CONCLUSION 5.
Fusion Development Path

- **The development path to realize fusion as a practical energy source includes four major scientific elements:**
  1) Fundamental understanding of the underlying science and technology and optimization of magnetic configuration
  2) Burning plasma physics
  3) High performance, steady-state operation
  4) Development of low-activation materials and fusion technologies

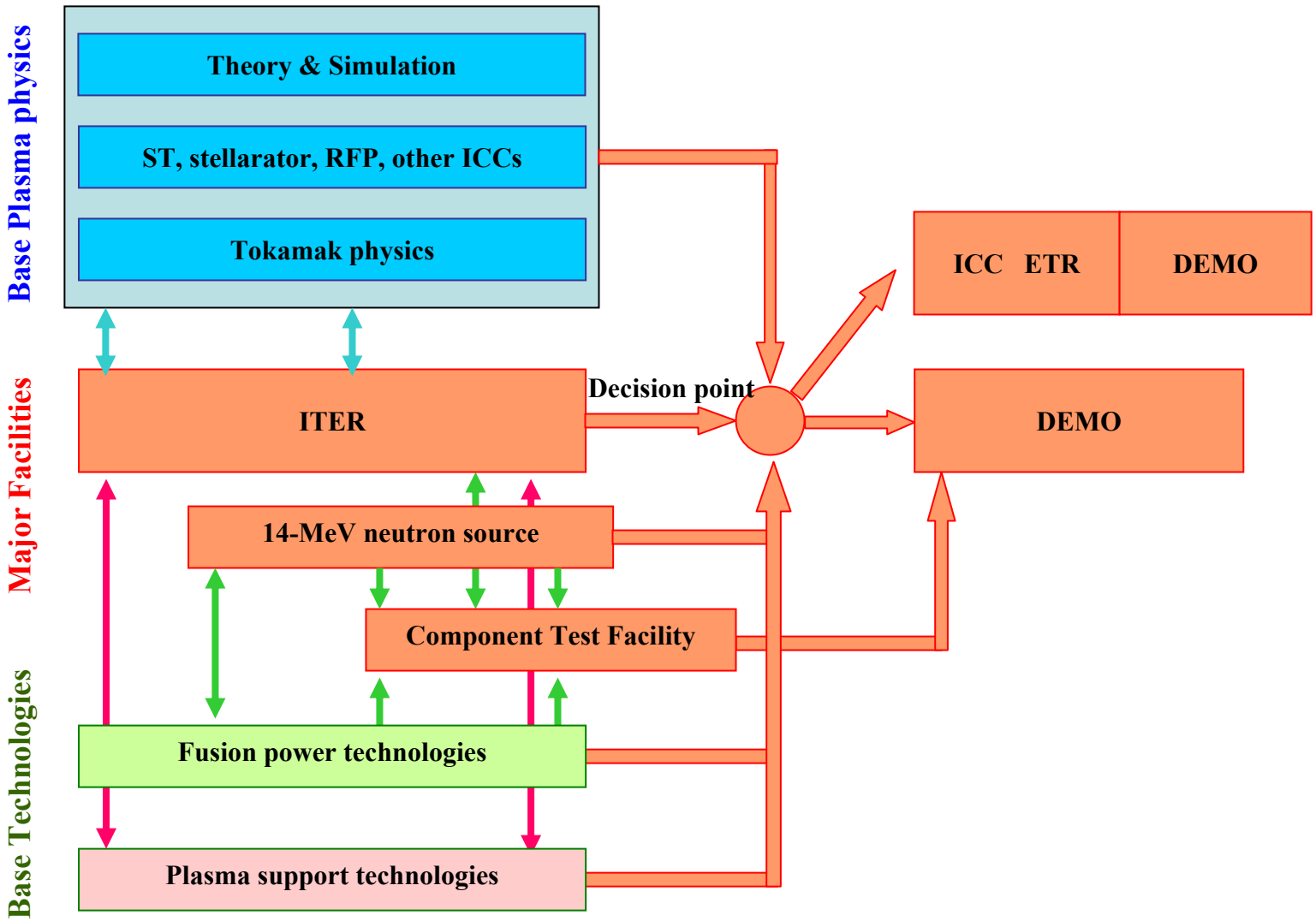
Low Activation Materials and Fusion Technologies Are Needed for Fusion Development

- Fusion power technologies are a pace setting element of fusion development. Development of fusion power technologies requires:
  1) Strong base program including testing of components in non-nuclear environment as well as fission reactors.
  2) Material program including an intense neutron source to develop and qualify low-activation material.
  3) A Component Test Facility for integration and test of power technologies in fusion environment.

ITER-Based Development Path

- An international tokamak research program centered around ITER and including these national performance-extension devices have the highest chance of success in exploring burning plasma physics in steady state.
- ITER will provide valuable data on integration of power-plant relevant plasma support technologies.
- Assuming successful outcome (demonstration of high-performance AT burning plasma), an ITER-based development path would lead to the shortest development time to a demonstration power plant.

