How to Succeed in Nano-Medicine with Corporate Relationships

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Outline

- Introduction of Nanotechnology
- Silicon Valley Successes (Computers)
- BD Cell Analysis History, the working of a unit in a large Corporation
- BD Cell Analysis Technology Sourcing
- Small Company Examples
- Other Human Factors (Rainforest & xTreme Innovation)
- Recommendations & Conclusion

This presentation is based on my personal thoughts, based on experience in several corporate environments. All of the information is in the public domain.

Nanotechnology Applications

- In-vitro Diagnostics
- In-vivo Imaging
- Drug Delivery
- Cell Separation for Cell Therapy
- Biomaterials

- Many Direct Consumer Market Applications
    - Cosmetics
    - Fuel Additives
    - …

Nanotechnology Industry Examples

- Nanosys
- Nanoplex / Oxonica
- nanoComposix
- NanoGate
- Cerax NanoWax
- BD
- Life Technologies

Nanosys

http://www.nanosysinc.com/

Nanosys is a nanotechnology company located in Milpitas, California founded in 2001. Nanosys, Inc designs products based on a technology platform that incorporates high performance inorganic nanostructures. Wikipedia

What We Do

Nanosys is an advanced materials architect. We design and build new materials at the molecular level to improve LCD color performance and battery storage capacity. Our solutions enable stand-out electronic products using known, viable manufacturing processes. Our Quantum Dot Enhancement Film, or QDEF, creates a visual experience that comes alive for the viewer, with deep blues, vivid reds and true greens. Our SiNANOde battery anode material has unlocked generation-leaping advancements in lithium ion batteries.

QDEF can increase the color performance of LCD displays by 50% or more.
Learn more...

By adding SiNANOde directly to their batteries, manufacturers can double the performance of today's best lithium ion batteries.

Nanotechnology at Lockheed-Martin

Lockheed Martin Achieves Patent for Perforene™ Filtration Solution, Moves Closer to Affordable Water Desalination

Lockheed Martin and Nanyang Technological University to Collaborate on Nanotechnology

Lockheed Martin Tests Carbon Nanotube-based Memory Devices on NASA Shuttle Mission

Lockheed Martin Advanced Technology Center Develops Revolutionary Nanotechnology Copper Solder

New Research partnership launched into quantum and nanotechnologies

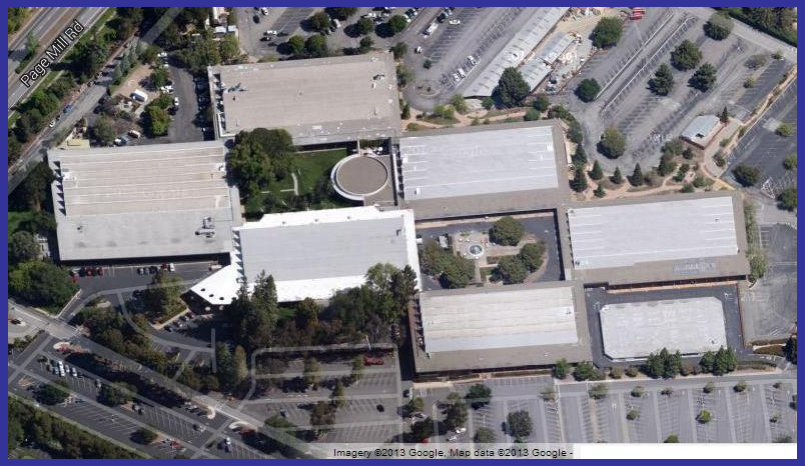
http://www.lockheedmartin.com/us/what-we-do/emerging/nanotechnology.html

NanoMedicine

- GSK (therapeutics, Nanobio emulsions to treat infectious disease)
- Pfizer (therapeutics, BIND drug targeting)
- Amgen (therapeutics, BIND drug targeting)
- Lateral flow assays (colloidal gold)
- Life Technologies (Quantum Dots)
- BD (diagnostics, SERS nanoparticles)

Silicon Valley
An encouraging example

- 1957 Fairchild Semiconductor (Stanford, Terman)
  - Intel, AMD, National Semiconductor
- 1938 Hewlett Packard
- 1976 Apple Computers
- 1994 Netscape
- 1998 Google
- 2001 Nanosys
- 2002 Nanoplex



History of BD Biosciences Cell Analysis

- A rare internal startup, supported by the corporate President/ CEO Jack Howe
- Aggressive internal development and in-licensing of science and technology early
- Mostly internal product development next
- Additional increase of revenues through acquisitions of companies with substantial sales volume.

BDIS History 1973 - 1980.

BD starts a new business with innovation out of academia.

