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Breakout Session #3

Energy Innovation via Computing: Potential Users Session

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Breakout Rooms & Schedule

Wednesday

- 2:30 – 2:45 – Introductions
  - Name and Company
  - What problems are you solving today?
- 2:45 – 4:30 – Barriers discussion
- 4:30 – 5:30 – Recommendation and benefit discussion
  - (Those leaving today)

Thursday (to be modified)

- 8:00 am – Resume Work
- 9:45 am – Break
- 10:00 am – Plenary for Initial Reports (20 minutes each)
- 11:00 am – Resume Work, Lunch at Lead's Discretion
- 2:30 pm – Break
- 2:45 pm – Plenary for Final Reports (35 minutes each)
- 4:30 pm – Workshop Conclusions
- 5:00 pm -- Adjourn

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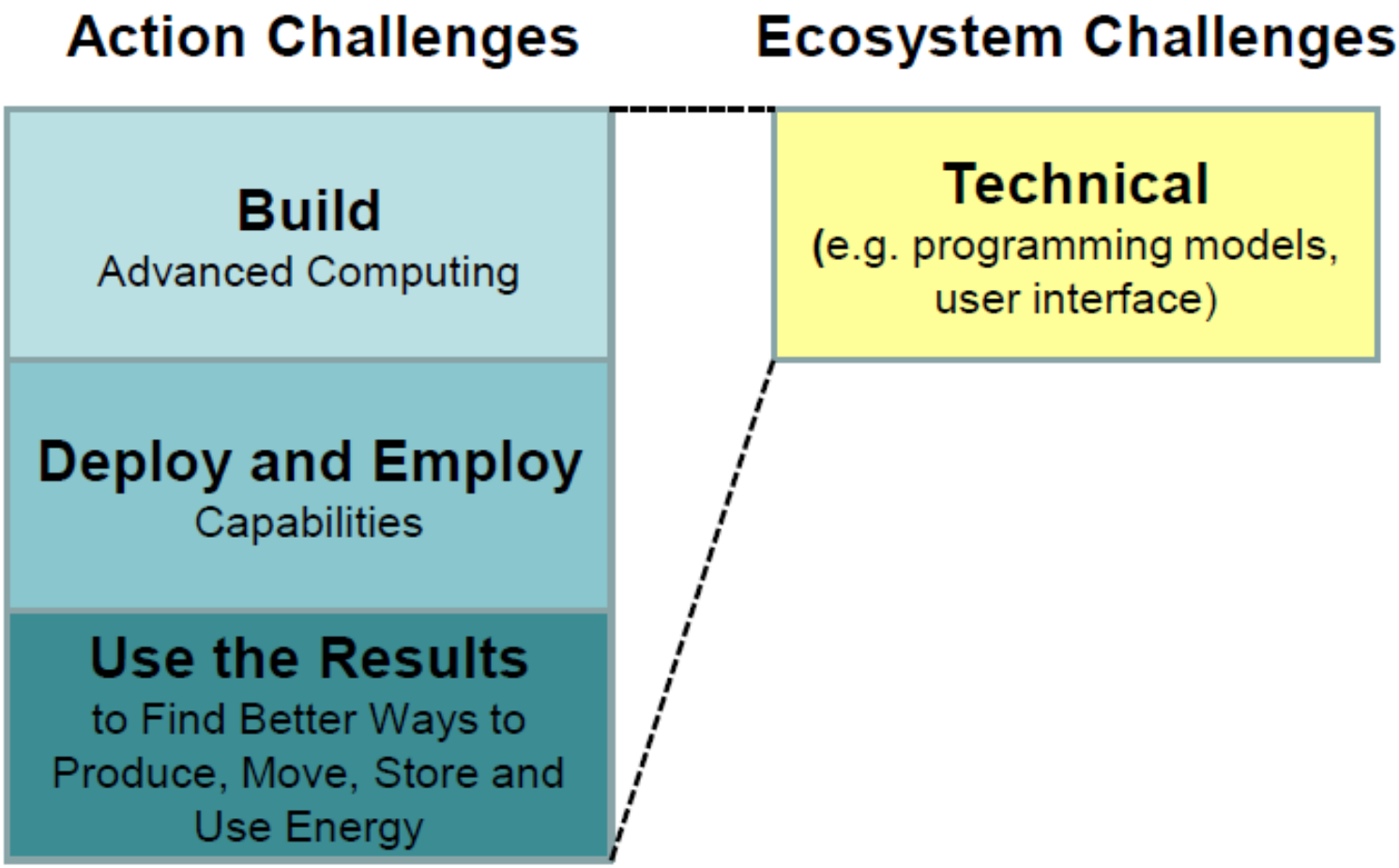
Types of Advanced Computing Grand Challenges



