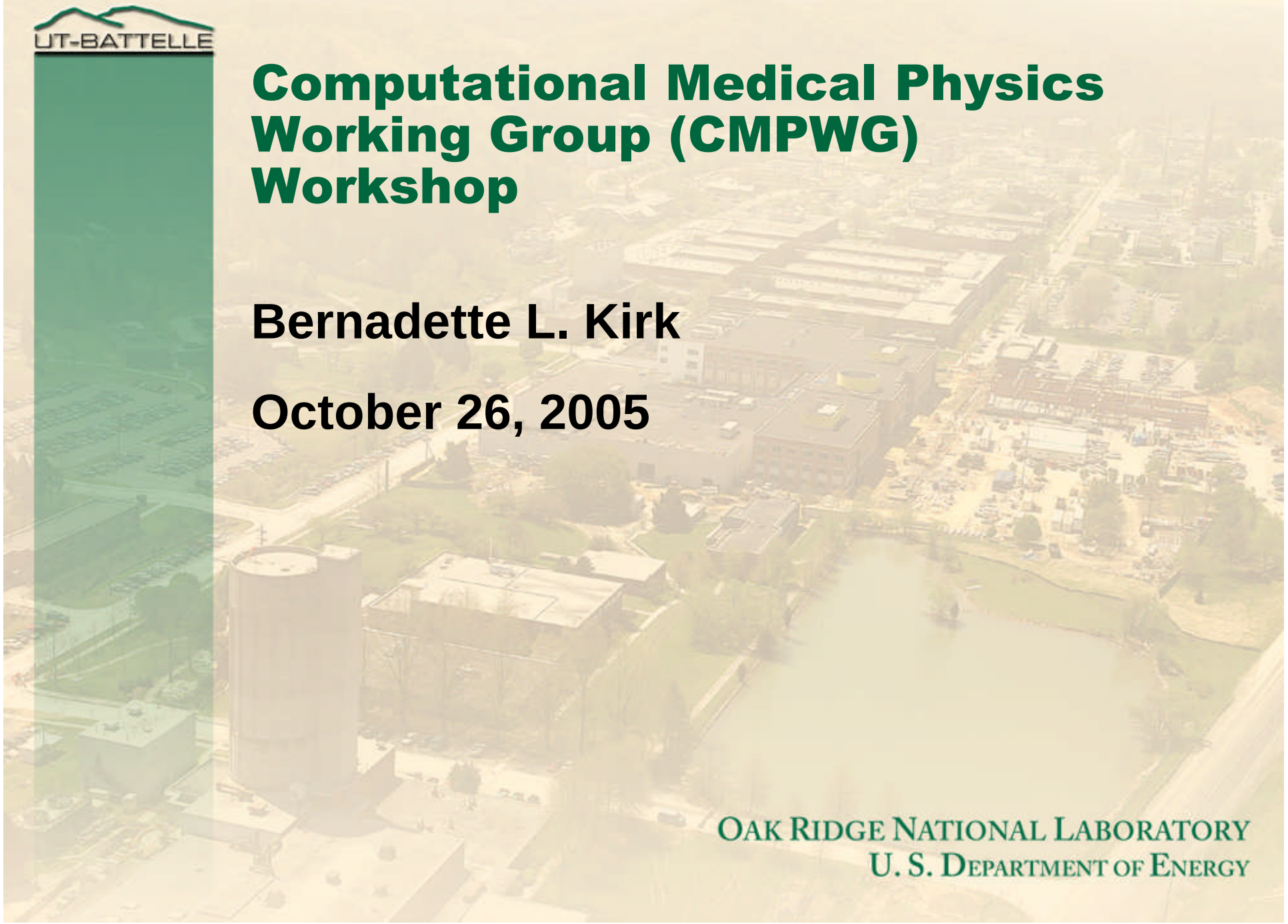


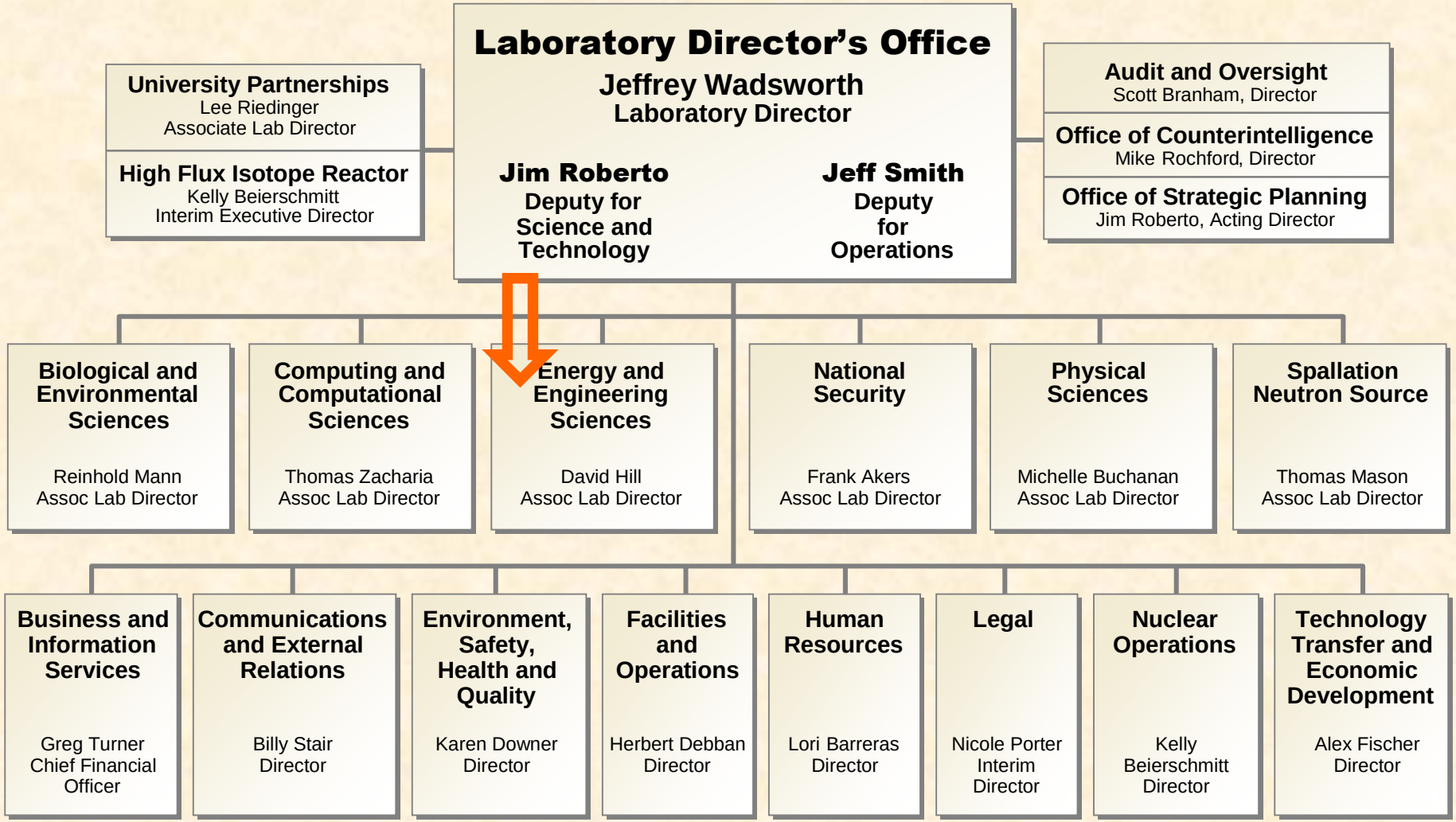
Computational Medical Physics Working Group (CMPWG) Workshop