1973 BD Intrapreneur Bernie Shoor begins to develop FACS technology, working with Dr. Len Herzenberg, professor of genetics at Stanford University, under a licensing agreement with the university.

1976 BD starts producing the world's first FACS system. It immediately revolutionizes cell analysis, and contributes to the genomics revolution.

1979 Based on input from Len Herzenberg, Bernie Shoor establishes the Monoclonal Center. He recruits Noel Warner to form the core research group for BDIS. Grounded in basic human immunology research, Noel's team of scientists investigates the diagnostic and therapeutic use of monoclonal antibodies.

BDIS History 1981 – 1990

Growth through more academia input and internal work.

1983 In collaboration with Stanford and UC Berkeley BD develops reagents for multi-color immuno-fluorescence analysis (phycobiliprotein labels and tandems) for multi-parameter flow cytometry.

1985 BD introduces the FACScan three-color flow cytometer.

1987 In collaboration with UCSB BD works on PerCP as a fluorescent label.

1990s BD continues the development of clinical cytometry applications with automated analysis algorithms (Multi-set, FACSCount)

2002to 2004 BD introduces a record number of new instrument products for clinical and research uses into the market (LSR-II, Imagn, FACSAria, FACSArray, SPA, LWA, FACSCanto).

BDIS History 2000 – 2012

BD continues to strengthen it's position in cytometry.

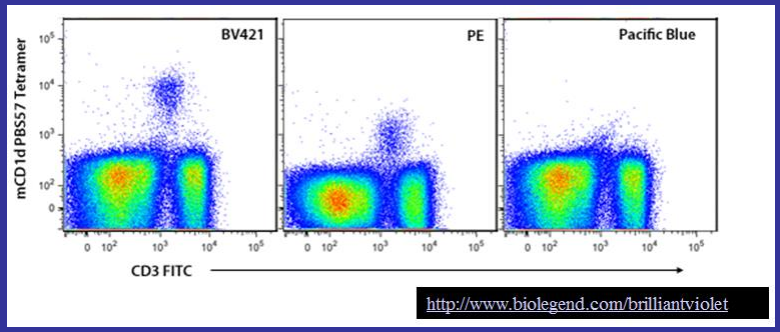
2006 The FACSCanto II is released.

2009 BD acquires Cytopeia, the developer of a high end droplet-technology cell sorter.

2011 BD acquires Accuri, the developer of a moderate-cost easy-to-use flow cytometer.

BD announces the advanced FACSVerse flow cytometer.

2012 BD acquires Sirigen, a developer of high brightness polymer dyes.



Technology/Product Sourcing Process in Established Companies

- University Licensing Offices
- Small company input
- Patent Databases (e.g. USPTO, Delphion)
- Scientific Literature (Google Scholar, Medline)
- Conferences
- Personal Networks

Considerations for Adding New Technology or Products

- Fit with Strategy
- Freedom to Operate (IP landscape)
- Size of Opportunity

The revenue level required from a new product line changes with the size of the company. Growth rates of 5%-10% are expected. Therefore a $1M platform product addition is not interesting for a company with $1B in yearly sales. There is a difference between large system products and consumables e.g. monoclonal antibodies.

Successful Newer Nano- and Bio-Businesses

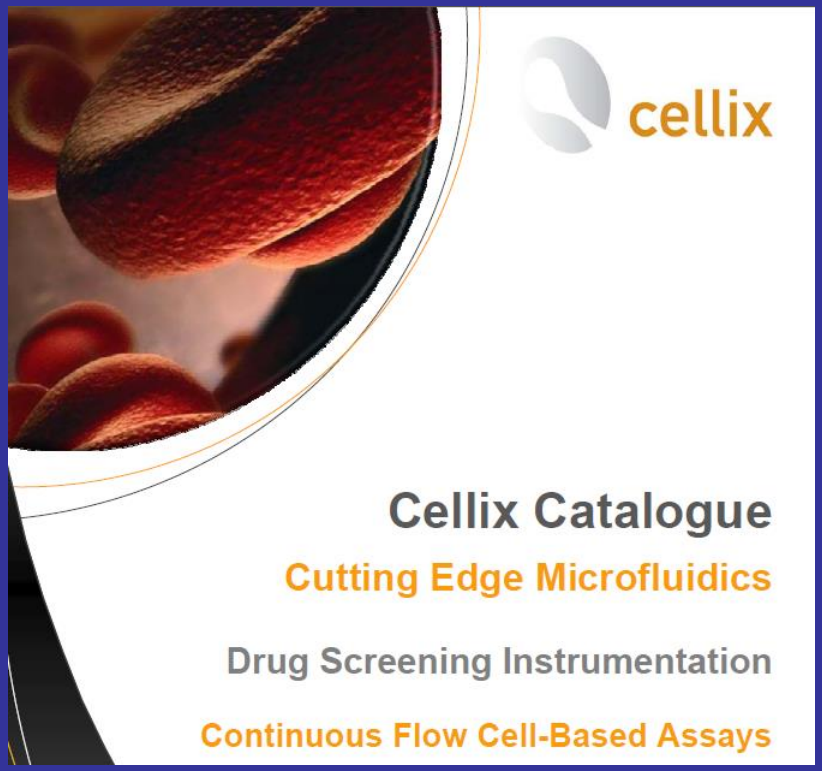
- Nanoplex / Oxonica (BD, ...)
- Miltenyi Biotech
- Radisens
- Cellix
- Pharmingen (BD)
- Guava (Millipore/ EMD Merck)
- Accuri (BD)

