Innovation?
Innovation.
Innovation!

“Game - changing ideas”

A personal perspective

Dietmar Winzker
PhD (Eng) UP
PhD (Eng Management) UJ
Introduction

A. What is Innovation?

B. Innovation Past and Present

C. Nurturing and Managing Innovation!
WHAT IS INNOVATION?

“The ability to see connections, spot opportunities and to take advantage”

It is not always clear if innovation describes the process, is inside a product or provides a method. Innovation can be a cause or an effect. Mostly it is a question of perspective.
What is Innovation?

- A new **idea**; original, more effective, categorically different
- Asking the right **questions** and suggesting answers
- A **radically** better solution, radically more effective process
- Creative **destruction** of the current situation
- An **Entrepreneurial** way of looking at processes, products, service delivery
- Opening previously unthinkable paths to new **possibilities**

Invention is the creative idea that leads to innovation
innovare – ‘make something new’

- Innovation and creativity is part of the essence of being human
- It is a discipline which can be learnt and practiced
- An innovative business lives and breathes outside the box
- It is not just good ideas but a combination of good ideas
- Being a good inventor is no guarantee for commercial success.
- The better mouse trap requires marketing, project management, distribution, organisational behaviour, training etc etc.
Innovation is mainly about THINKING, EVALUATING AND DOING

Not only about utilizing technical knowledge.......
Innovation is not an isolated concept. For example,

You cannot grow a business only by cost-reductions, efficiency and product improvements, important as that may be.

Innovation is an integrated part of a business in terms of technology, economy, politics, education, community, company and national culture and others involving many different stakeholders at different levels and in diverse contexts.
“Innovation and Marketing are the two key success factors” – i.e. Great Idea, PLUS Shipping it!

Innovation is critical for prosperity, growth and quality of life.

Innovation can be incremental, evolutionary or disruptive

Ie exploit what we know, build the future, create new opportunities.
What do we mean when we say that a company / country / institution is innovative?

What attribute, part or personal characteristics do we focus on?

Often our perspective is on technology, when it could also be the situation, the environment, the education, the culture the ......
Innovation has many different dimensions

Different context
Different levels
Different disciplines
Different cultures
Different systems
Different Paradigms

Understand the contextual interaction, the content and the application of its different disparate pieces.

Innovation may take place on many different interconnected layers in a bigger system in a kind of neural network.
Fundamental requirements for Innovation

Thinking
Asking the right questions
Vision / Perspective
Passion
Persistence
Leadership
Execution (ie shipping)
One more,

“To turn really interesting ideas and fledgling technologies into a profitable company that can continue to innovate for years, requires a lot of discipline.”

- Steve Jobs, CEO Apple Inc
Innovation is difficult to pin down

- Innovation does not equal invention
- Innovation is not just new products, materials and processes
- Technology is very often a trigger for innovation
- Co-operation across disciplines often aids innovation
- Breakthroughs often come from unexpected corners by means of Paradigm Shifts:
  
  For example,
  - Tectonic plates
  - Prof Ignaz Semmelweis
  - Albert Einstein
What about Spontaneity?
Are we not all creative and innovative from birth?
Tacit and Explicit Innovation?
INNOVATION PAST AND PRESENT

Is the “process” something new?
1. **Early Days:** Leonardo and the Renaissance

2. **The Industrial Age:** The Three Power Waves: Steam / Electrical / Information

3. **The Digital Age:** \( I + I = IO \)
Early Days: Leonardo, Copernicus, Gutenberg, Newton

- 500 years ago Leonardo da Vinci (1452 – 1519) invents the future by asking questions
- Leonardo had no formal education
- Ideas and keen observation
- Although the technology for his innovative thinking was not yet available, he was a genial innovative Engineering Scientist.
- **Architect of the Possible (& Impossible)**
Early Days: Leonardo, **Copernicus**, Gutenberg, Newton

- Copernicus (1473 – 1543) hypothesized that the sun “was the center of the universe” and not the earth.