Bernadette L. Kirk

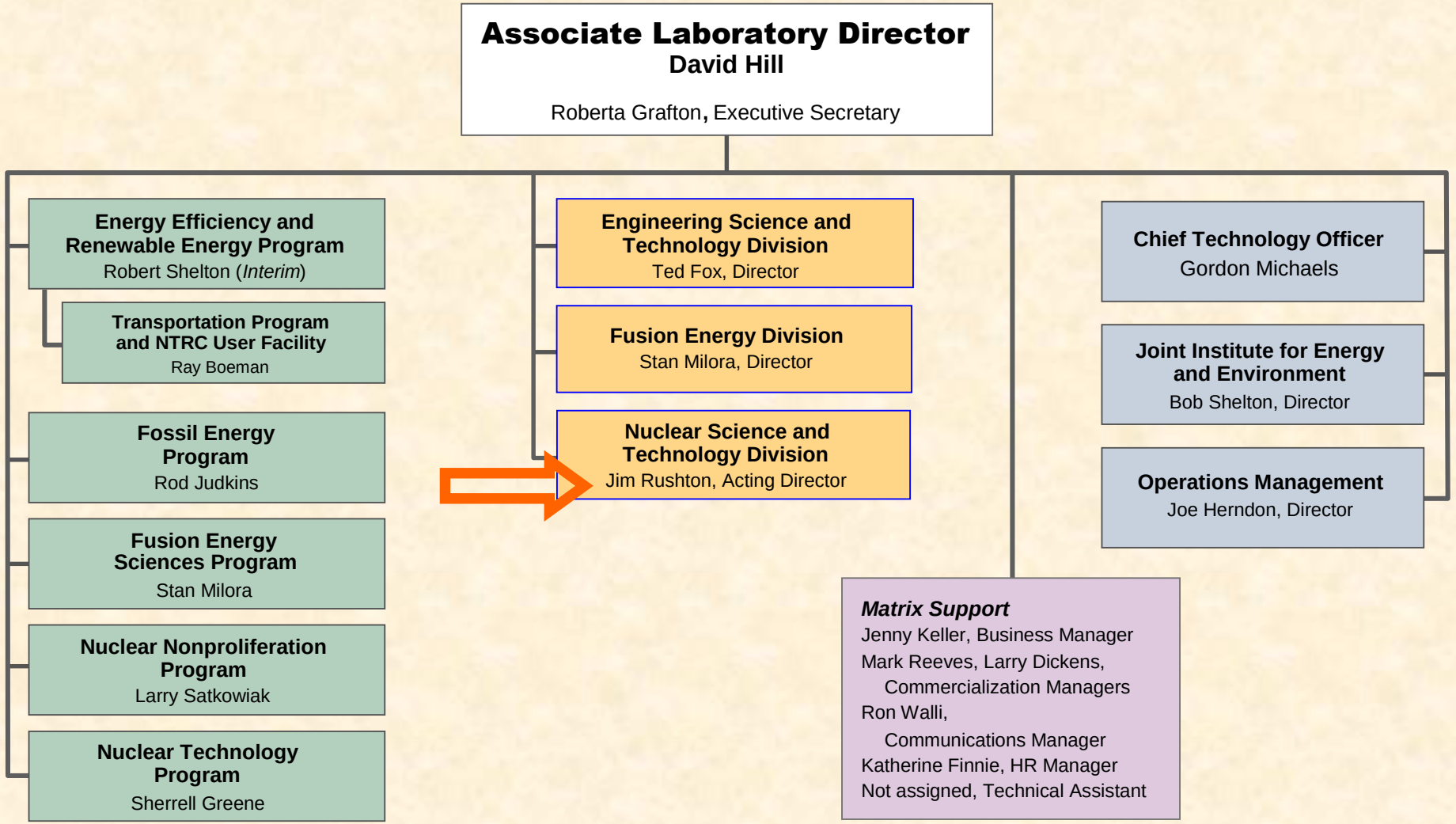
October 26, 2005

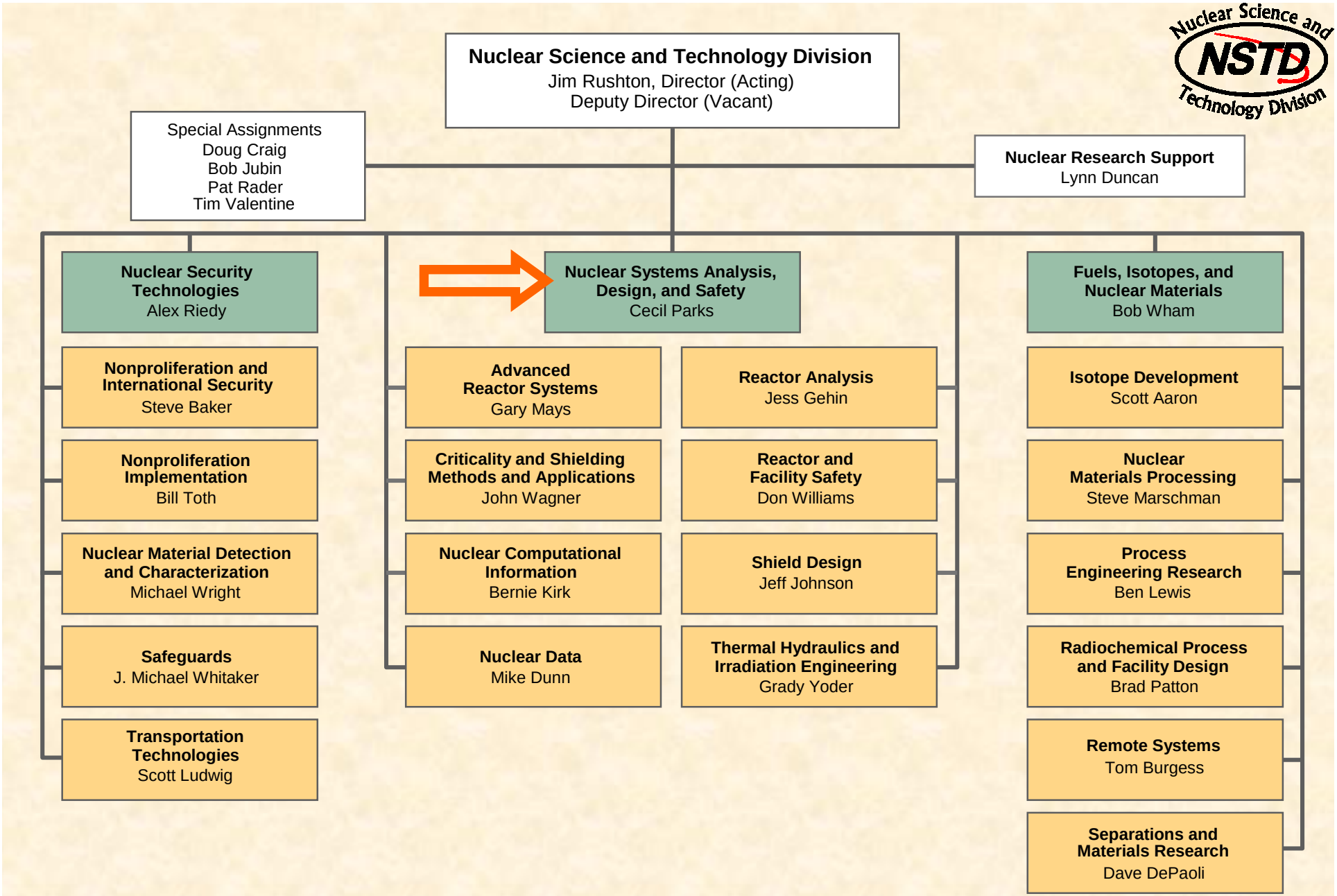
OAK RIDGE NATIONAL LABORATORY
U. S. DEPARTMENT OF ENERGY

Oak Ridge National Laboratory



Energy and Engineering Sciences Directorate

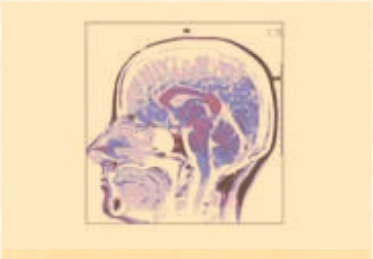



Nuclear Science and Technology Division
Jim Rushton, Director (Acting)
Deputy Director (Vacant)
Special Assignments
Doug Craig
Bob Jubin
Pat Rader
Tim Valentine
Nuclear Research Support
Lynn Duncan
Nuclear Security Technologies
Alex Riedy
Nuclear Systems Analysis, Design, and Safety
Cecil Parks
Fuels, Isotopes, and Nuclear Materials
Bob Wham
Nonproliferation and International Security
Steve Baker
Nonproliferation Implementation
Bill Toth
Nuclear Material Detection and Characterization
Michael Wright
Safeguards
J. Michael Whitaker
Transportation Technologies
Scott Ludwig
Advanced Reactor Systems
Gary Mays
Criticality and Shielding Methods and Applications
John Wagner
Nuclear Computational Information
Bernie Kirk
Nuclear Data
Mike Dunn
Reactor Analysis
Jess Gehin
Reactor and Facility Safety
Don Williams
Shield Design
Jeff Johnson
Thermal Hydraulics and Irradiation Engineering
Grady Yoder
Isotope Development
Scott Aaron
Nuclear Materials Processing
Steve Marschman
Process Engineering Research
Ben Lewis
Radiochemical Process and Facility Design
Brad Patton
Remote Systems
Tom Burgess
Separations and Materials Research
Dave DePaoli

