



CANDU Plant Life Management - An Integrated Approach

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Summary

- **PLIM Program Objectives**
- **PLIM Overview**
 - ✓ **Critical Systems Structures and Component Assessments**
 - ✓ **Reliability Centred Maintenance Program**
 - ✓ **Technology Watch**
- **Summary**

CANDU PLIM

Objectives:

- 1. Maintain public risk well within the regulatory requirements over the plant life.**
 - ✓ Life Assurance**

- 2. Maintain life time capacity factors $\geq 85\%$ providing energy at a competitive cost during the reactor life.**
 - ✓ Life Assurance**

- 3. Avoid major unexpected surprises.**
 - ✓ Life Assurance**

- 4. Preserve the option of extending plant life beyond 30 years.**
 - ✓ Life Extension**

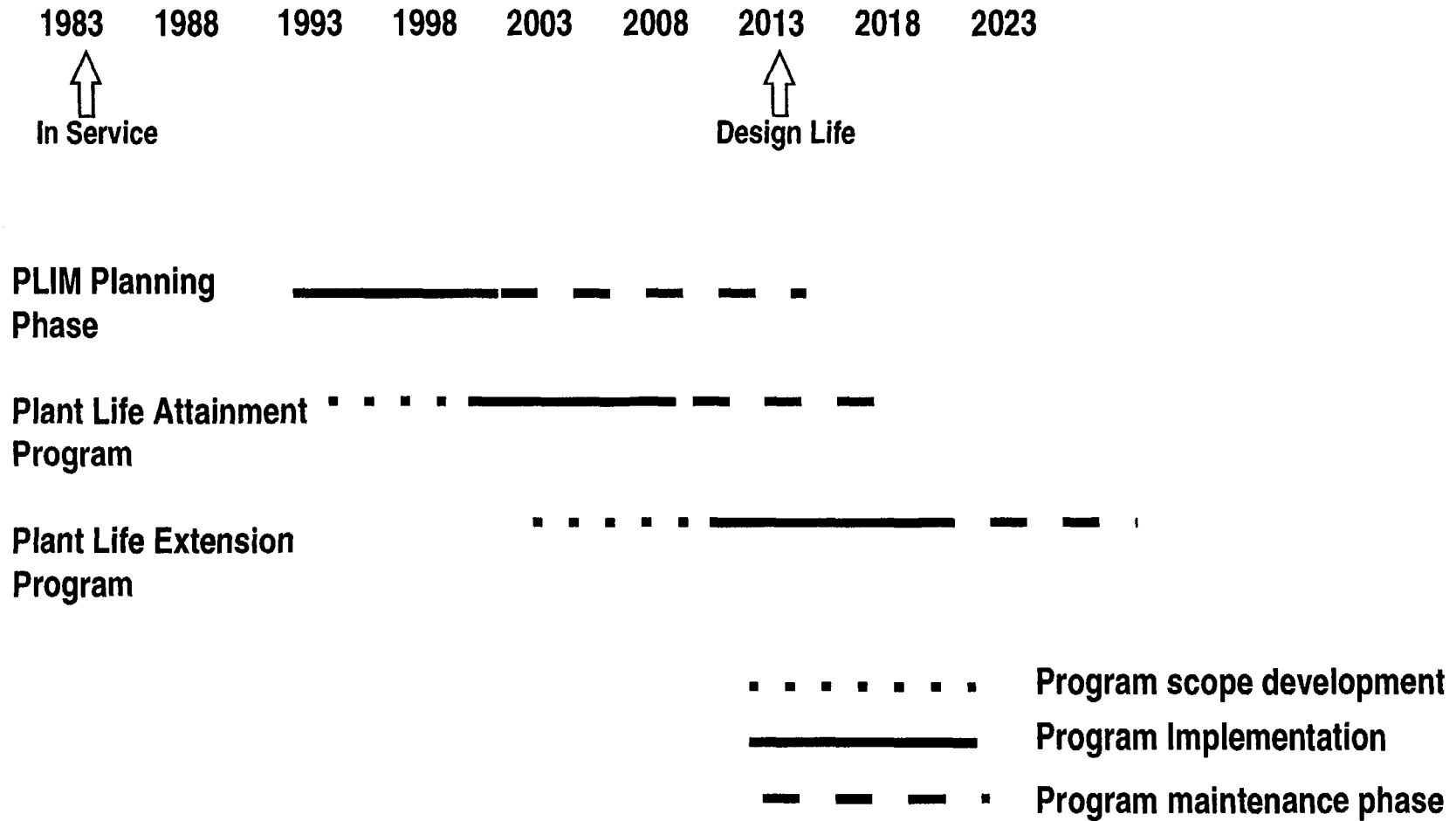
CANDU PLIM

Objectives (Con't)

- **Assure new customers that CANDU can meet and exceed its target design life by demonstrated performance of existing stations.**
- **Provide a Plant Life Management Program, and its associated Reliability Centred Maintenance Programs as part of the new Product to provide this assurance.**
- **Provide our current customers with expert assistance in implementing PLIM assessment recommendations.**



PLIM FOR CANDU 6 NPPs (with 1983 In-service date)



Plant Life Management - Areas of Focus

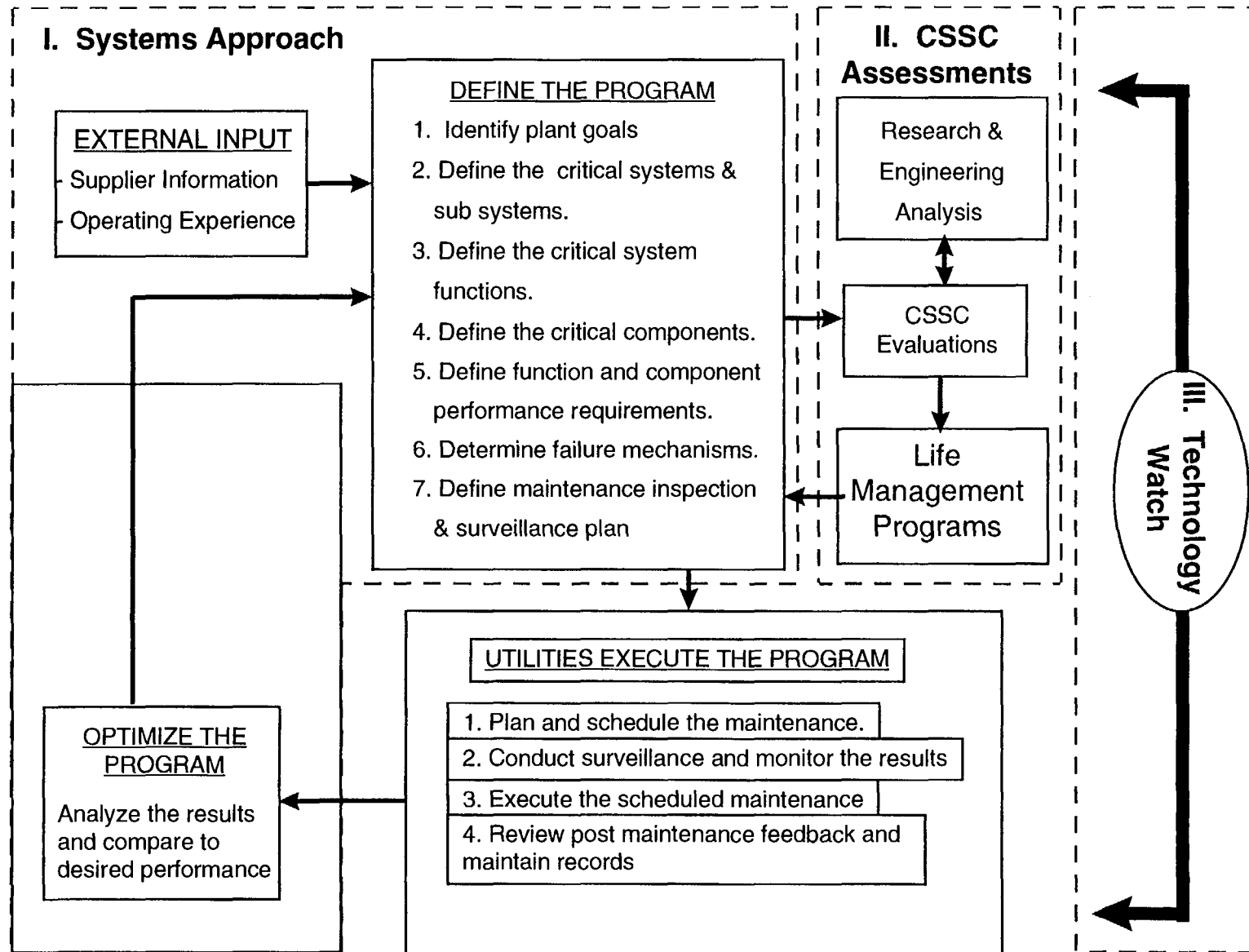
- **Regulatory Environment**
- **Business Environment and Processes**
- **Public Environment**
- **Human Performance and Capability**
- **Technology**



