Status of the Next-Generation Supercomputer Project

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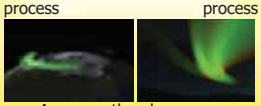
Six Goals of the Japan's "Third Science and Technology Basic Plan" in FY2006 – FY2010

Goal One
Discovery & Creation of Knowledge toward the Future


Milky Way formation process


Planet formation process

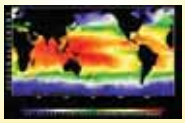

Aurora outbreak process

Goal Two
Breakthroughs in Advanced Science and Technology


Nuclear reactor analysis


Rocket engine design

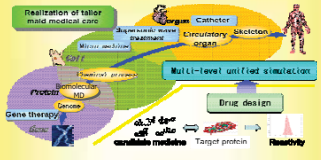
Goal Three
Sustainable Development
- Consistent with Economy and Environment -


An influence prediction of El Nino phenomenon

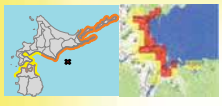
Development and Application of Next-Generation Supercomputer


Nano technology


Car development



Multi-level unified simulation


Tsunami damage prediction


Clouds analysis

Goal Four
Innovator Japan
- Strength in Economy & Industry -

Goal Five
Good Health over Lifetime

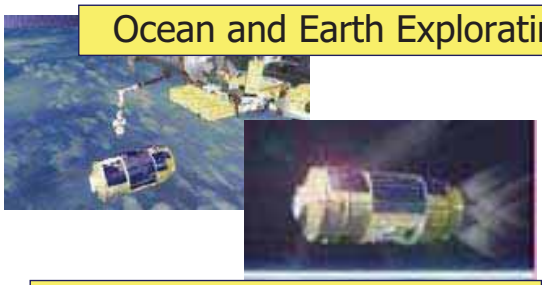
Goal Five
Safe and Secure Nation

Key Technologies for National Importance

X-Ray Free Electron Laser (XFEL)

Next Generation Supercomputer

Ocean and Earth Exploratin System



Space Transport System

Fast Breeder Reactor & Fuel Recycle Technology

Outline of the Next-Generation Supercomputer Project

- Objectives are
  - to develop the world's most advanced and high-performance supercomputer
  - to develop and deploy its usage technologies including application software.

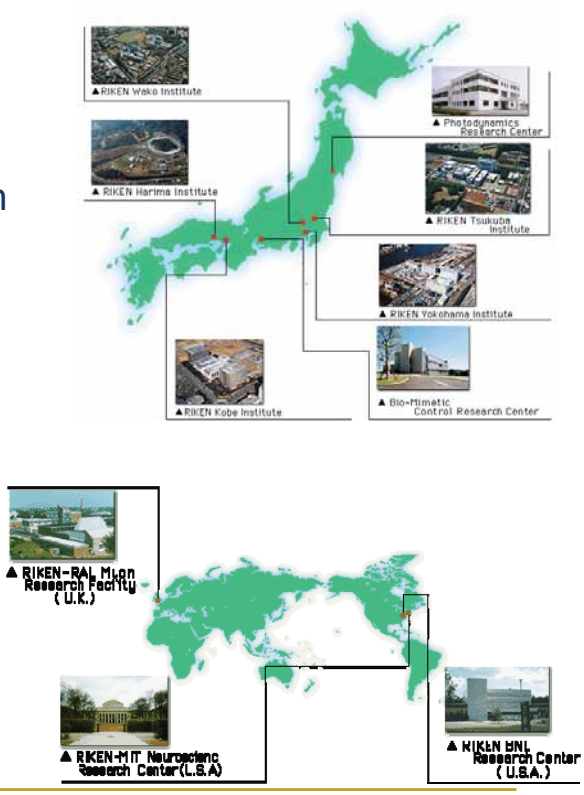
  as one of Japan's Key Technologies of National Importance.
- Period of the project: FY2006-FY2012
- RIKEN (The Institute of Physical and Chemical Research) plays the central role of the project in developing the supercomputer under the law on sharing large scale experimental facilities which are unique in Japan, or so-called "common-faclilities law."