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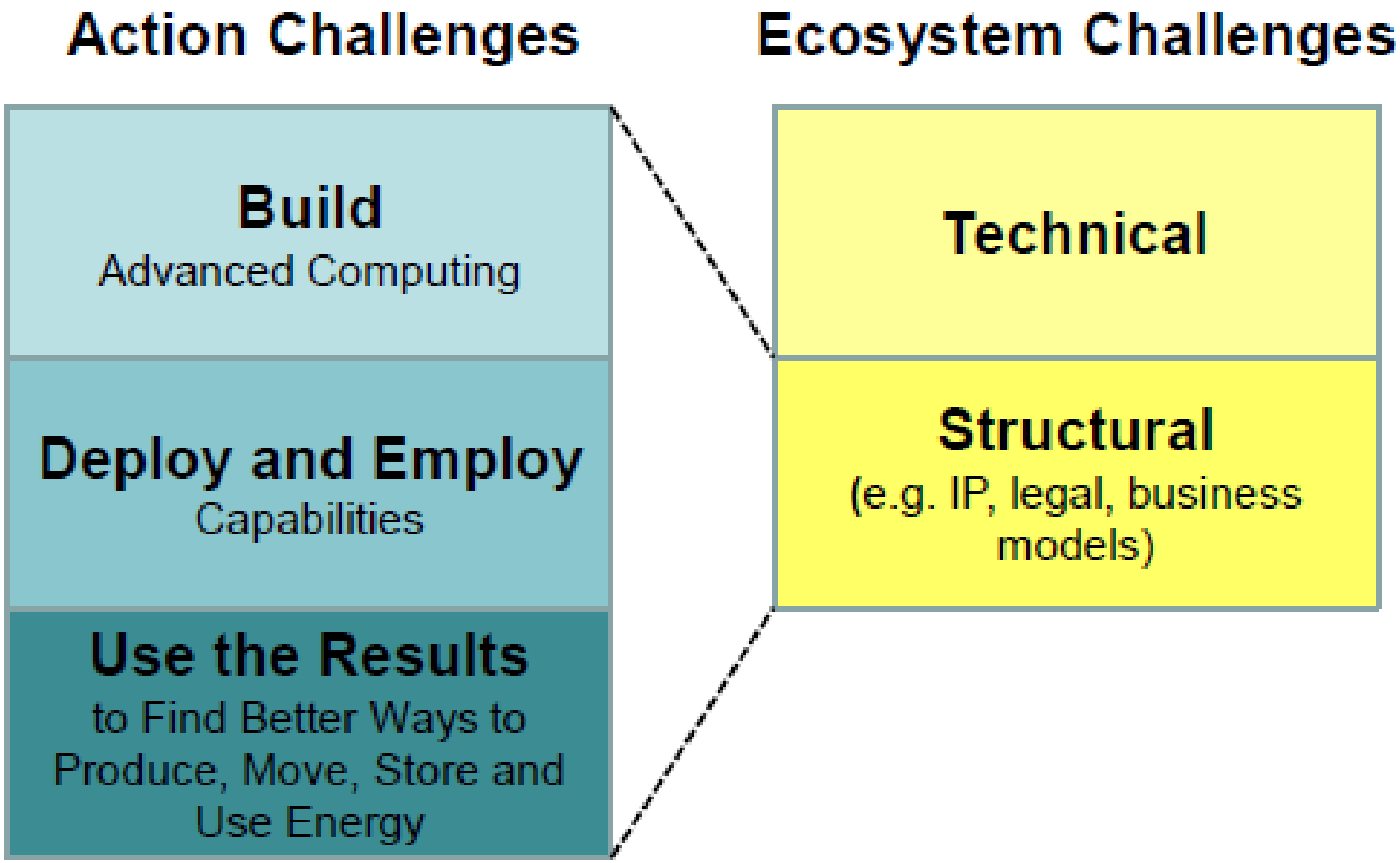
Types of Advanced Computing Grand Challenges