Cellix

Cellix develops, manufactures and sells micro-fluidic pumping solutions, consumable biochips, software and automated solutions for applications in cell biology, microfluidics and nanofluidics, physics, chemistry, cell and particle studies. Customers include biology laboratories in academia, government and the pharmaceutical and biotechnology industry worldwide.

Stemming from a collaborative partnership between the Department of Physics and Clinical Medicine at Trinity College Dublin, Cellix was incorporated by co-founders Vivienne Williams, Dmitry Kashanin and Igor Shvets.

Cellix is pleased to acknowledge the support of the following investors: Investec Ventures, OTC Asset Management and Enterprise Ireland.



https://www.ieda.co.jp

Radisens

Radisens was founded in 2009, to develop an integrated blood testing device for the physician office, replacing the 10-12 different instruments otherwise required. Such level of integration is realized by a combination of proprietary advances across assay development, centrifugal microfluidics, micro-cytometer detection and manufacturing process development. Strong support was obtained from Enterprise Ireland, City Enterprise Board, and The Rubicon Centre incubating the company throughout its early startup phase.

(kindly provided by Radisens CEO Jerry O'Brien)

Examples of Sources of Support for Product Innovation

Funding

- SFI (funding for public institutions)
- Enterprise Ireland
- European Union e.g. FP7 > Horizon 2020
- Private Funding

Technology and Advice

- Center for Nanohealth, Swansea U
- Trinity College Dublin
- Dublin City University, BDI
- University College Dublin

Recommendations
Interaction with large Corporations

- Build local critical mass in a nanotechnology area enhanced by external collaborations to create value for a partner
- Understand the business development processes of target companies
- Build specific business value to attract attention
- Take advantage of non-monetary support for technology evaluation and further technology development

Human Aspects

The Rainforest

Break rules and dream

Open doors and listen

Trust and be trusted

Experiment and iterate together

Seek fairness, and not advantage

Err, fail, and persist

Have a bias towards action

Pay it forward

From V.W.Hwang, The RAINFOREST Blueprint

Xtreme Innovation

Innovators *over* Ideas
Do *over* Talk
Take over Ask
Commitment *over* Committees
200% *over* 20%
Why not? *over* Why?
***Pre*totype** *before you* *Product*type

Don't finish what you've started.
Failure is an option.
Reinvent the wheel.
The more the messier.

Details at: http://www.albertosavoia.com/

Increasing the Likelihood for Success

- Have passion for what you are doing
- Be amongst the best in your field, get excellent people to help
- Network, network, network, …
- Focus on a well prepared business plan, but adjust as real opportunities arise or the environment changes
- Connect with large corporations in your fields to learn about needs in the market and potential for collaboration.
- Learn about the requirements of your corporate contacts.
- Leverage endorsement of your science into public funding (SFI, Enterprise Ireland, Horizon 2020, SBIR, STTR)
- Assess outside input critically in the context of your business plan.
- Learn how to create (perceived by others) value for your business quickly.
- Do not give up easily, but be realistic in judging the value of your business.

Christopher Columbus, Example of an early Entrepreneur

(Columbus Day observed in the USA on Monday of this week)

Business Goal: Find an easier sea route to India

Approach: A successful business plan raised money from the Spanish Crown (Ferdinand and Isabella) after being turned down by Portugal to implement the plan

Result: The business plan had to be adjusted, because of failure to find the intended sea route, but discovering new lands became a large success.

Conclusions

There are many examples of successful businesses in biotechnology, based on the vision of a creative inventor and the work of skilled entrepreneurs.

Working on a strong network of experienced professionals is almost always needed for success.

Connecting early to large established companies in the target market increases the chances for success.

(Often the business plan has to be adjusted to a changed environmentor better insights.)

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