Using Roadmapping to Drive Collaborative Innovation

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THE INSTITUTE FOR TRIPLE HELIX INNOVATION

Key Points

How can you measure innovation if you don't know where you're going?

- **Roadmaps and Roadmapping**
  - Roadmap objectives and purposes
  - A common planning framework
- **Roadmapping for Collaborative Innovation**
  - International Technology Roadmap for Semiconductors (ITRS)
  - METI's Strategic Technology Roadmapping Initiative (Japan)
  - Malaria Vaccine Roadmap

Roadmaps and Roadmapping

A Roadmap

- is the view of a group of how to get where they want to go, or achieve their desired objective. (*Discipline*)
- helps the group make sure the capabilities to achieve their objective are in place at the time needed. (*Focus*)

Roadmapping

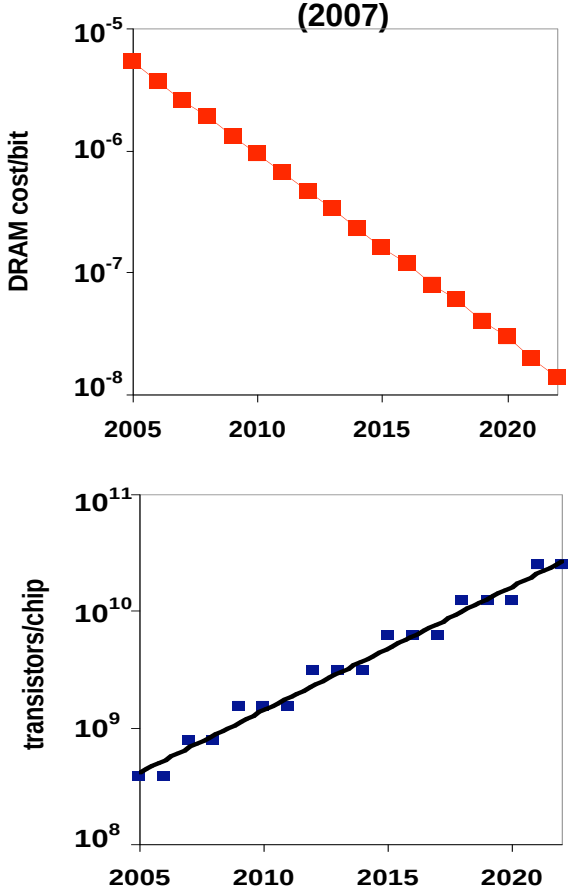
- is a *Learning* process for the group.
- is a *Communication* tool for the group.

The learning and communication benefits of the roadmapping process are as important as the roadmap document that results.