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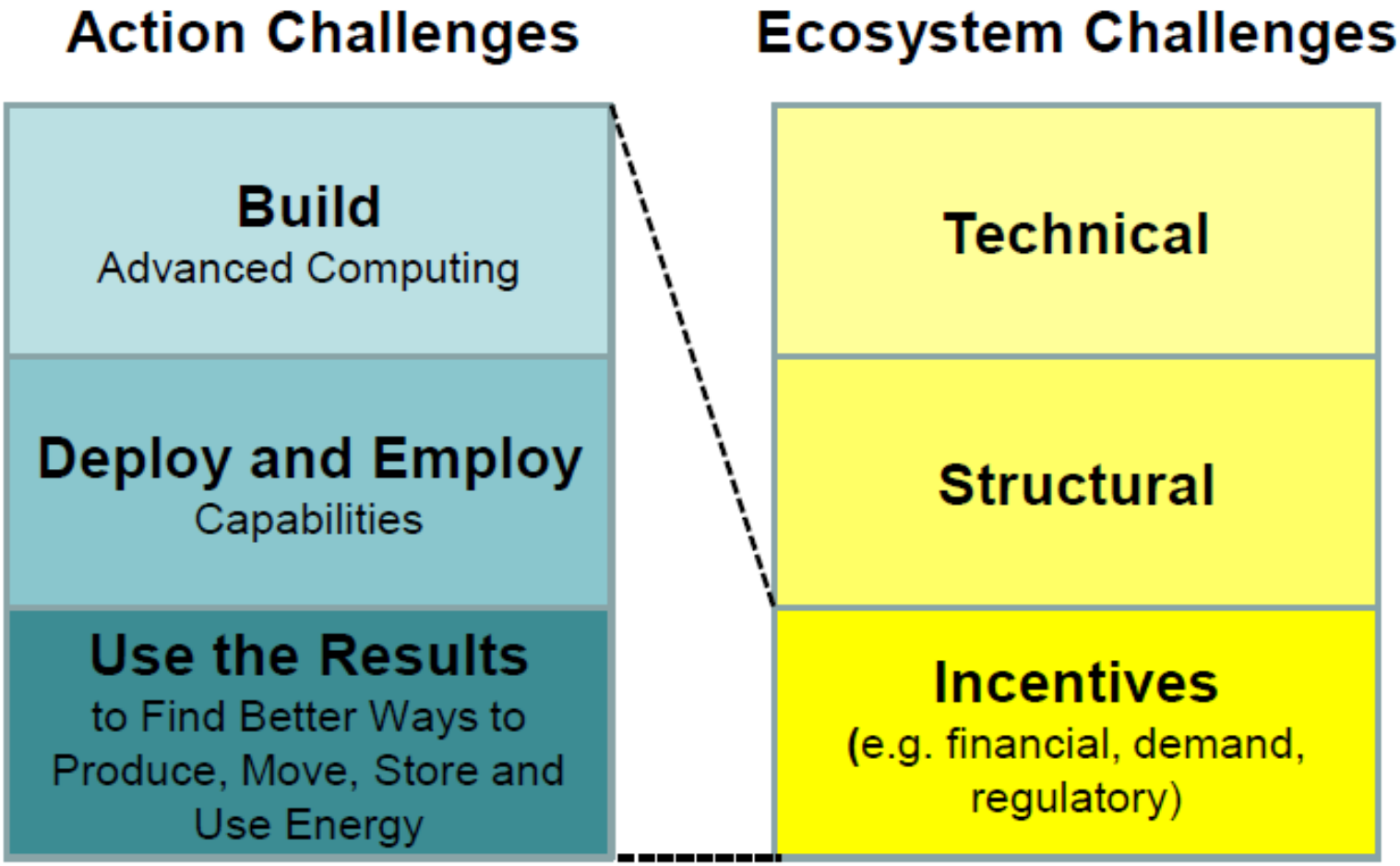
Types of Advanced Computing Grand Challenges



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Energy Innovation via Computing: Potential and Challenges: Major Questions

- **What does energy innovation mean to you?**
  - What problems are you solving today?
  - Does the ability to solve more complex analysis problems differentiate you in the market?
- **How could advanced computing help?**
  - What kinds of simulations and analytics does your company require?
  - Do companies in your business sector recognize the value of advanced computing?
- **What grand challenges exist that are holding energy innovators back?**
  - What are the gaps, that if filled, would help your company compete more effectively?
  - What role does code validation through experiments play in your simulation effort?
  - Are you finding a workforce appropriately trained in computation/simulation?
- **What recommendations do you have for increasing utilization of advanced computing for energy?**
  - What advice would you give others considering the use of advanced computing?
  - What could USG/DOE do to facilitate and promote wider adoption?

