

Sustainable Society and ICT

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Equation for Sustainability of Humankind

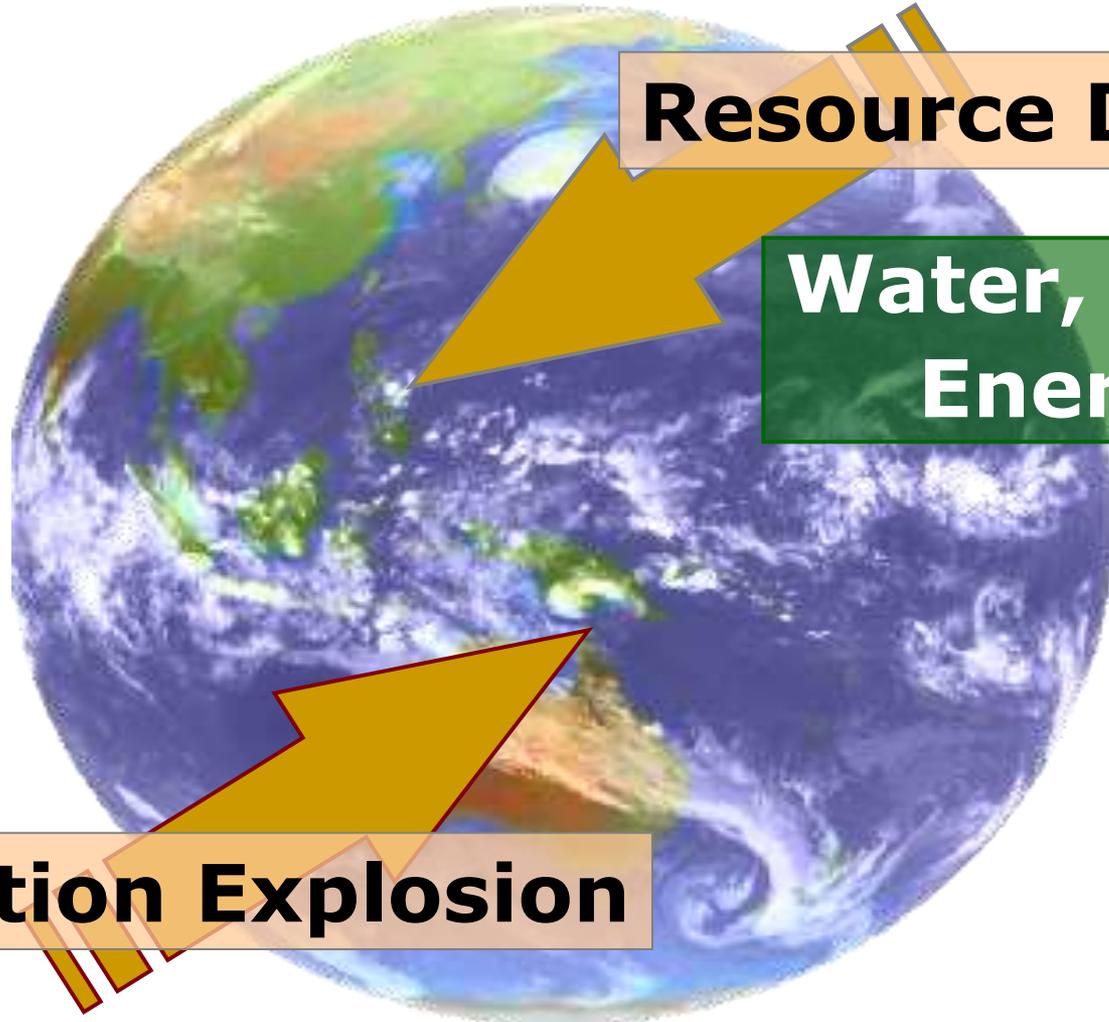
$$\text{Population} \times \text{QOL (Quality of Life)} \\ = \text{Resource} \times \text{Production Efficiency}$$

Resource: food, energy, and water

- Efficient use of limited resources
- Appropriate living standard
- Redefinition of “Happiness”