Modeling Scenario

Physical World

Theory

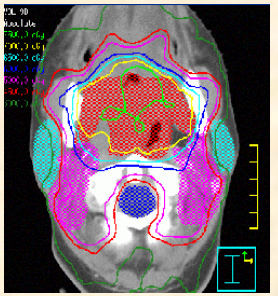


Experiments

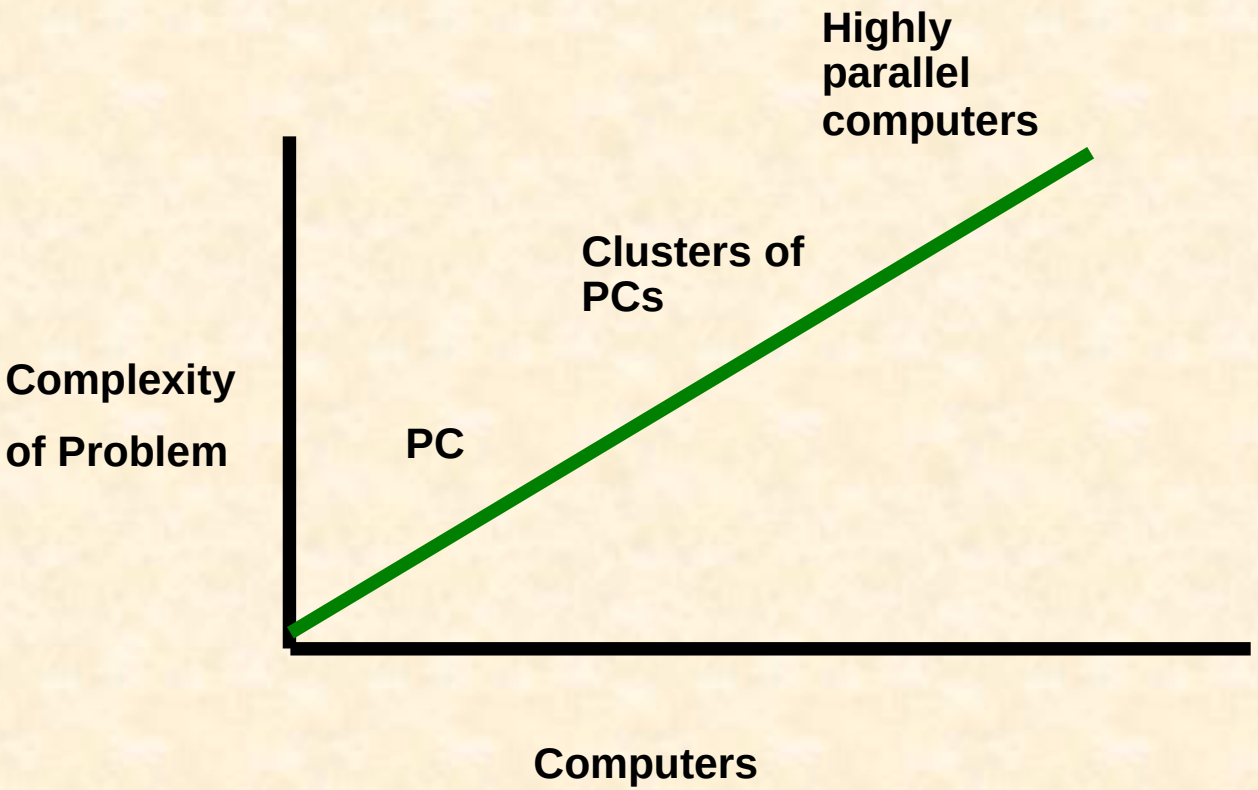
Software

Prediction

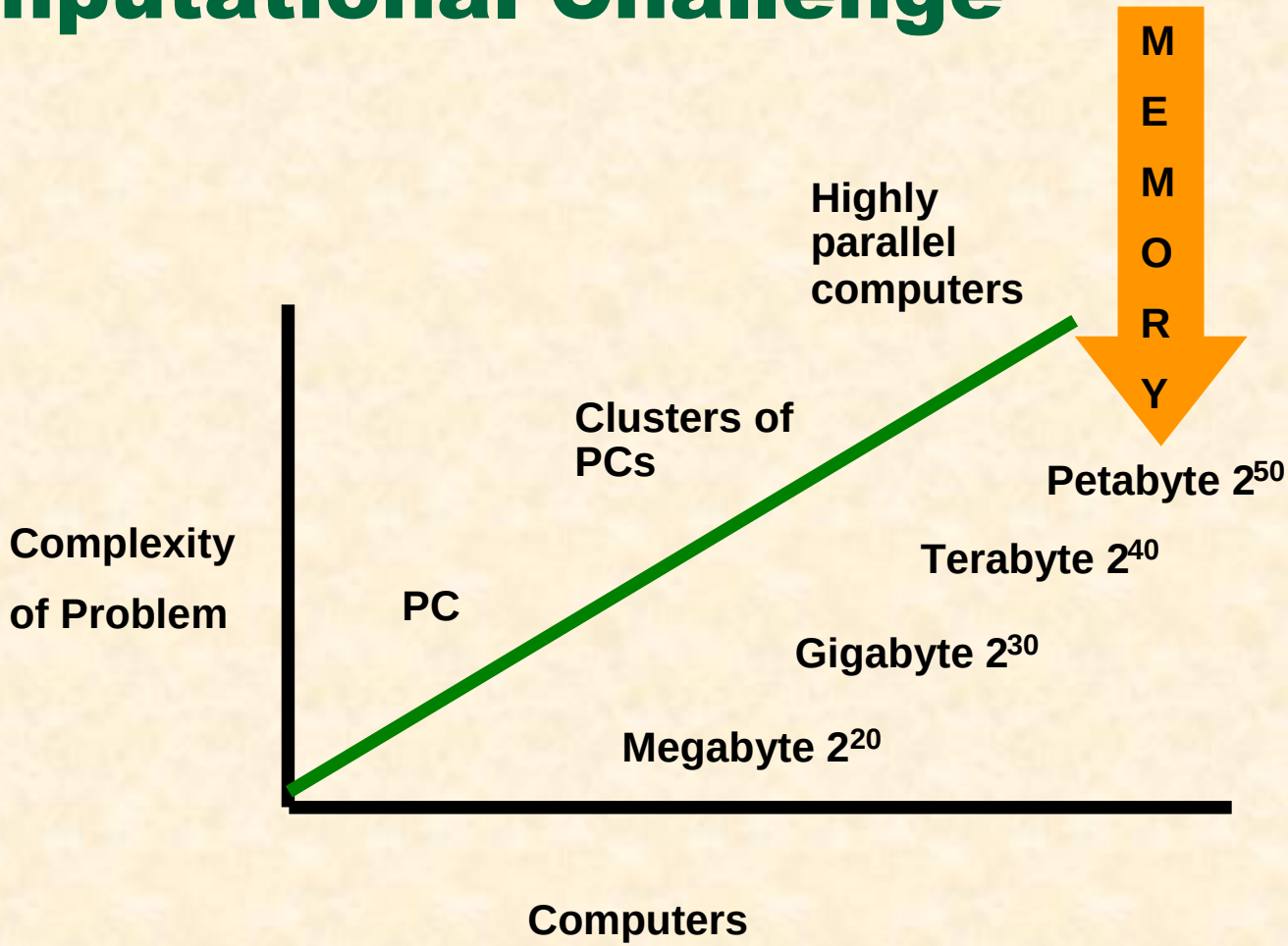
Treatment plans



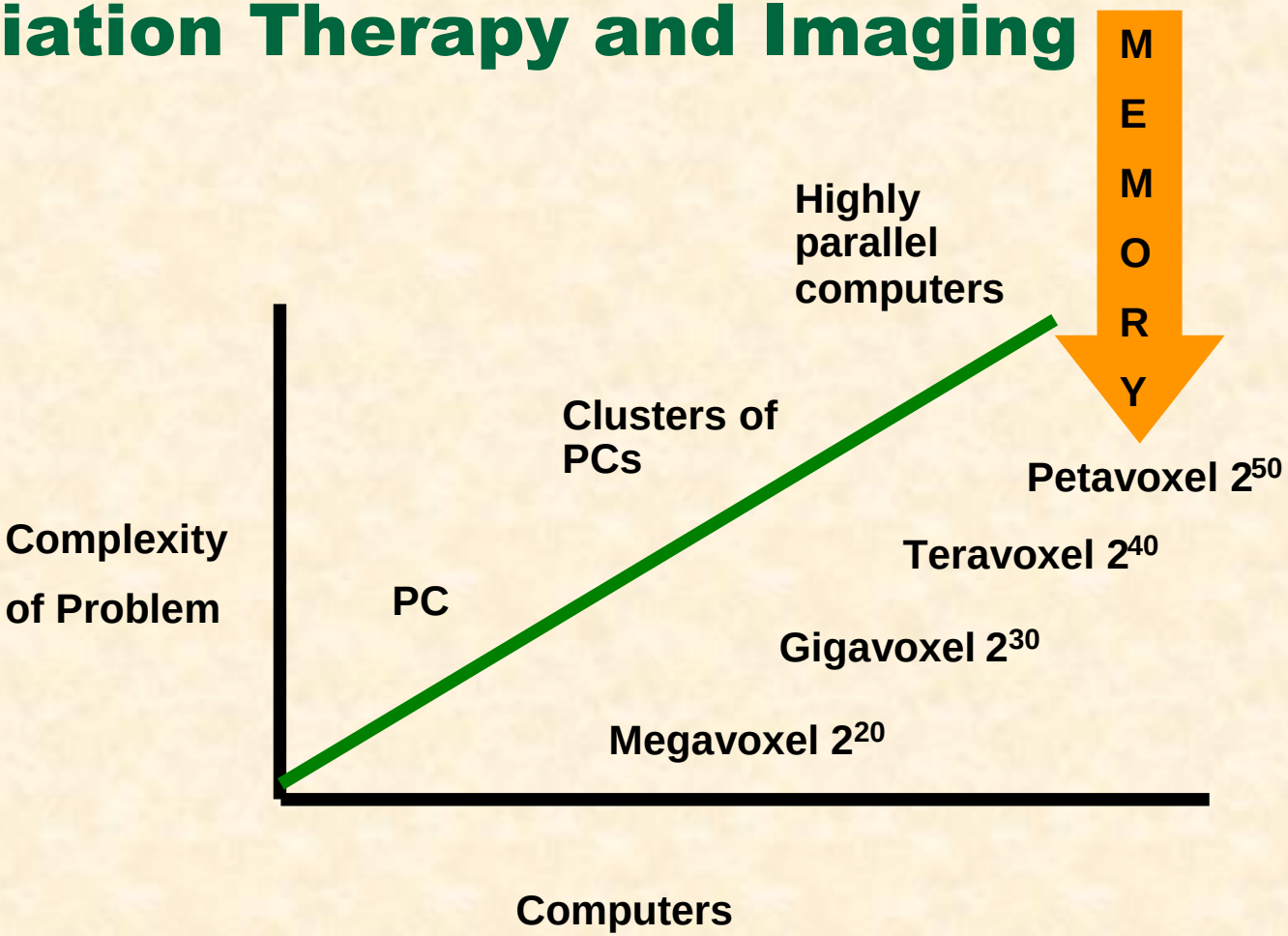
Computational Challenge



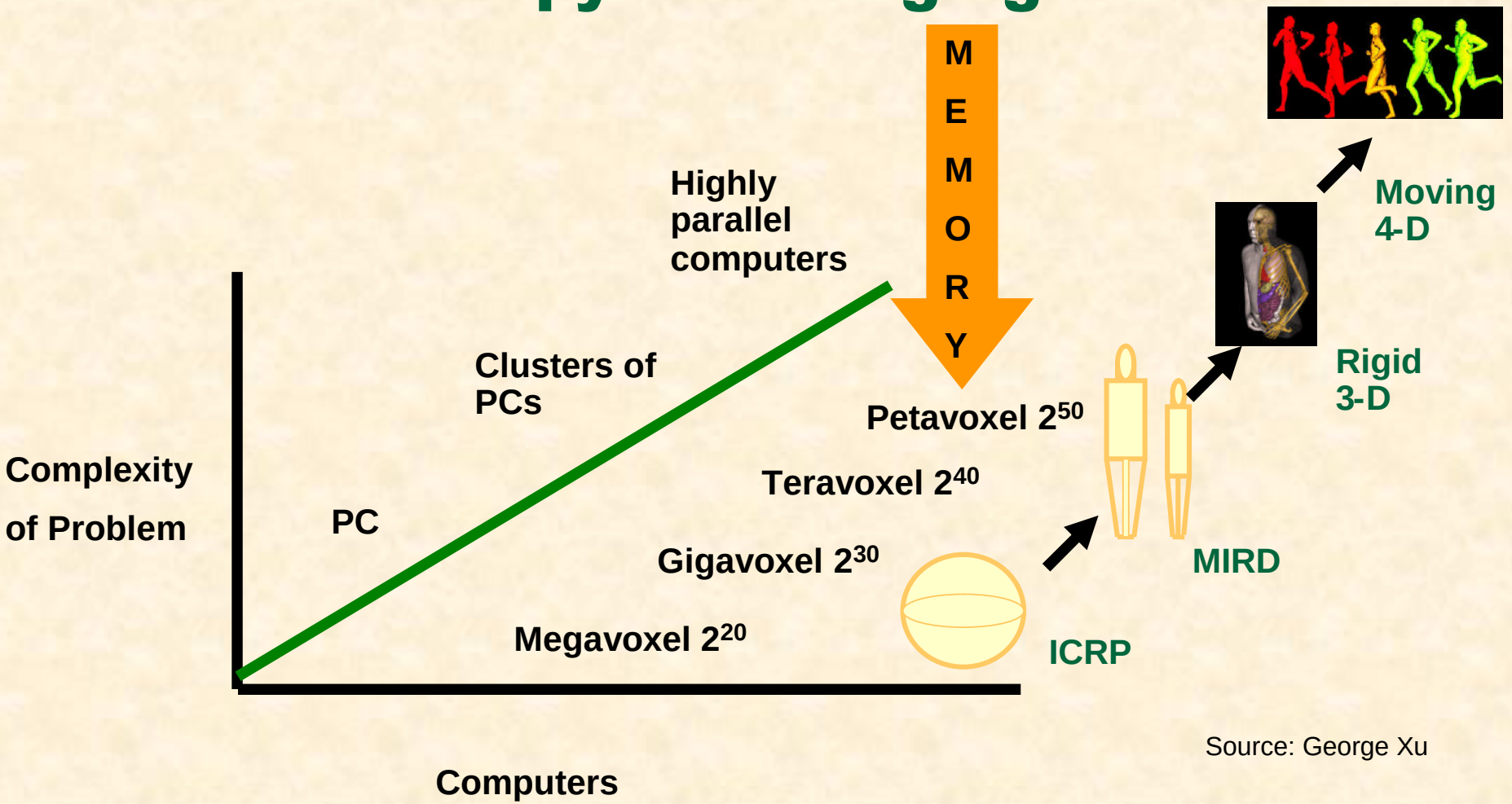
Computational Challenge



Computational Challenge for Radiation Therapy and Imaging



Computational Challenge for Radiation Therapy and Imaging



Source: George Xu