RIKEN is ...

An institute of comprehensive research in a wide range of fields, including physics, chemistry, medical science, biology, and engineering, covering the entire range from basic research to practical application.

- established in 1917 as a private research foundation,
- reorganized in 2003 as an independent administrative institution under the Ministry of Education, Culture, Sports, Science and Technology (MEXT).
- 3000 full-time researchers and 2000 guest researchers.
- 7 sites in Japan, 3 sites outside of Japan

- Funding mainly comes from MEXT(Ministry of Education, Culture, Sports, Science and Technology)



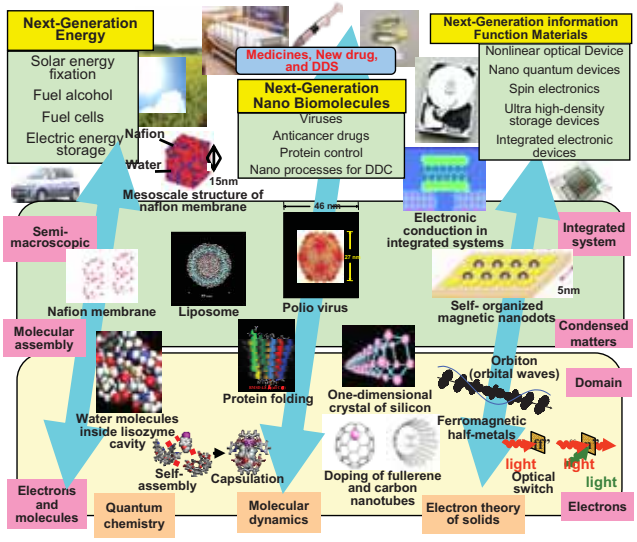
Goals of the project

- Development and installation of the most advanced high performance supercomputer system with LINPACK performance of 10 petaflops.
- Development and deployment of application software, which should be made to attain the system maximum capability, in various science and engineering fields.
- Provision of flexible computing environment by Grid technology with supercomputers located at universities and research institutes in Japan.
- Establishment of an "Advanced Computational Science and Technology Center (tentative)" as one of the Center of Excellences around the supercomputing facilities.

Major applications on Next-Generation Supercomputer

Grand Challenges

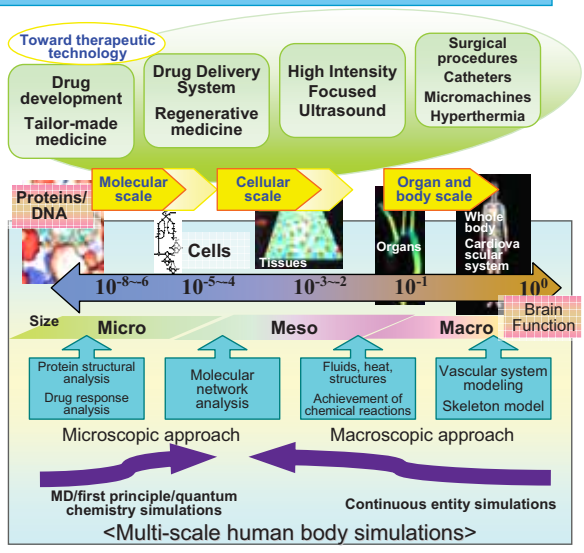
Next-Generation Integrated Nano-Science Simulation Software



Base site: Institute for Molecular Science

To create next-generation nano-materials such as new semiconductor materials by integrating fundamental theories and simulation techniques in the fields of new-generation information functions/materials, nano-biomaterials, and energy.