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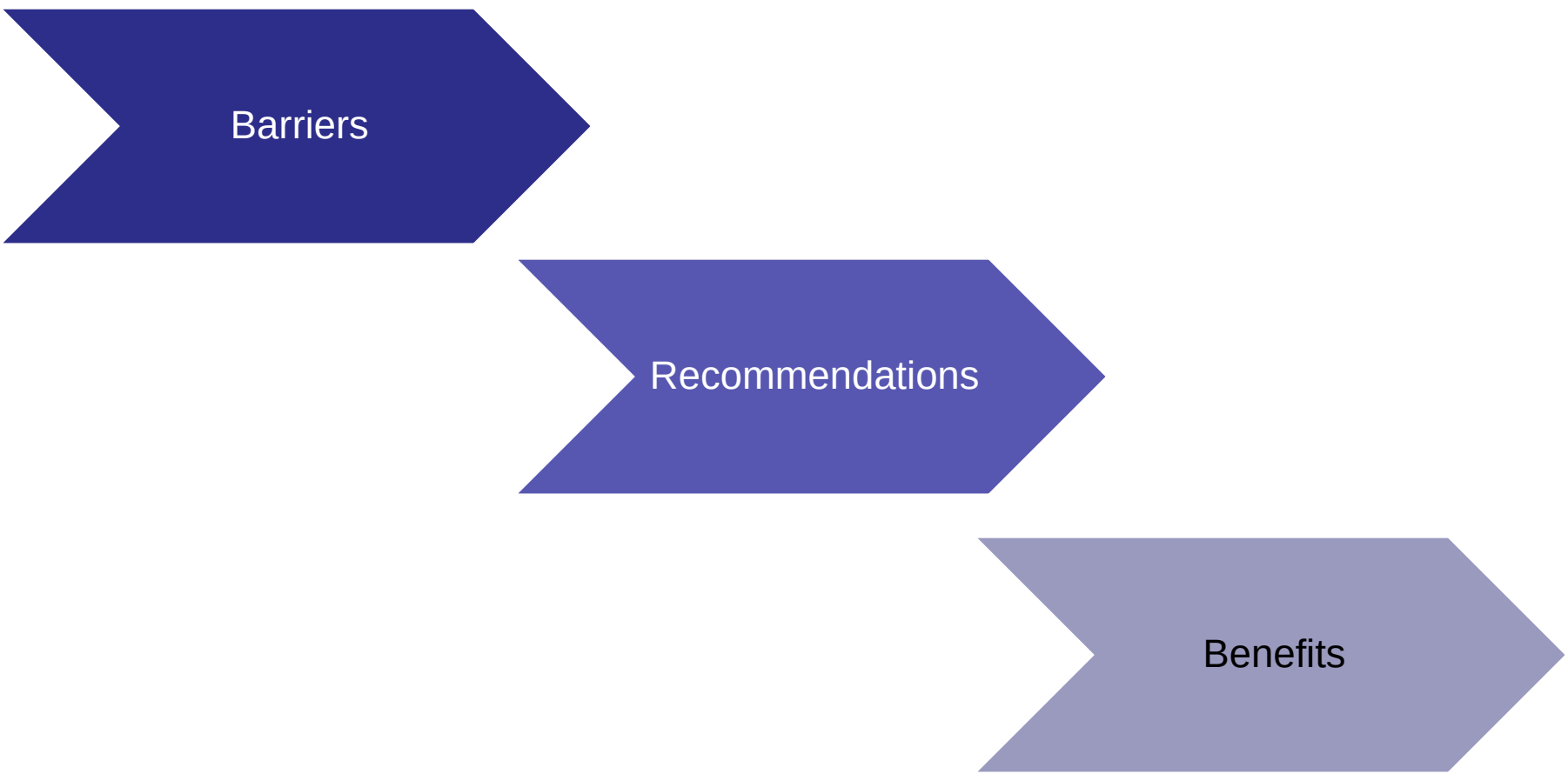

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Taxonomy of barriers

- **Industry understanding of labs and visa versa**
- **Access to and transition of advanced computing capabilities**
- **Gaps in DOE advanced computing strategy**

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Barrier: Industry understanding of labs and via versa