National Center for Computational Sciences at Oak Ridge National Laboratory
http://nccs.gov

100 teraflops by 2006; 250 teraflops by 2007

- 40,000 sq. ft. computer center with 36 inch raised floor, 18 feet deck-to-deck
- 12 megawatts of power
- 4,800 tons of cooling with redundant capacity to allow concurrent operation and maintenance

ORNL Computers

11th Jaguar

Cray XT3

5212 (25 teraflops) compute processors

4.8 gigaflop per processor

2 GB of memory per processor, 10TB memory compute partition

2.4-GHz AMD Opteron processor.

50th Phoenix

Cray X1

1024 (13 teraflops) multi-streaming vector processors

12.8 gigaflop per processor

2 TB of globally addressable memory.

Ram

a 256-processor SGI Altix; 2 TB of shared memory

256 Intel Itanium2 processors running at 1.5 GHz each with 6 MB of L3 cache, 256K of L2 cache, and 32K of L1 cache

Cheetah

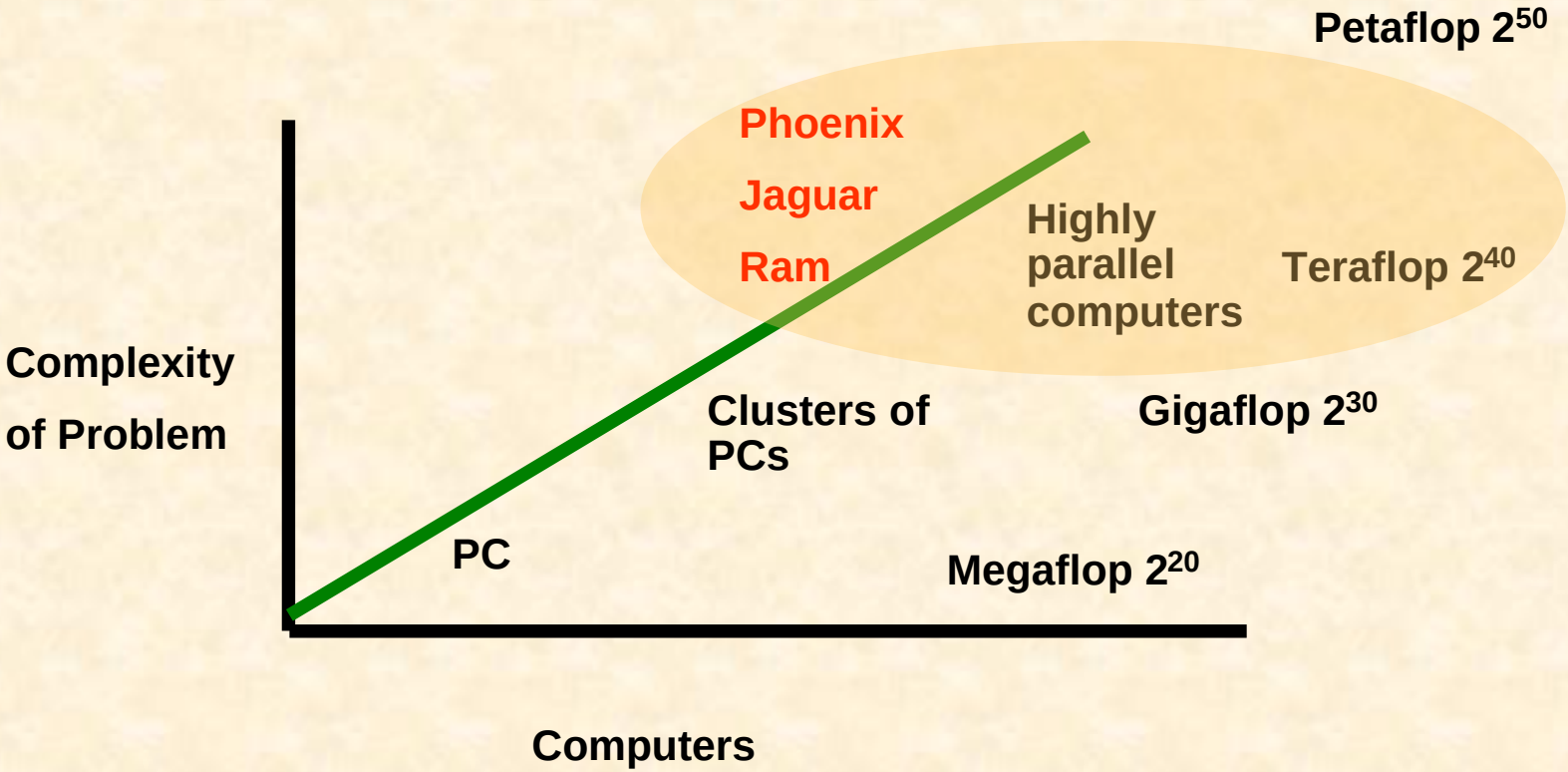
a 27-node IBM p690 system

each node has thirty-two 1.3 GHz Power4 processors. Most of the nodes have 32 GB of memory, but five of the nodes have 64 GB of memory, and two have 128 GB of memory.