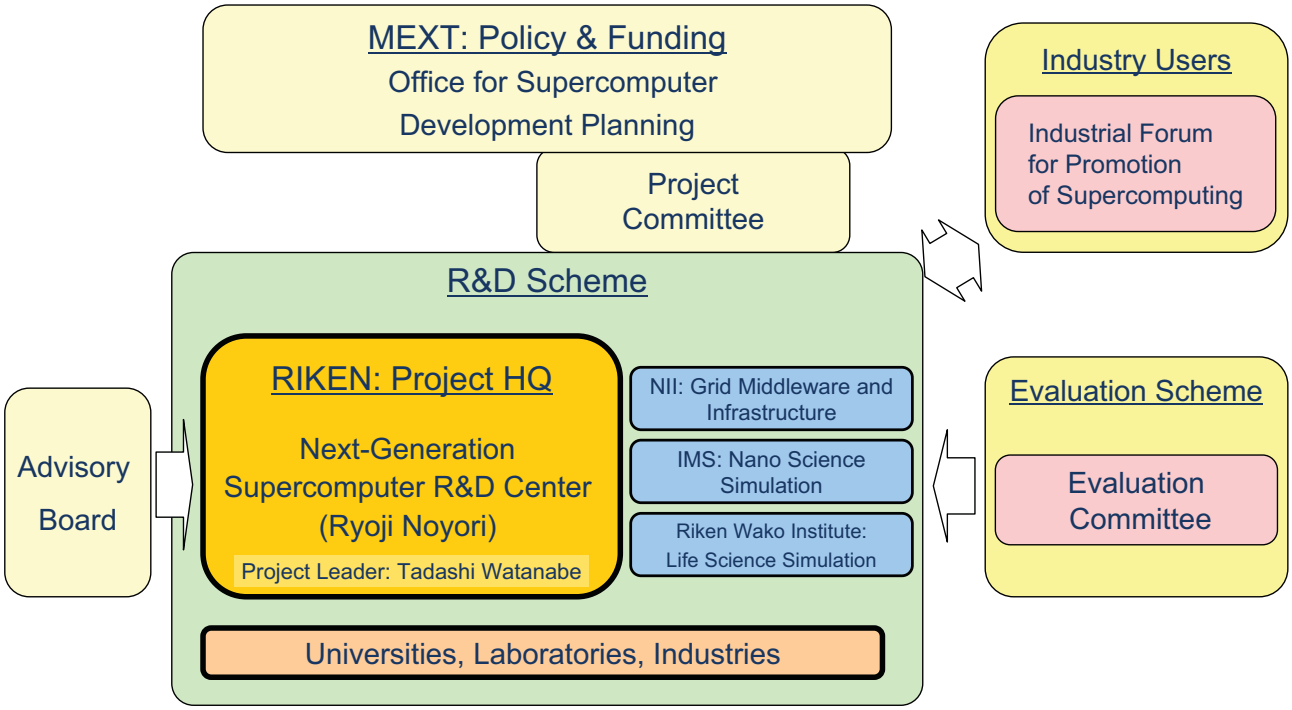
Next-Generation Integrated Life-Science Simulation Software