Limits to Growth

The Earth is too small for us



Resource Depletion

**Water, Food,
Energy**

Population Explosion

Resource Constraints

Water, Food and Energy A Matter of National Security

- 20th Century: wars about oil
- 21st Century: wars over water

The word "**rival**" comes from
"people sharing the same **river**"

Water: The Ultimate Resource

- Water: essential for food production
 - Securing Water needs Energy
- Deforestation and Desertification
 - Depleting Water resources
- Water makes Alliances

After the Great East Japan Earthquake

Fukushima has changed the energy policy planning

- Renewable Energy
 - Insufficient to replace conventional energy (for now)
 - Increased use of renewable energy (in the long run)
- LNG-fueled power generation
 - Complements renewables
- Demand-Supply adjustment and Peak-shifting
 - New market mechanism – dynamic pricing
 - Smart Grid, Smart Meter
 - Electricity Storage

Peak Shifting – smarter use

- Top 10% of Generator Capacity Works for only 2% of total annual hours
- can't fully rely on renewable energy
 - California Heat Wave: once in 50 years (2006)
only 5% of Wind Turbines were available
- Dynamic Pricing
 - Fixed Pricing: no incentive
 - TOU (Time of Use) Pricing: not effective enough
 - CPP (Critical Peak Pricing): cuts peak demand by 15~20%