Tiger

a 144-processor Cray XD1; 8 GB of memory per two processor node Tiger has six nodes with attached FPGA co-processors

ORNL Computers

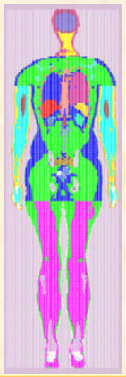


George Xu - Consortium of Computational Human Phantoms

(CCHP) http://www.virtualphantoms.org/

Nuclear Science and NSTD Technology Division

Different groups from Germany, UK, USA, Japan, Korea and Brazil

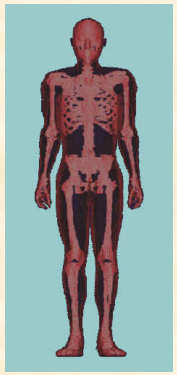


Golem/ICRP

Helga

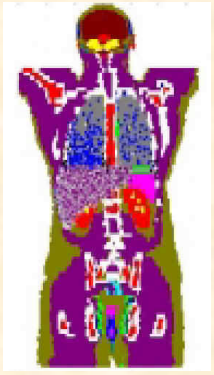
Irene

Donna



NORMAN

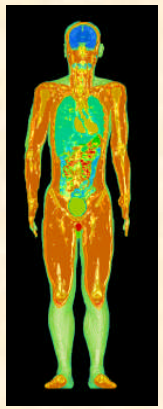
MAX

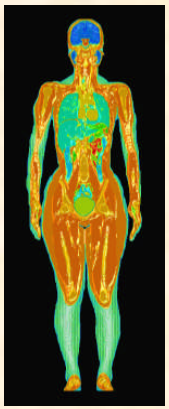


Zubal's

VIP-MAN

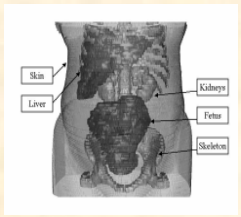
Otoko





Nagaoka

KORMAN



Mother/Fetus

UF-Newborn

UF-Newborn

OAK RIDGE NATIONAL LABORATORY
U. S. DEPARTMENT OF ENERGY

UT-BATTELLE

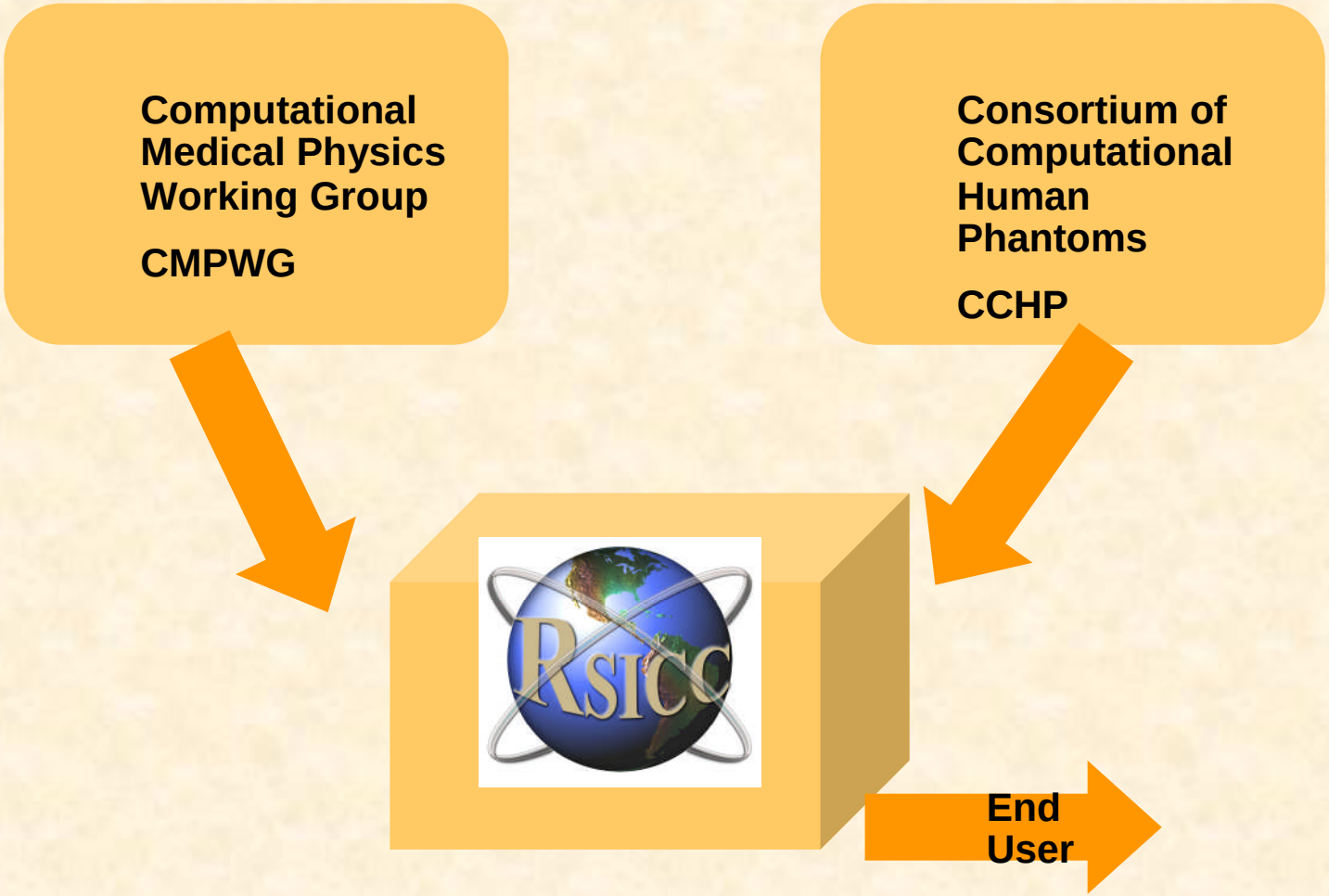
Objectives

- Identify the medical physics problems and experiments for computational benchmarks
- Identify the software tools, their applications, strengths and weaknesses
- Identify applications suitable for parallel computing
- Identify the roadmap for benchmarking activities