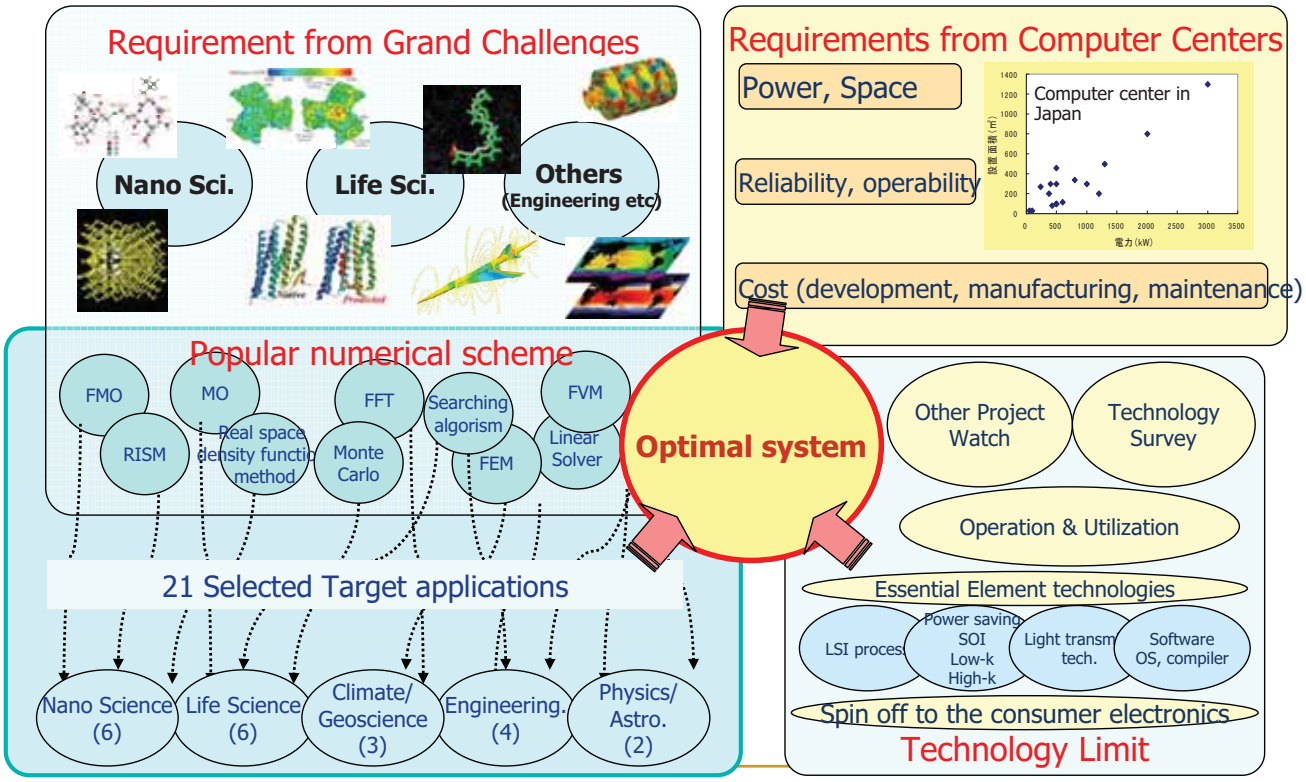
Base site: RIKEN Wako Institute

To provide new tools for breakthroughs against various problems in life science by means of petaflops-class simulation technology

Project organization

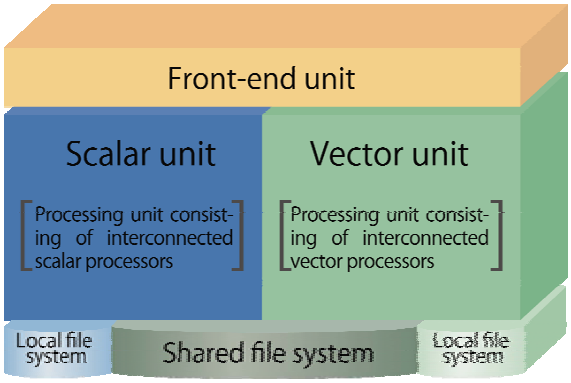


What architecture is suitable for the project?