A Rich Portfolio of Renewable Energy Sources

Locavore Energy System



Wind



Solar



Geo-
Thermal



Biomass

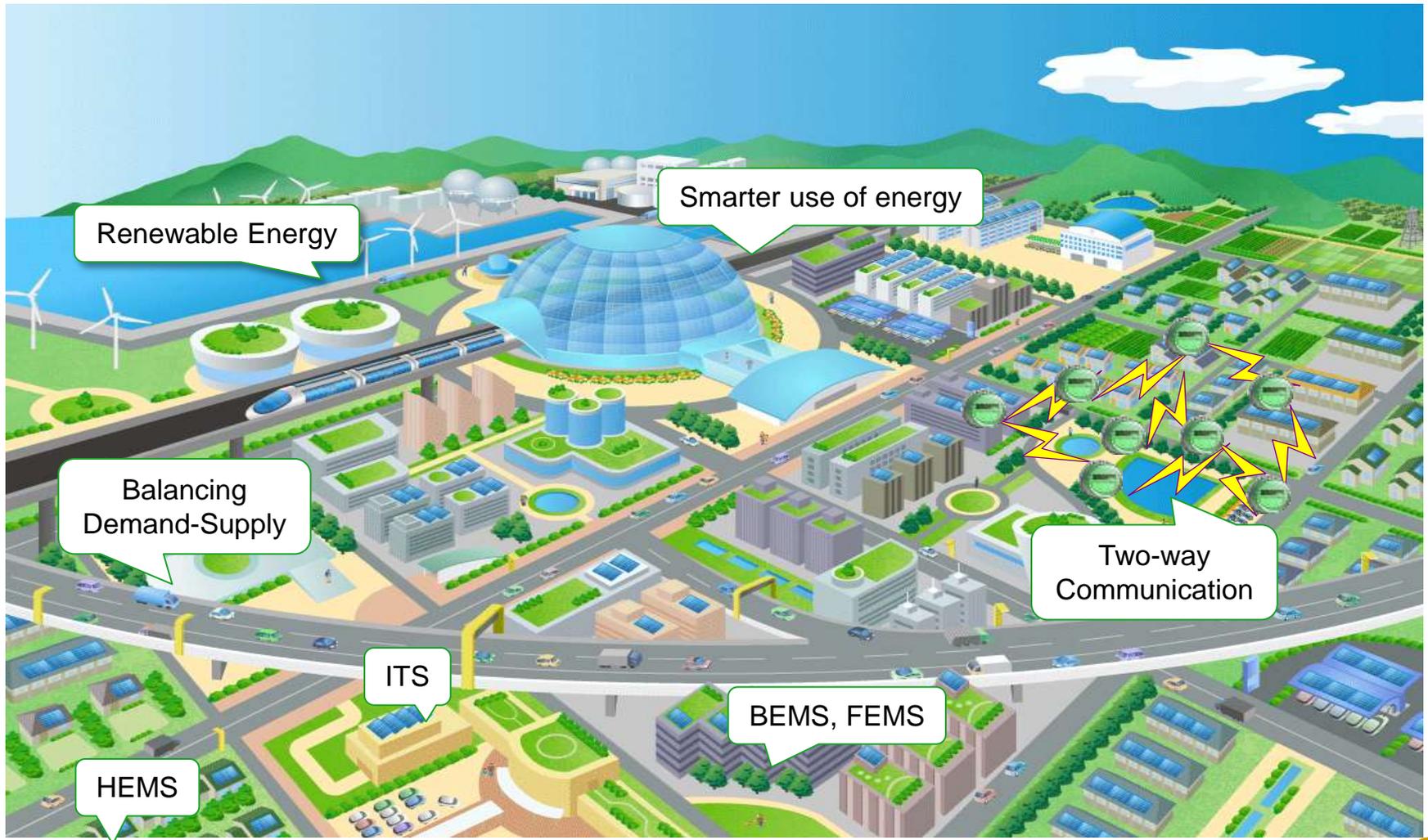


Small
Hydro



Pumped
Hydro

Toward A Sustainable and Eco-friendly Community



Through the Great Earthquake

from "Me" to "We"

- "Mutual Help" gathers momentum
 - Can't count on Public Help
- Community Awareness
- Changes in Value Systems



Clouds Have Proven To Be Useful

- Disaster Relief & Emergency Assist.
 - Properly matching needs with supplies
- Home Health Care - for Senior Citizens
 - Info.-sharing: Doctors, nurses and care-workers
- Pets Rescue and Support

Crowds and Clouds

- Power of Crowds (collective intelligence)
 - Crowd Sourcing – Wikipedia, InnoCentive
 - Social Marketing – Twitter, Facebook
 - Human: Wisdom, Sensitivity, Values
- Cloud Computing empowers Crowds
 - Cloud – a new “Collaboration Framework”
 - A new style of relationship among people