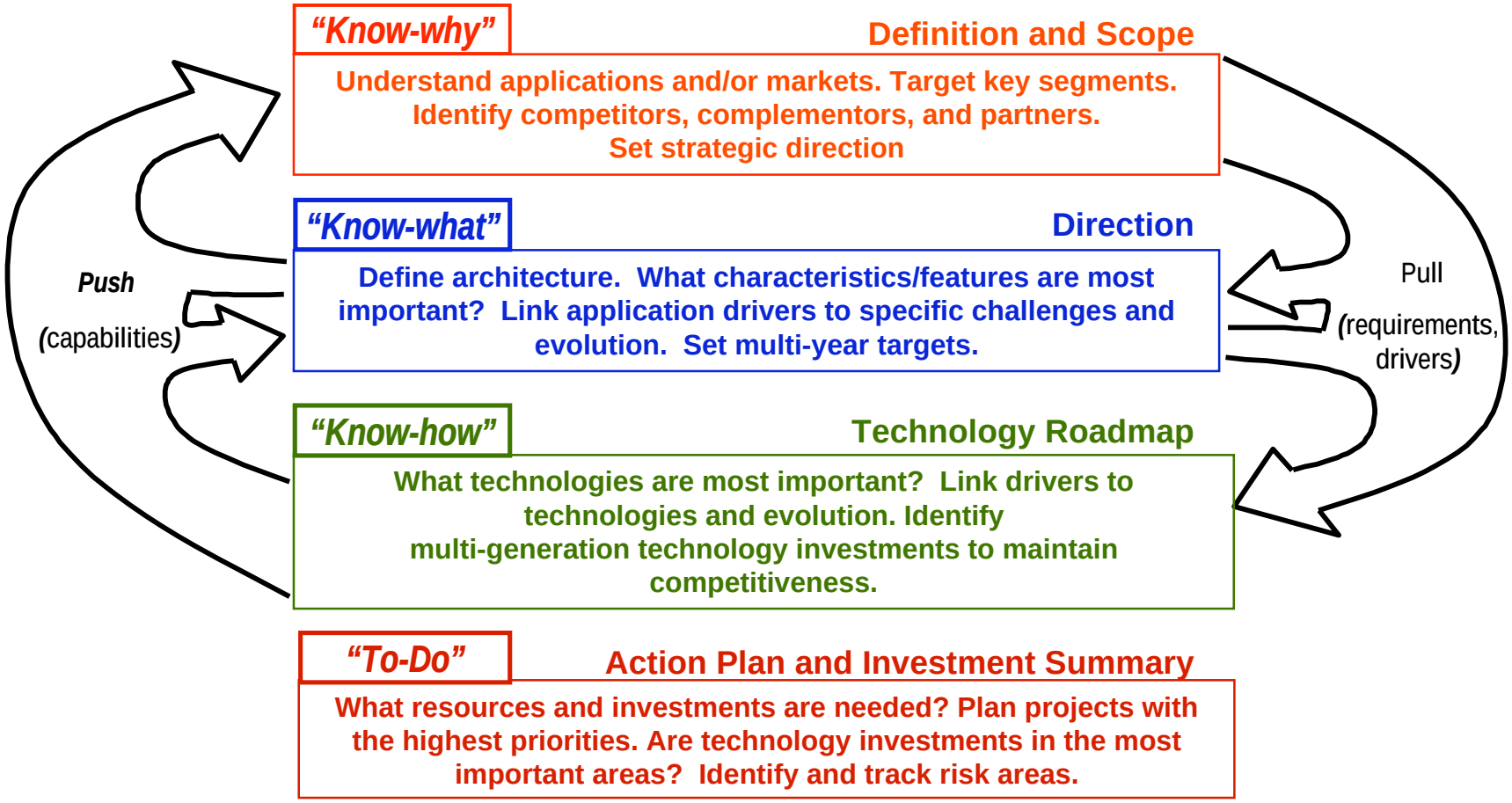
Many Roadmapping Objectives

Roadmap Types	Examples:
Science and Technology • **Identify or Set Research Agenda** • **Technology Assessment**	• Malaria Vaccine Roadmap • Quantum Computing Roadmap • Structure and Evolution of the Universe: Beyond Einstein Roadmap (NASA)
Industry and Government • **Set Industry Direction** • **Coordinate Execution**	• International Technology Roadmap for Semiconductors (ITRS) • US Dept. of Energy – Industries of the Future: Aluminum, Glass, Steel, … • Japan Strategic Technology Roadmaps for National Innovation System (METI & NEDO)
Corporate/Organization • **Set and Monitor Direction** • **Coordinate Execution** • **Manage Portfolios**	• Value Creation (Strategy) Roadmaps • Product-Technology and Platform Roadmaps • Service Capability Roadmaps • Manufacturing Roadmaps

The International Technology Roadmap for Semiconductors (2007)

