are the key metrics for power management?)

III. Current state of knowledge

- a. Plasma power distribution (Turnbull)
- b. High heat flux handling (Raffray)
- c. Materials compatibility (Tillack)
- d. Systems integration (Malang)
- e. Development and fabrication (Waganer??)

Need similar outline and schedule from other TWG's

IV. R&D Needs *(gaps in knowledge)*

- a. Plasma power distribution (Turnbull)
- b. High heat flux handling (Raffray)
- c. Materials compatibility (Tillack)
- d. Systems integration (Malang)
- e. Development and fabrication (Waganer??)

V. Development Paths (TBD)

(how can we close these gaps, i.e., with experiments and modeling?)

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