



The Key to Success in the Nanotechnology Business

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14 years since the boom – The future direction of nanotech

- ◆ January 2000 – NNI in the US sparks the boom
 - ◆ 2001 – The start of the nanotech boom in Japan
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- ◆ 2001–2006 The dream of nanotech
 - ◆ 2007–2013 The challenging period of nanotech
 - ◆ 2014– The real business of nanotech



The dream of nanotech (2001–2006)

- ◆ Nanotech to change the world
 - ◆ The US promoted nanotech as a symbol of the resurgence of the manufacturing industry
 - ◆ CNT, fullerene, self-assembly, etc. become the stars of nanotech
 - ◆ In Japan, “1,000 university-based startups” plan becomes the engine of growth, and venture capital becomes the fuel



The challenging period of nanotech (2007–2013)

- ◆ Nanotech wakes up from the dream
 - ◆ Bankruptcy of Lehman Brothers in 2008 → Crisis in Greece and the Middle East in 2010 → The Great East Japan Earthquake in 2011 → Crisis in the EU and strong yen in 2012
 - ◆ The enthusiasm of major enterprises shrinks
 - ◆ Nanotech startups' chances of making profits fade away
 - ◆ Venture capital is frozen
 - ◆ Nanotech firms take a hit and go through downsizing



The real business of nanotech (2014–)

- ◆ Amidst downsizing, nanotech firms become aware of their mission
 - Core competencies (real strengths)
 - Positioning (where to make money)
 - Business models (how to make money)

- ◆ Nanotech moves closer to people's needs
 - From technology development to solution development
 - From “mastering technology” to “combining technology”



Aiming for a “5-1” business

Creating nanotech products that achieve 500 million yen in sales and 100 million yen in business profits

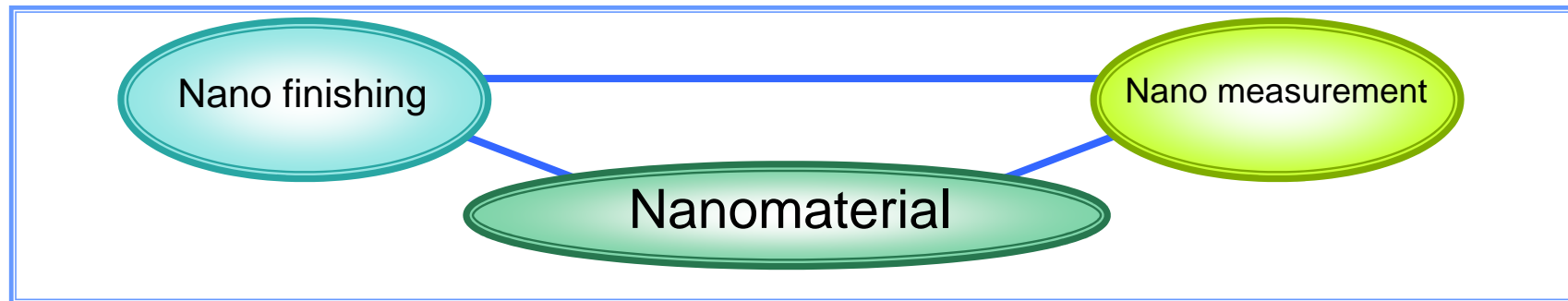
- High-performance nanomaterial
- Photonic crystal
- Nano surface finishing/decoration
- Nanocoating
- Advanced medical materials
- Nanoimprint
- Biochemistry
- Nano inkjet
- MEMS/NEMS
- High-speed AFM