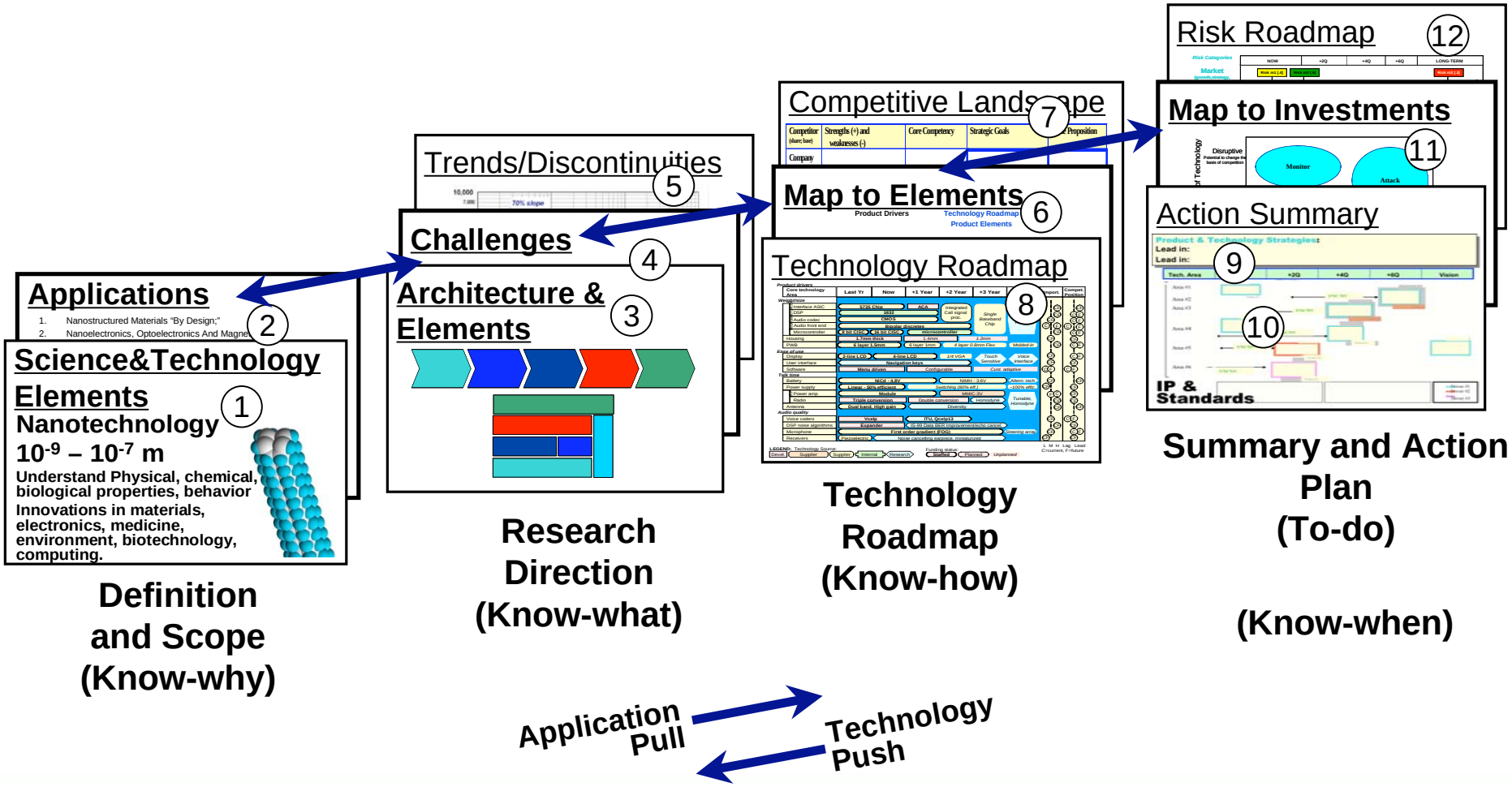


Roadmap Planning in Four Steps



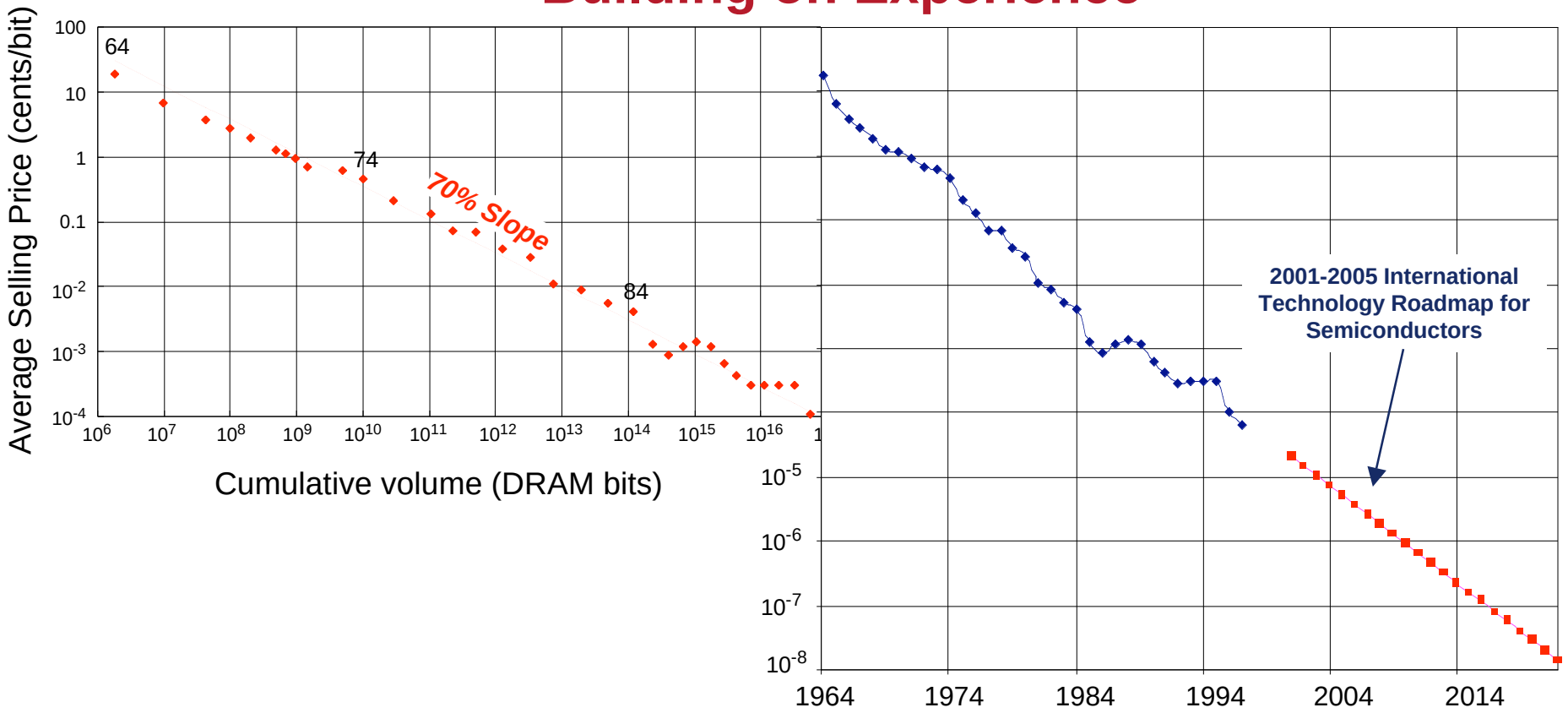
(Sources: Tom Kappel; Phaal, R., Farrukh, C., and Probert, D., Fast-start Technology Roadmapping; Richard Albright.)

Science and Technology Roadmap



International Semiconductor Technology Roadmap

Building on Experience



- Repeated, significant changes in product and technology
- Semiconductor Roadmap coordinates many industry players, driving “Moore’s Law”

http://www.itrs.net/

Japan's Strategic Technology Roadmaps

Collaboration for Economic Development

Leadership METI (Ministry of Economy, Trade and Industry)

Participation Government, Industry, Academia

Challenges

1. To maintain international competitiveness under growing economies in the world
2. To achieve sustained economy with sustainable environment
3. To supply sufficient human resources under the predicted decrease in population

Purposes

1. Seeks public understanding by providing an explanation of the perspective, details, and achievements of METI's R&D investments
2. Understands technological and market trends, prioritizes critical technologies, and develops policy infrastructure for planning R&D projects
3. Promotes cross-field and cross-industrial alliances, technology fusion, and coordinated implementation of relevant policies
4. Assembles the comprehensive strength of industry, academia, and public institution

http://www.meti.go.jp/report/data/g50330bj.html

Japan's Strategic Technology Roadmaps

Roadmapping Areas

Information and Communications

1. Semi-conductors,
2. Storage and non-volatile memory,
3. Computers,
4. Networks,
5. Usability (e.g. displays),
6. Software