PLIM - Three Major Thrusts

- **Assessments of Major Critical Systems, Structures and Components (CSSCs) to ensure degradation mechanisms are understood and steps taken to mitigate them.**
- **Reliability Centred Maintenance Program.**
- **Technology Watch to anticipate new emerging issues as early as possible.**

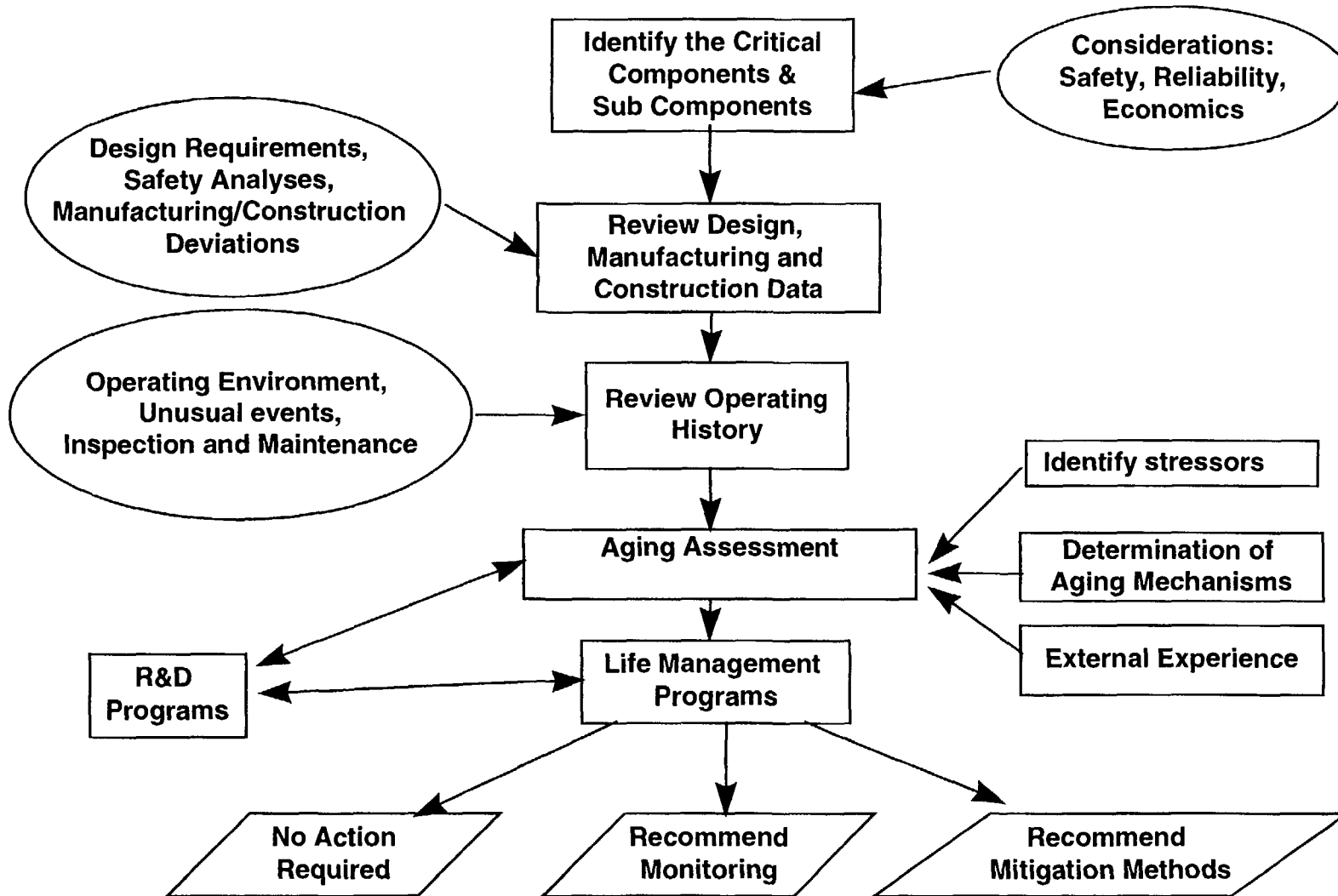
Integrated Plant Life Management Approach