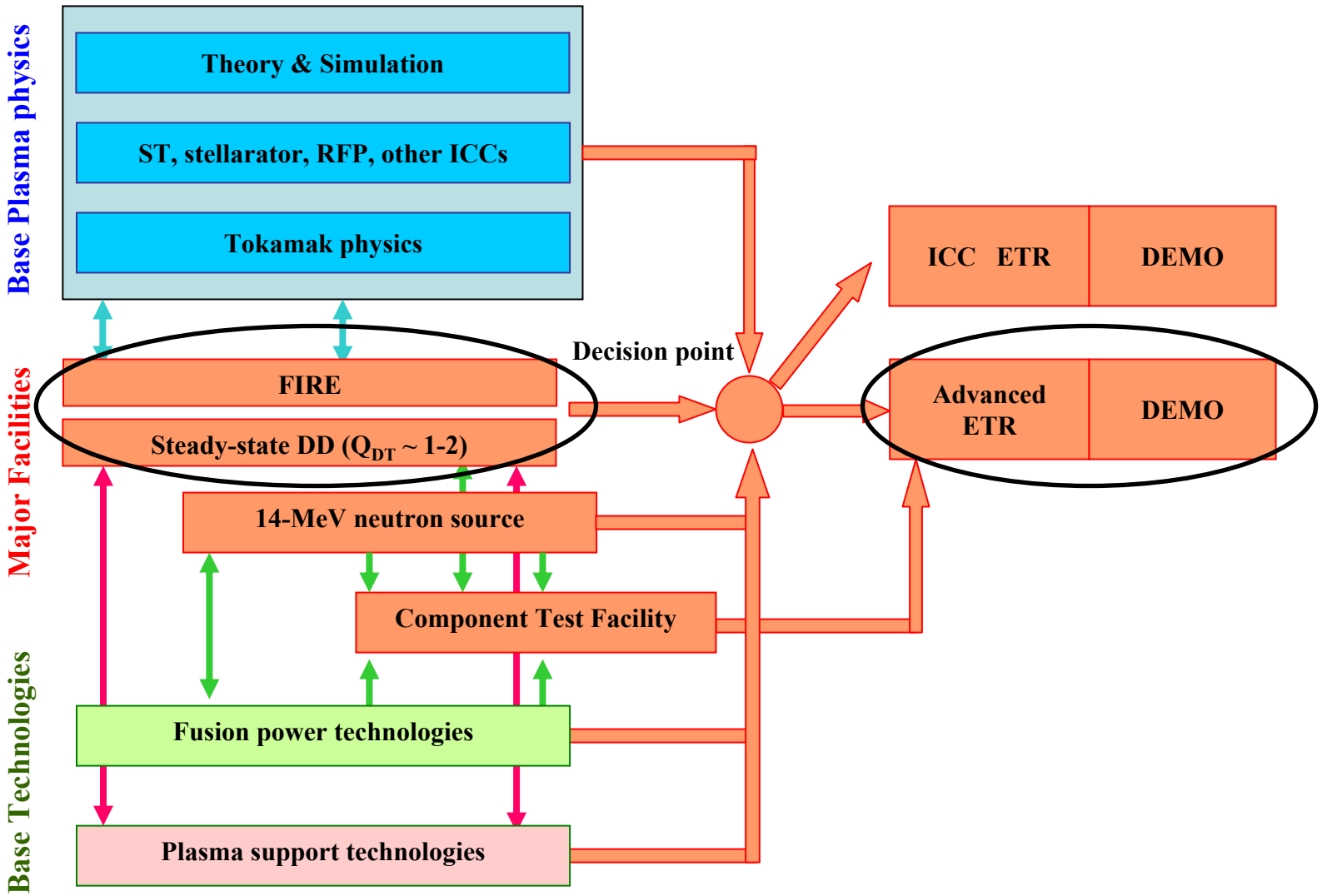
ITER-Based Development Path



FIRE-Based Development Path

- FIRE-based development plan reduces initial facility investment costs and allows optimization of experiments for separable missions.
- It is a lower risk option as it requires “smaller” extrapolation in physics and technology basis.
- Assuming successful outcome, a FIRE-based development path provides further optimization before integration steps, allowing a more advanced and/or less costly integration step to follow.

FIRE-Based Development Path



Role of IGNITOR in Fusion Development

- IGNITOR allows early demonstration of an important fusion milestone, burning plasmas.
- IGNITOR has a low initial facility investment cost.
- Because of its short pulse length, IGNITOR cannot thoroughly investigate burn control and/or advanced tokamak modes.
- **IGNITOR could be an element of a portfolio of experiments supporting ITER-based or FIRE-based development scenarios.**