Life Science

1. Drug discovery,
2. Diagnostic and Treatment equipment,
3. Regenerative medicine

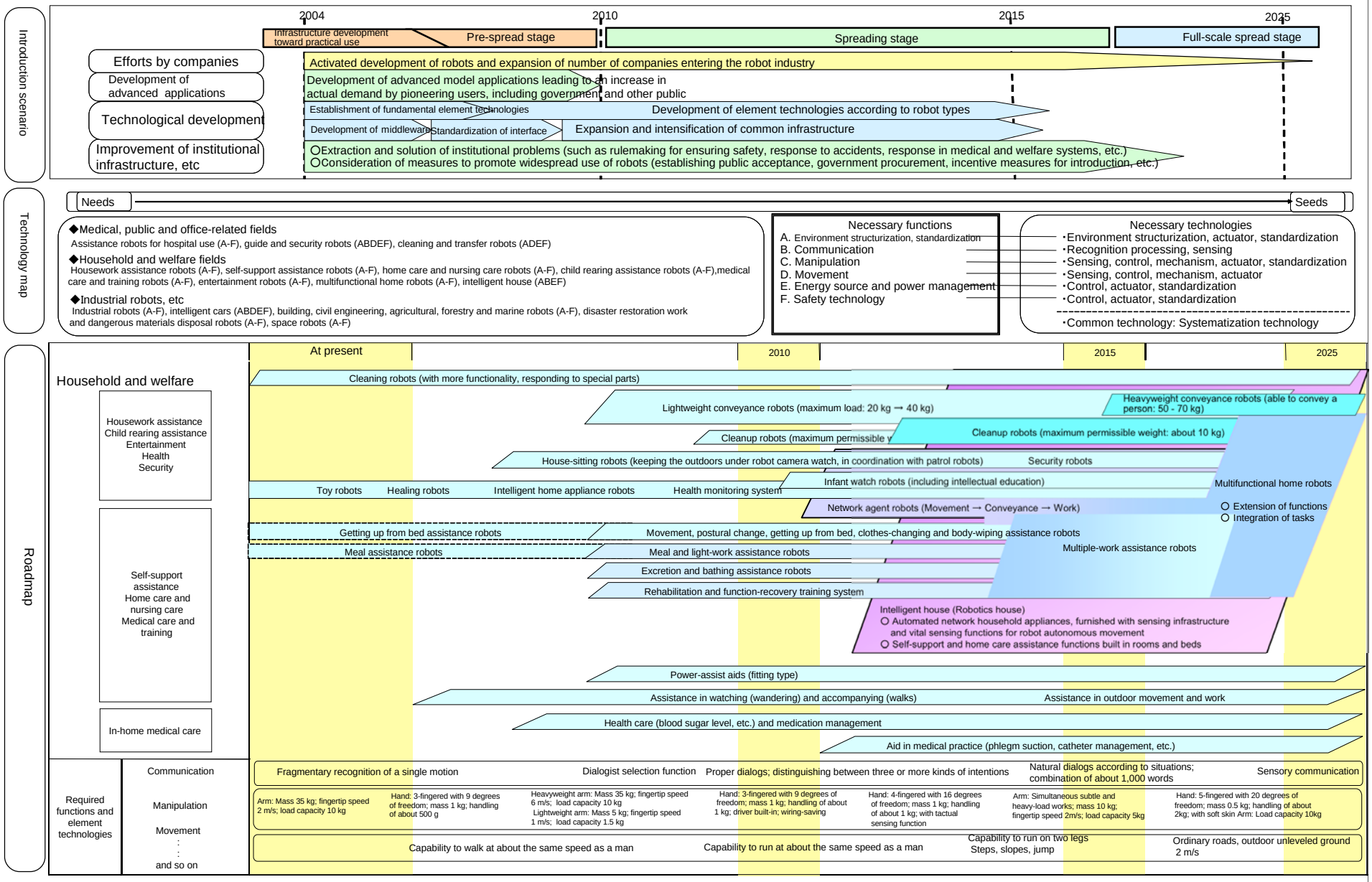
Environment and Energy

1. Carbon dioxide capture and storage,
2. Reduction of CFC and development of CFC substitutes,
3. Comprehensive control of chemical substances,
4. 3Rs (Reduce, Reuse and Recycle),
5. Energy (under development)