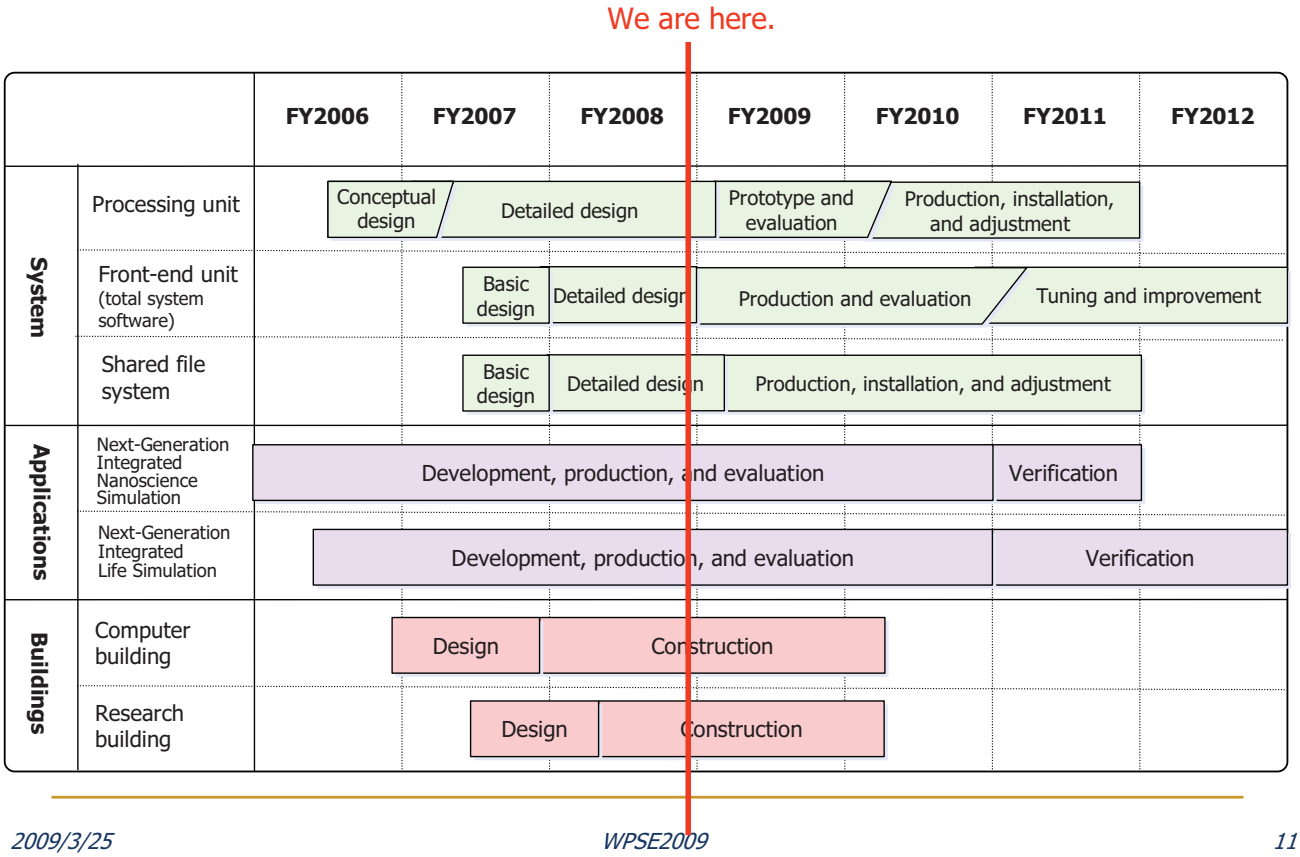
Configuration of the system

- The Next-Generation Supercomputer will be a hybrid general-purpose supercomputer that provides the optimum computing environment for a wide range of simulations.



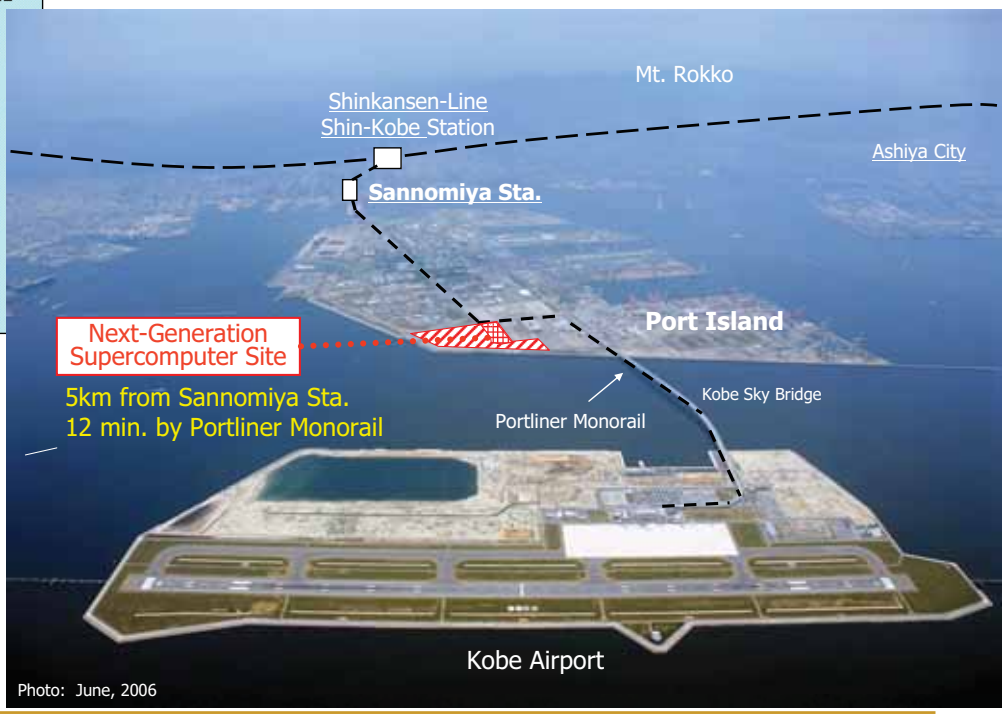
- Calculations will be performed in processing units that are suitable for the particular simulation.
- Parallel processing in a hybrid configuration of scalar and vector units will make larger and more complex simulations possible.

