From Bench to Bedside & Market – A Researcher’s Perspective

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Long List of KPIs for the Researcher

- Publications – Journal papers; citation count; h-index
- Research grants
- PhD students trained
- International/National Research Awards
- Invited/Keynote/Plenary talks at major conferences
- Editorial Board membership of major journals
- Leadership in the professional or international community
- Invitations to serve on review panels and advisory boards
- “Success stories” highlighted in national & international media
- Patents/licensing/spin-off companies (last or least of all?)
Going beyond Just Publications: From Bench to Bedside/Market

Technologies developed on the bench can only make an impact when they move from the lab to the market.

Prototype (Bench) → Market Ready Product → Application (Bedside/Market)
Can an Academic/Researcher be an Entrepreneur?

- Among the many roles and responsibilities, can an academic/researcher also be an entrepreneur?
- The ANSWER is an absolute “YES”!
- It is possible to go beyond “Publish or Perish” and translate our scientific outcomes.
Many researchers are confused with the following:

- **Novelty**: Something new but may not be useful
- **Creation**: Something new and valuable but may lack utility
- **Invention**: Something new, having potential value through utility
- **Innovation**: Something new and uniquely useful

**Novelty does not equate to commercializability!**
My Own Entrepreneurial Experience

- Robust Dynamics (2000)
- Clearbridge NanoMedics Pte Ltd (2009)
- Clearbridge Biomedics Pte Ltd (2009)
- Clearbridge mFluidics Pte Ltd (2013)
- Incubator: Clearbridge Accelerator (2009)
Cancer & Circulating Tumor Cells (CTCs)

- One of the top killers in the industrialized world.
- One in three will develop cancer in their lifetime.
- Circulating tumor cells (CTCs) are cancer cells detached from primary tumor & released into bloodstream through metastasis.
- Metastasis is the main cause of cancer death.

JP Thiery, CT Lim, Cancer Cell, 2013.
CT Lim, D Hoon, Physics Today, 2014.
Tumor & Liquid Biopsies

Tumor Biopsy
- Invasive
- Painful
- Less frequent
- Tumor is heterogeneous, results depend on where we sample

Liquid Biopsy
- Less invasive
- Less painful
- Frequent
- Where tumor biopsy is not possible
- CTCs are heterogeneous but they are the important metastasizing ones

'Liquid biopsy' blood test can complement Tumor Biopsy and radically change cancer treatment.
Spiral CTChip®

CT Lim et al, Patented, 2011.
Spiral microfluidic Biochip

CT Lim et al, Patented, 2011.

“Everything Should Be Made as Simple as Possible, But Not Simpler.” Albert Einstein
CTCs for Targeted Therapy & Personalized Medicine

CTChip Technology

CTCs, plasma, ctDNAs, buffy coat

Genetic & molecular Analysis

FISH
qRT-PCR

Sequencing
Staining & Enumeration

Medical Report
Name: XXXXXXXX

XXXXX XXXX XXXX

XXXXX

XXXXX

XXX

XXX

XXXXX

CTC Analysis:
Cell Count XXX
Druggable Mutation – XXXX

XXXXX

XXXXX

Personalized treatment
NUS Startup

Milestones

– 2009 Company incorporation
– 2010 Incubation by Clearbridge Accelerator, Series Seed Financing
– 2011 TECS Proof-of-Value Grant, SPRING Singapore
– 2011 Series A Financing
– 2012 Launch of ClearCell CX system
– 2013 Series B
– 2014 ClearCell FX system achieves CE Mark
ClearCell FX System

- Clearbridge BioMedics is **ISO 13485 certified**
- **CE Mark approved in December 2013**
- BioChips manufactured in Singapore by a leading contract manufacturer

Automated system

1. Load BioChip cartridge
2. Load in/out tubes
3. Press “Go”
CTChip Users Network

- USA
- UK
- Asia - Singapore, China, Japan, Korea
- Australia
Selected Awards & Honors

- Invented in Singapore, CNA, 2016
- 60 Minutes, CBS TV News Show, 2014
- TIE50 Award (Top 50 startups), TIEcon 2014 (Silicon Valley)
- Hottest Startup in Singapore 2014
- BBC World News 2013
- 1st Prize: Asia Entrepreneurship Awards 2012 (Japan)
- President’s Technology Award 2011
- Rising Star Innovator Award, TechVenture 2011
- IES Prestigious Engineering Achievement Award 2010
A Multidisciplinary Effort

Engineers / researchers / Students

Clinicians & Oncologists

Patients / Users

Industrialists / Investors

Biologists

Government / Funding Bodies / Regulatory Agencies
What I have Learnt

• **Critical components**: good idea back up by solid research
• **Discernment** to know which research are most likely to be commercializable
• **WARNING**: Develop solution to a problem, not solution looking for a problem
• **Network**: know **who** to work with, **who** to seek help from & **who** to ask for money!
• **Communication**: Be able to communicate effectively across different disciplines as well as to both users and the business communities
What Not to Do

• Wear too many hats at the same time - Determine the role you want to play: CEO, CTO, scientific advisor or member of board of directors?

• Being detached from the startup & not maintaining the flow of information.

• Expecting this to be a quick route to riches!
For me as a Researcher ...

- Keep abreast of the most cutting edge research

- Enable me to think more broadly and creatively, and how to develop and transfer technology that could lead to new business opportunities

- Hone my presentation and negotiating skills

- Acquire ability to manage multiple teams and multi-task given limited time and resources

- Open new doors such as securing academic-industry funding, engage important collaborators, and access to new talents
How to Make a Real Impact

Use the **NABC** approach towards value creation. Example:

- **Need** – Better detection, diagnosis & real-time monitoring for cancer
- **Approach** – Liquid biopsy via our microfluidic biochip (potentially disruptive)
- **Benefits** – Less invasive & painful, real-time monitoring, cheaper, ease of use
- **Competition** – Ours is more sensitive, accurate, cheaper, easier to use than competition. Our technology has been patented.
How to Make a Real Impact

• Focus on tackling the most urgent societal challenges – aging population, urban sustainability, energy, water, healthcare.

• Will need researchers with the drive, passion and perseverance as well as technical know-how to turn discoveries into everyday realities.

"Genius (Innovation) is one percent inspiration and ninety-nine percent perspiration." - Thomas A. Edison

It’s not just about ideas. It’s about how to make them happen.
Thank You

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