Manufacturing

1. Robots,
2. Aircrafts,
3. Space,
4. Nanotechnology,
5. Materials and components,
6. MEMS (Micro-Electro Mechanical System),
7. Green Bio (Biotechnology for environmental improvement and fine materials production)

Field of robotics Image of robots in and after 10 to 20 years



Malaria Vaccine Roadmap

Coordinating Research Direction

Leadership Malaria Vaccine Initiative (Gates Foundation) and other Funders.

Global Ownership More than 230 people representing more than 100 organizations in 35 countries provided their input.

Vision The malaria vaccine community will develop an effective vaccine that prevents severe disease and death caused by Plasmodium falciparum malaria in children under five in sub-Saharan Africa and other highly endemic regions. Efficient global coordination and collaboration will stimulate the malaria vaccine pipeline and accelerate progress towards this achievement.

Landmark By 2015, develop and license a first generation malaria vaccine that has a protective efficacy of more than 50% against severe disease and death and lasts longer than one year.

Strategic Goal By 2025, develop and license a malaria vaccine that has a protective efficacy of more than 80% against clinical disease and lasts longer than four years.

http://www.malariavaccineroadmap.net

Summary

Roadmapping:

Discipline & Focus

Learning & Communications

Roadmapping: To Learn More

- *Research and Technology Management* special sections on roadmapping:
  - March-April 2003, Vol. 46 No. 2, 26 – 59
  - March-April 2004, Vol. 47 No. 2, 25 – 57
- *Technological Forecasting and Social Change* special issue:
  - "Roadmapping: From Sustainable to Disruptive Technologies," Volume 71, Issues 1-2, (January - February 2004)

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- Mapping Tools
  - "Product and Technology Mapping Tools for Planning and Portfolio Decision Making," Albright and Nelson, *PDMA Toolbook for New Product Development II*, John Wiley & Sons, October, 2004.
- Key Papers
  - Willyard, C.H., and McClees, C.W.: Motorola's technology roadmapping process, Research Management, Sept.-Oct., 13-19 (1987).
  - Groenveld, P.: Roadmapping integrates business and technology, Research Technology Management, Sept-Oct., 48-55 (1997).
  - T. Kappel, "Perspectives on roadmaps, How organizations talk about the future," Journal of Product Innovation Management, V18 (2001) p 39-50.
  - R. Kostoff and R. Schaller, "Science and Technology Roadmaps," IEEE Transactions on Engineering Management, VOL. 48, NO. 2, May 2001.
  - R. E. Albright, Roadmapping for Global Platform Products, Product Development and Management Association Visions Magazine, Vol. 26 No. 4, pgs. 19 – 22, October, 2002.
  - R. E. Albright, "Roadmapping Convergence," in Managing Nano-Bio-Info-Cogno Innovations: Converging Technologies in Society, W. S. Bainbridge and M. C. Roco, eds., Springer, 2006. On applying roadmapping to converging technologies: nanotechnology, biotechnology, information technology, cognitive science.
  - Philip J. Whalen, Strategic and Technology Planning on a Roadmapping Foundation, Research and Technology Management, Volume 50 Number 3, May 2007
  - Raymond R. Cosner; E. Jefferson Hynds; Alan R. Fusfeld; Carl V. Loweth; Charles Scouten; Richard Albright, Integrating Roadmapping Into Technical Planning, Research and Technology Management, Volume 50 Number 6, November, 2007.
  - Pieter Groenveld, Roadmapping Integrates Business and Technology, Research and Technology Management, Volume 50 Number 6, November, 2007 (reprint and update of an earlier paper).
  - Yuya Kajikawa, Osamu Usui, Kazuaki Hakata, Yuko Yasunaga and Katsumori Matsushima, Structure of knowledge in the science and technology roadmaps, Technological Forecasting and Social Change, Volume 75, Issue 1, (January 2008), Pages 1-11

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