Schedule of the project



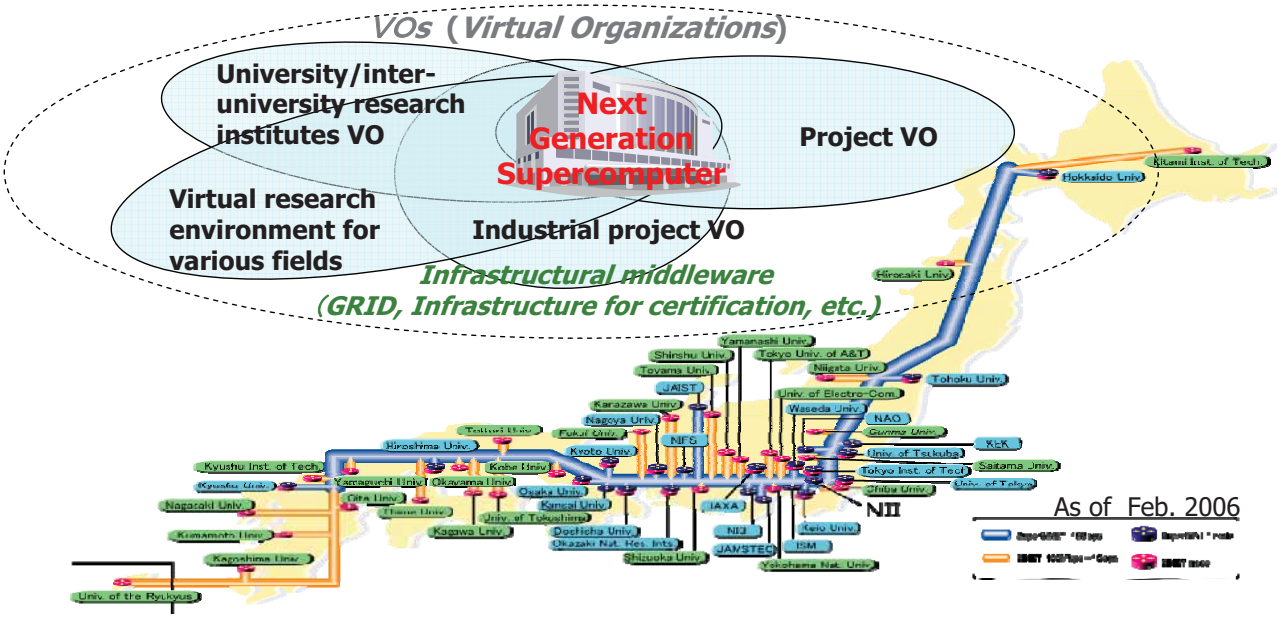
Location of the supercomputer site, Kobe-City