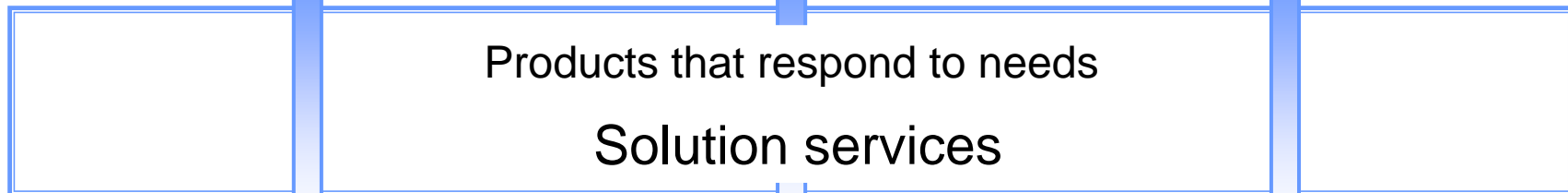
Structure of a business that moves closer to people's needs

- Capture needs directly
- What should be provided are solutions

Nanotech



Solutions



Customer needs





Structure of a business that moves closer to people's needs

<Case Study> SCIVAX

- Nanoimprint started as an alternative technology for semiconductor lithography.
- Our company responded by contracting the production of prototypes from clients and pulled in various needs for nanoimprint.
- As a result, we discovered that there was high demand for technologies to deal with enlargement and curved surfaces even in cases where requirements for precision were not very rigorous. By developing technologies to meet those needs, we are succeeding in developing new solutions.
- At present, we have procured a total of 1 billion yen from the Innovation Network Corporation of Japan and other sources and are moving to volume production.



Business models based on “wisdom”

- ◆ Source of profits can be found in “wisdom”
 - Building wisdom-led business models
 - Utilizing partners for production, sales and capital

<Case Study> NanoCarrier

- As a pioneer of micellar nanoparticles technology, NanoCarrier was established as a medical product development company utilizing drug delivery systems. In 2009, it was listed on the TSE Mothers market.
- The source of the company’s technology is research by world-class researchers, Professor Kazunori Kataoka of the University of Tokyo and Professor Teruo Okano of Tokyo Women's Medical University.
- NanoCarrier has reduced clinical trial costs of drug development through tie-ups with major corporations including Nippon Kayaku and Kowa.
- In the area of medical material development, the company has capital tie-ups and conducts joint development with Shin-Etsu Chemical.



From individual commissioned production to a mass production system

- ◆ A mass production system based on “wisdom”
 - Bringing in production technology professionals at an early stage
 - Expanding the target market: Needs of developers → Needs of producers → Needs of consumers

<Case Study> Photonic Lattice

- A company established with “photonic crystal” technology developed by Professor Shojiro Kawakami of Tohoku University as its core technology.
- The company develops and manufactures double refraction·phase difference evaluation systems, polarization cameras and photonic crystal elements.
- Previously, photonic crystal slabs were fabricated using electron beam lithography and as each slab was created individually, it was extremely costly.
- The company introduced a production system using nanoimprint technology instead of lithography to cut costs substantially and succeeded in moving to volume production system.



Cultivating markets globally

◆ Nanotech moves into the global market

- Making nanotech into products that can't be found anywhere else in the world
- Aiming for sales in the global market from the startup stage

<Case Study> Research Institute of Biomolecule Metrology

- In the 1990s, the company was founded on technology developed in the Biomolecule Visualization Project at the Joint Research Center for Atom Technology (JRCAT) in the former Agency of Industrial Science and Technology (the present Advanced Industrial Science and Technology: AIST). It successfully developed the High-Speed Atomic Force Microscope (HS-AFM), which produces topographical video images at a rate of 20 frames per second (those by other companies produce a single image in about 2-3 seconds).
- The technology allows the movements of antibodies and DNA to be observed in real time and is evaluated highly by researchers in the field of pharmaceutical development and biotechnology.
- Since its release, the HS-AFM was first sold in Europe and the United States. Later, as its reliability became widely known, it was introduced to leading research institutions and universities in Japan.
- At present, the product is being improved and the company is collaborating with a major measurement instruments manufacturer in preparation for volume production.



Aiming to create an industry

- ◆ Replacing an industry vs. creating a new industry
 - Realizing dramatically improved cost performance
 - Creating new value