- **Industry understanding and access to Lab capabilities**
  - How can a company quickly understand Lab technologies?
  - How do I talk to?
- **Lack of understanding of business models and environments across Labs/industry interface**
  - Setting realistic expectations on both sides
  - Labs understanding the ROI argument
- **Ability to shape the discussion**
  - How can industry get Labs to anticipate industry needs
  - Industry understanding the value / constraints in lab
- **“Technical links are easy; Business links are hard”**

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Recommendation

- **Recommendation #1: A DOE-facilitated "Industry and Lab Marketing Strategy"**
  - Benefit: Industry can clearly identify how to work with labs, what labs do (via workshops and newsletters)
  - Who leads: DOE Tech Transfer office, work with Labs
- **Recommendation #2: A DOE-organized, "Match.com" for Industry and Labs**
  - Benefit: Improve business reach into labs to advance services. A multi-level matchmaking allowing company-Lab connections, ID of capabilities and POCs
  - Who leads: DOE Tech Transfer Office; Nimbis project is a good template
- **Recommendation #3: Lab technical staff perform rotations, sabbaticals, assignments in industry, and vice-versa**
  - Benefit: Lab staff better understand industry's needs and challenges; industry sees what lab expertise can do for labs
  - Who leads: Using the "Match.com" from recommendation, #1, Labs lead efforts
- **Recommendation #4: Incent Site Offices to encourage Lab-industry collaboration**
  - Benefit: Ease the path for industry to leverage lab to improve business
  - Who leads: DOE Tech Transfer office

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Barrier: Access to and transition of advanced computing capabilities

- **Providing industry with "trial access" to DOE HPC**
- **Confusion and lack of uniformity over IP restrictions in DOE**
- **Funding model for labs to adapt technology and industry to reduce risk of adoption**
  - Bridging DOE tools into industrial use
- **Easy access to expertise**
- **Usability, interoperability, and robustness gap in DOE tools**
  - And when to user ISV versus lab codes
- **Engagement strategy around ISVs**

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Access to and Transition of Advanced Computing Capabilities

- Vehicle: Create a standardized vehicle for engagement across all DOE entities (e.g. common CRADA, WFO, ACT etc.)
- Access: Define and prioritize areas of laboratory expertise and industry expertise (e.g. top five list) to allow access to industry and laboratory resources
- Provide Test Drive: Facilitate access to HPC and lab expertise to conduct pilot projects, etc.
- Engage ISVs: Expedite integration of code into industry software via explore opportunities and challenges for laboratory access to industry partners expertise and vice versa (i.e. don't reinvent the wheel). Workshop specifically focused on ISV issue.

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Barrier: Gaps in DOE advanced computing strategy

- **Examples of S&T and capabilities gaps**
  - Electric grid
    - No consensus on mapping problems to architectures
    - Lack of a roadmap inhibit R&D in tools development
    - Policy versus business decision making
  - Lack of Appropriate HPC tools specifically for design-optimization-control of complex engineered energy systems
    - No easy-to-use (MATLAB-like) HPC tools for modeling, model reduction, control design, signal processing, optimization and uncertainty quantification of complex systems
    - Lack strategies and technical approaches to develop and integrate these design tools and large scale simulations

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Two Main Recommendations

[RECOMMENDATION 1] Create forums that enable labs, industry and academia to jointly focus on the solution of a specific design-optimization-control problem for engineered energy systems. (These should be hands-on workshops of considerable length to enable cross fertilization of disciplines and the transfer of expertise.)

BENEFITS

- **Workshops of this type will serve to introduce external researchers and users to DOE people and capabilities.**
- **These workshops would provide a foundation for the development of HPC "design-optimization-control" tools necessary to ensure broad industrial usage.**
- **The workshops would provide feedback between DOE and industry on tool requirements and on tool readiness to be of practical use to industry.**
- **The results of the workshops could be the basis of web based educational / dissemination programs to inform and include the broad DOE-Industry-Academic user base**.

- Who: DOE Tech Transfer Office, Office of Science, Applied Offices

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Two Main Recommendations

[RECOMMENDATION 2] Create new applied mathematics and computing research programs, beyond traditional HPC programs, to do fundamental and applied research in emerging energy areas that require advances in control sciences, optimization and engineering design. (This should be an Office of Science/ASCR type agenda, potentially partnered with an applied office (EERE, etc).)

BENEFITS

- **These programs would provide a foundation for the development of new R&D and HPC tools necessary to ensure the solution of DOE problems and to address missing expertise required to advance the discipline.**
- **This program would provide a transformative approach to the development of new tools of use to both DOE and industry .**

- Who: DOE Tech Transfer Office, Office of Science, Applied Offices