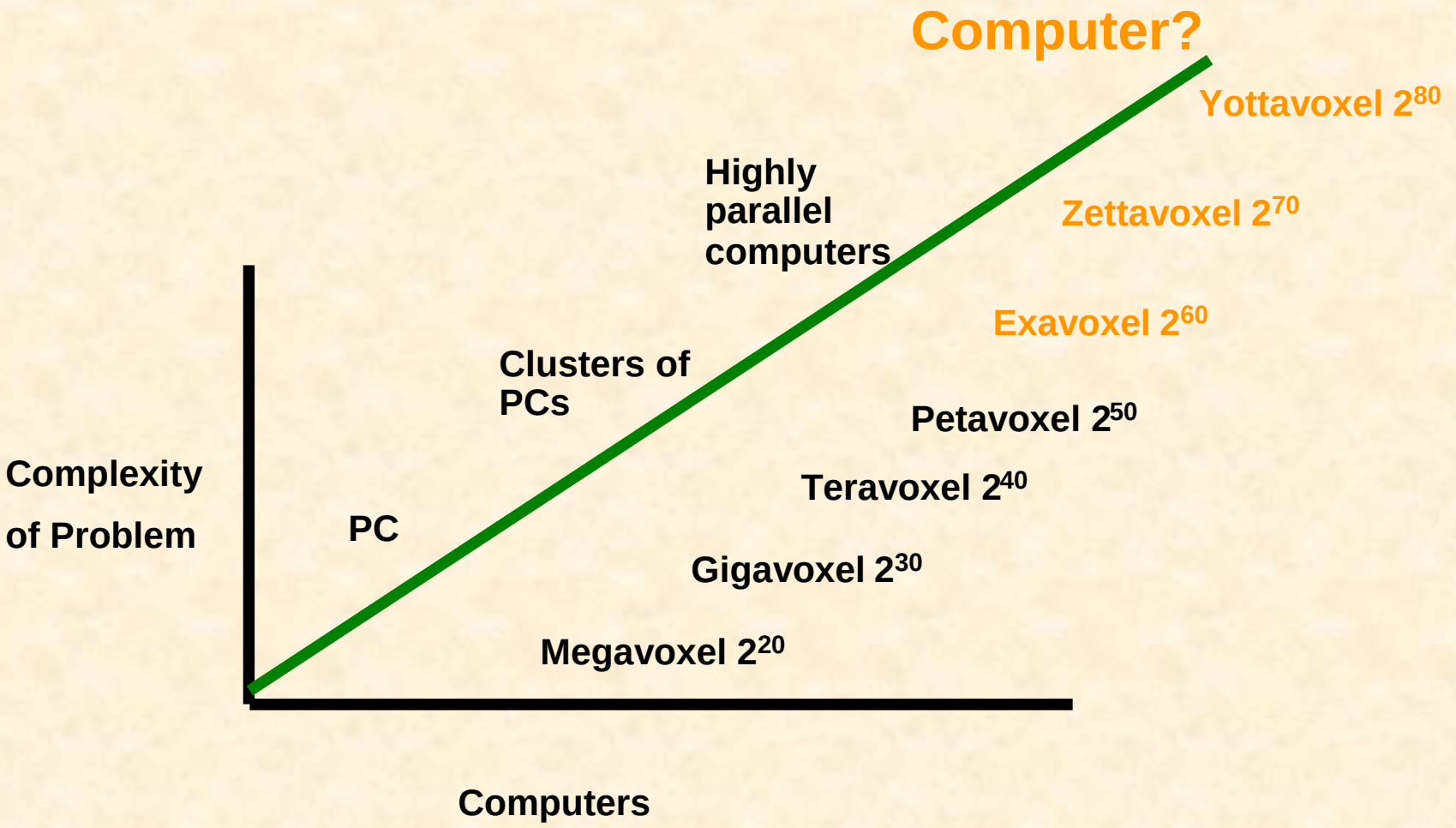
ACTION ITEMS

Sharing Information

http://cmpwg.ans.org



The Future and Beyond: Nanotherapy and Nanoimaging



AGENDA

- 8:00 Welcome, Jim Rushton
- 8:15 Introductions and objectives of meeting, Bernie
- 8:30 Status of the field and needs
- 15 minutes - Mark Rivard, Brachytherapy
- 8:45 15 minutes - Robert Jeraj, External Beam Therapy
- 9:00 15 minutes - Wayne Newhauser, Proton therapy
- 9:15 15 minutes – Saed Mirzadeh, Nuclear Medicine
- 9:30 15 minutes – Keith Eckerman, ICRP activities in computational dosimetry
- 9:45 15 minutes – Richard Ward, Virtual Soldier
- 10:00 Break
- 10:15 Status of software and needs
- 15 minutes – Dick Lillie, DOORS
- 10:30 15 minutes – Tim Goorley, MCNP/MCNPX
- 10:45 15 minutes – Glenn Sjoden, PENTRAN
- 11:00 15 minutes – Douglas Peplow, EGSNRC
- 11:15 15 minutes – Farzad Rahnema, COMET
- 11:30 15 minutes – Dave Nigg, SERA/MINERVA
- 11:45 15 minutes – Cassiano, EVENT
- 12:00 Working Lunch – Open Discussions
- 1:00 15 minutes – Mike Dunn, Nuclear Data
- 1:30 15 minutes – Erno Sajo, View From University Research
- 2:00 Discussion
- 3:00 Break
- 5:00 Adjourn
- 7:00 Wrap-up Dinner