450km (280miles)
west from Tokyo



Artists' image of a building

Relations to other supercomputer centers

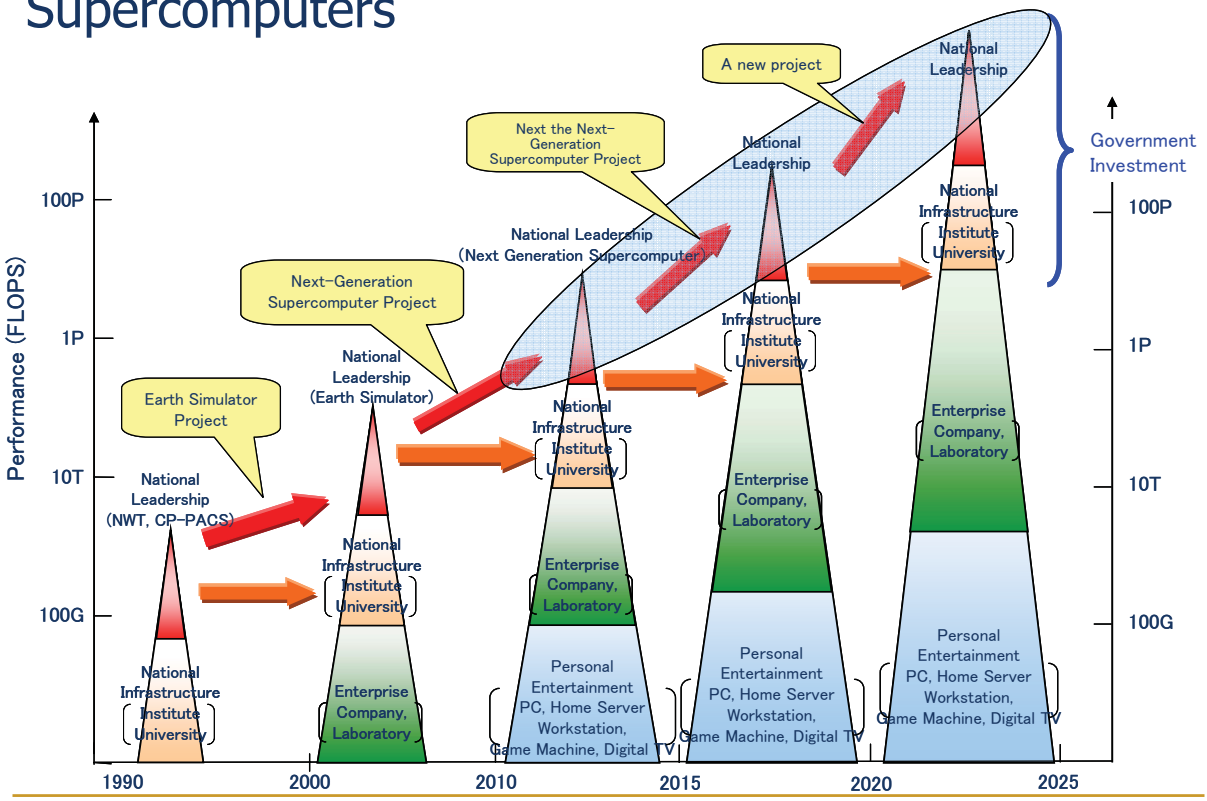


Cyber Science Infrastructure Plan (CSI) proposed by National Institute of Informatics (NII)

Promotion program of supercomputing to Industries

- Industrial Forum for supercomputing promotion was established in 2005.
- More than 160 companies from various industries are participated in.
- Activities
  - Discussion on how to use the next-generation supercomputer
  - Seminars for promotion and training
  - Simulations of car engines and bodies, material and polymer, weather, etc. on current supercomputers

MEXT's Vision for Continuous Development of Supercomputers



Concluding Remarks

- Science and technology of the 21st century must tackle difficult and complicated problems for human survival and for the future of the Earth.
- Integration of sciences that transcends the boundaries of different fields, development of new sciences, and innovation are required.
- Therefore, it is indispensable to promote supercomputing technologies capable of over peta-scale computing by working in cooperation with computational science and computer science areas.