Breaking Through Resource Constraints

The Role of Supercomputing

- Energy
- Rare Earth Elements Substitute
- Drug Discovery



For Our Future We Can't Count On Luck

The Third Pillar of Science **Simulation**

Supercomputers enhance our ability

Common Stories of Nobel Laureates

1. Long, unrelenting efforts
2. Serendipity
3. Notice unusual phenomena and delve deep into them

Tackling Complex Challenges

Cross-disciplinary, Multi-scale

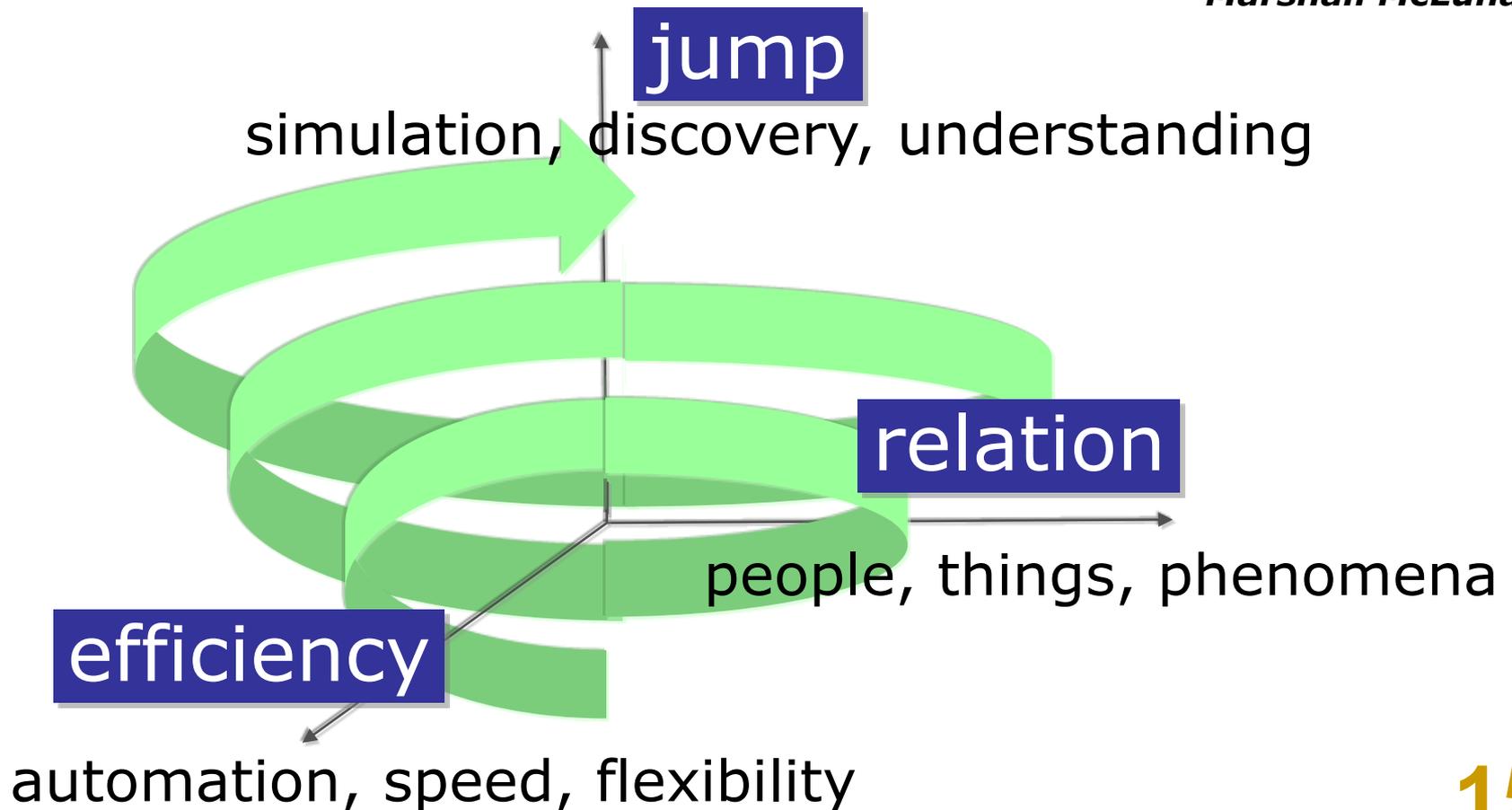
**Cooperation between
a wide range of experts**

- Fields of expertise:
 - becoming more advanced and narrow
 - loss of overall picture
- Complex phenomena
 - Understanding from an overall perspective
- Integrated Simulation:
 - New form for research and experimentation
- Advanced R&D Platforms
 - Next-Generation Supercomputer Facilities

The Role of ICT

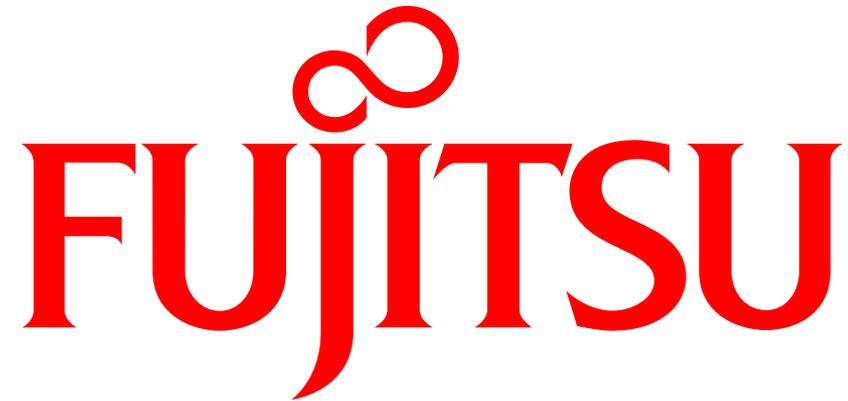
**“We shape our tools
and thereafter they shape us.”**

- *Marshall McLuhan*



For The Future We Want





shaping tomorrow with you