Methodologies

- **Use the joint vendor / utility developed methods for the conduct of PLIM Studies on major components**
- **Use an RCM based approach for the systematic identification of critical SSC's and resulting surveillance, inspection and maintenance programs**
- **The Technology Watch process is based on AECL's R&D infrastructure and utilities' knowledge base**

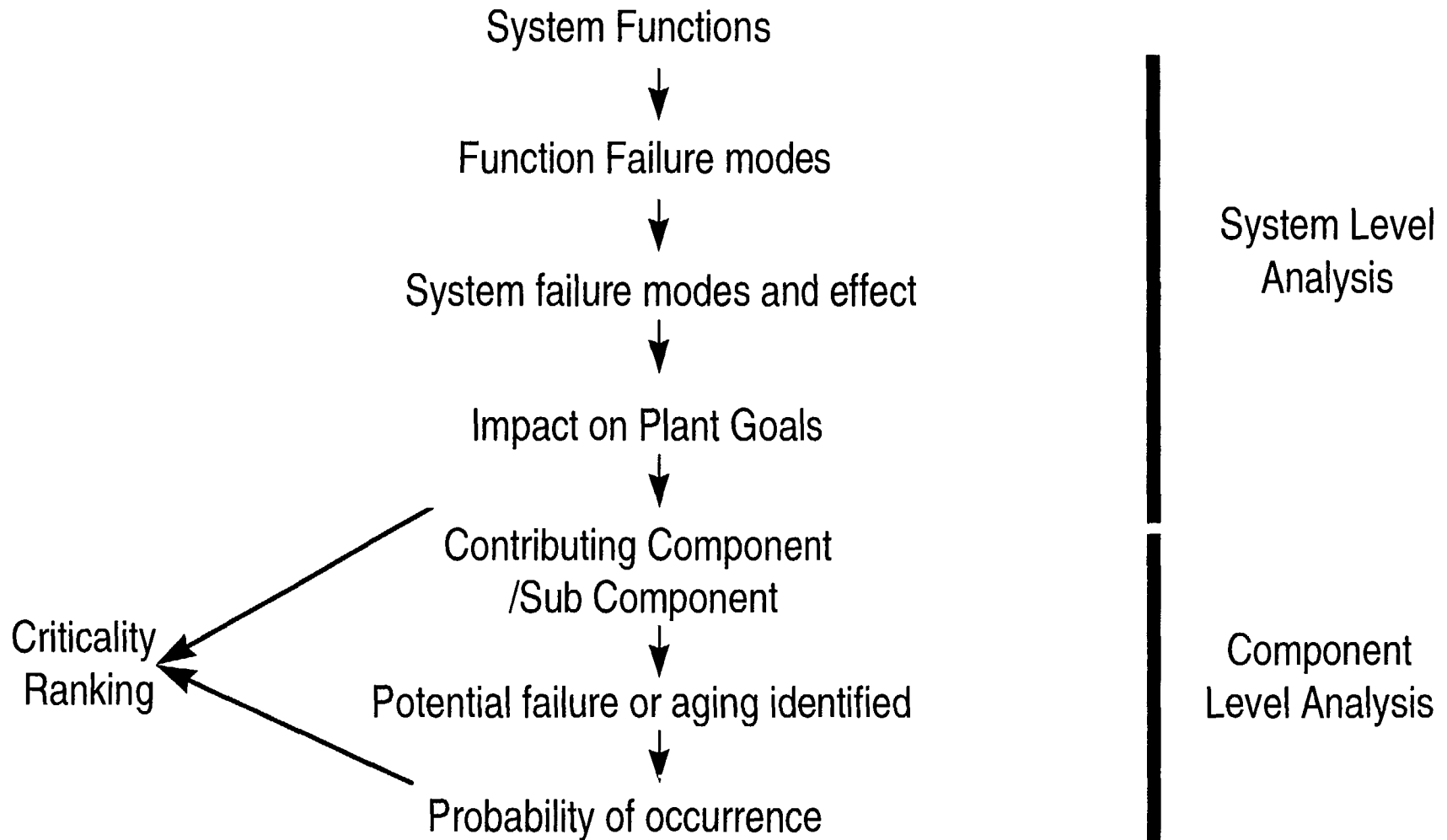
PLIM CSSC Assessment Methodology



CSSC Assessment Status

<u>System/Component</u>	<u>Status</u>
● Fuel Channel	Mature
● Reactor Structure	Base Assessment Complete
● Containment Structure	Base Assessment Complete
● HTS piping (Feeders excluded)	Planned for 1998/99
● Cable Systems & Motors	Planned for 1998/99
● Inst. and Controls components	Proposal later in 1999
● Conventional piping	Planned for 1998/99
● Large Pressure vessels	Proposal later in 1999
● Large/high pressure/high capacity pumps	
● Steam Generators	Base Assessment Complete
● Airlocks	
● Turbine Generator	
● Civil Structures Reactor Building internal load-bearing structures	

Reliability Centred Maintenance Methodology



Reliability Centred Maintenance Program

Scope:

- ✓ **Conduct a system by system assessment using reliability centred methodology**
- ✓ **Recommend optimization of the plant surveillance, maintenance and inspection**
- ✓ **Identify the best practices for managing maintenance**
- ✓ **Use latest IT and integrate with other station systems**

Outputs:

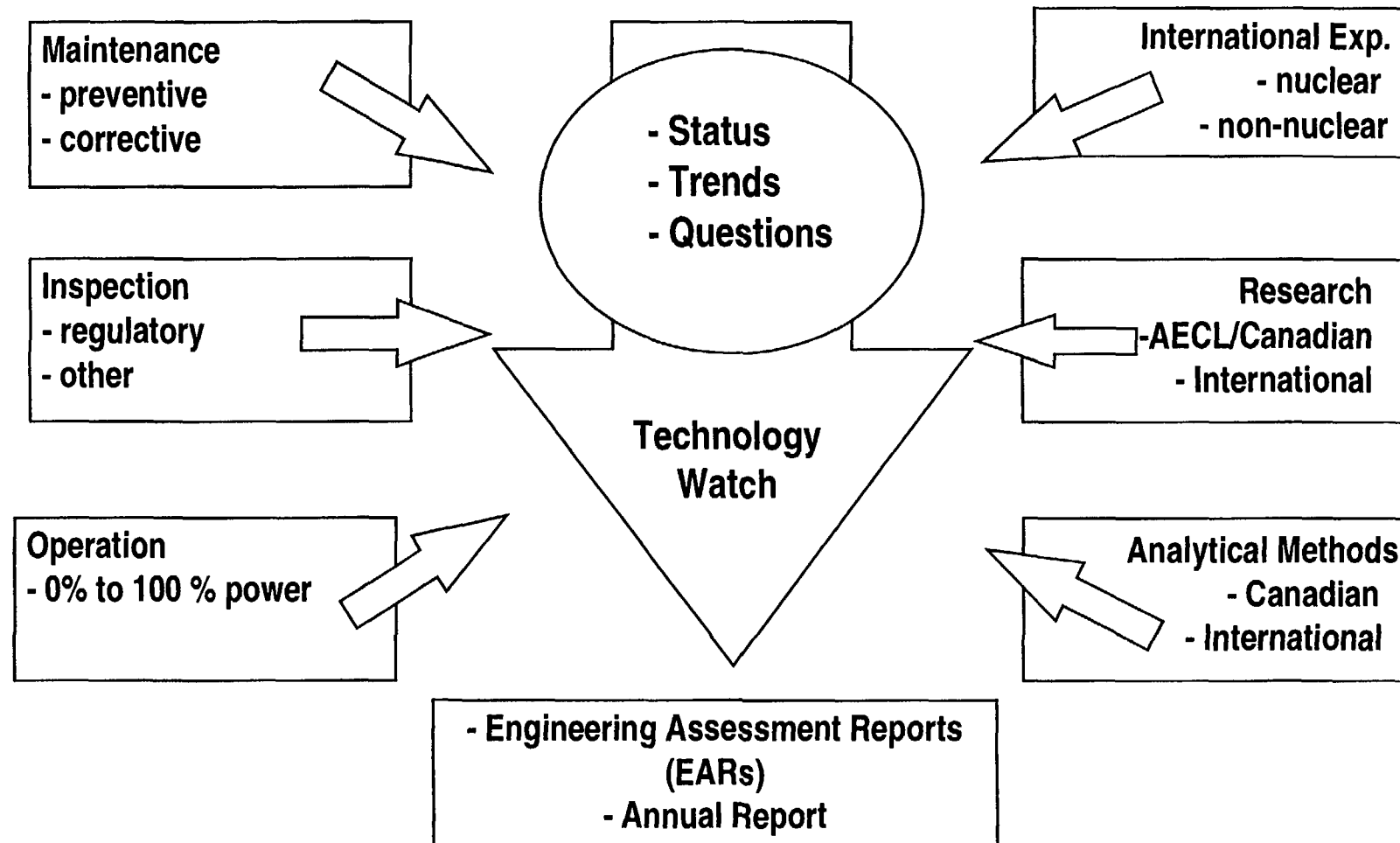
- ✓ **Management of Maintenance and Inspection**
- ✓ **CANDU Component Maintenance**
- ✓ **CANDU System Maintenance Manual**
- ✓ **CANDU Inspection Manual**

Reliability Centred Maintenance Program

Status:

- **1 Trial System Complete (auxiliary boiler feedwater at Pt. Lepreau)**
- **Planned for this year: Implementation of System Level RCM Programs on**
 - ✓ **1 Process System**
 - ✓ **1 Safety Related System**
 - ✓ **1 Safety System**

Technology Watch Methodology



Technology Watch Program

- **Issues**

- ✓ **Leverage existing knowledge, AECL and Utility Programs**

- ✓ **Separate wheat from the chaff**

- ✓ **Recognition and Resolution of Problems**



Technology Watch Plan - 1998

- **Establish Technology Watch Program**
- **Conduct a scan of industry OPEX, emerging industry issues from research and regulatory activities**
- **Establish the top issues which could potentially impact on plant safety and performance. Assess the adequacy of the current initiatives underway for these issues/concerns**

Summary

- **An integrated approach to PLIM has been developed for CANDU reactors**
- **Strategies, methods, and procedures have been developed for assessment of critical systems structures and components, and for implementing a reliability centred maintenance program**
- **A Technology Watch program is being implemented to eliminate “surprises”**
- **Specific work has been identified for 1998. AECL is working on the integrated program with Canadian CANDU owners and seeks participation from other CANDU owners**