- Copernicus started a new cosmology

- The innovation was a completely new perspective which opened the door to many new innovations due to a new perspective. A new paradigm.

- He caused a Weltbild Revolution
Early Days: Leonardo, Copernicus, **Gutenberg**, Newton

- **Johannes Gutenberg** (1400 – 1467)
- Printing of books with movable type
- **Mass Distribution of knowledge**
Early Days: **Newton**, the dawn of a new understanding

- Isaac Newton (1643 – 1727)
- Keen Observation
- Newton proposes that Nature is a system of knowledge, ordered and structured
- Ideas
- The utility of Mathematics
- Genius – Greatest Scientist of all times
- **Fundamentals upon which to build for centuries**
Lessons? - Leonardo, Copernicus, Gutenberg, Newton

- Looked at the Possible & Impossible
- Clean sheet observation; no “education” bias!
- Produced Paradigm shifts in their time
- Ideas disseminated widely
- Passionate about what they were doing
The Industrial Age

Three Power Waves
The Three Power Waves

- **Industrial Revolution Phase I: 1790 - 1890**
  - Steam Power
  - Scientific Insight and understanding
  - Natural Laws (Physics) systematically applied
  - Exploration. Search for raw materials.
  - Craftsmanship replaced by machines
  - Mass production becomes possible
  - Faster transportation (Speed of railroad)
  - More effective communication
  - Western Optimism
The Three Power Waves

- **Industrial Revolution Phase II: 1890 - 1990**
  - Electrical Power
  - Scientific Management
  - Production automated
  - Fierce competitiveness
  - Globalization
  - Education standardized & universal
  - Two big World Wars
  - The Space Race
  - Bi-polar world (East – West)

EFFICIENCY
The Three Power Waves

- **Industrial Revolution Phase III: 1990 - 2015 +**
  - Information Power
  - Intense Globalization
  - International Financial Network(s)

- Internet access, World Wide Web
- Social Media, Self-Everything, Mobile-Everything
- Economy of individual needs / wants / requirements

- Optimism gives way to Pessimism
- Multi-polar world
- Terrorism, Mass movements, Ethnic Violence and Cyber-war
The Digital Age  \[ I + I = IO \]

- A single **person did not create** the internet that we know and use today.
- **However, Tim Berners-Lee** introduces www to the public on August 6, 1991.
- Belongs to no-one but vulnerable

- Revolution in connectivity and speed
- Email, VOIP, >>>speed and interaction
- Only the beginning......
1. PASTforward: from $I^3$ to $I^n$

2. **Scope of Innovation** Disciplines / Context / Culture / Level / Content /

3. **Leaders of Innovation**

4. **Requirements for Innovation** Ask the right Q / Vision / Passion / Courage to act/
1. **PAST**forward: from I$^3$ to I$n$

> ① Innovation focused on products and processes (mass manufacturing), marketing push (Print Media, Radio & TV), people are mainly commodities (employees as well as customers / consumers)

> ② Innovation by individuals, propelled by the internet opened up possibilities extremely far ranging across all contexts, levels, disciplines, systems; etc that were previously virtually unthinkable.

> ③ From the SETI search, to crowd-funding, self-marketing, book-publishing, trading, R & D, …. Moneytizing virtually anything that can be transmitted via the internet.
2. Scope of Innovation: Big Picture

Disciplines / Context / Culture / Level / Content /

Content:
- Big Picture
- Strategy
- Vision
- Leadership
- Asking the right Q
- Knowledge management
- Nurturing of creativity
- Prepared for Paradigm shift

Employees / Coworkers
- Enabled / empowered
- Etc etc

High-Tech:
- Research, Communication, Project Mgmt, Processes, Systems

Culture:
- Culture of Learning
- Mentoring
- Coaching
- Facilitating

Democracy
- Socialist
- Dictatorship
2. Scope of Innovation: Big Picture

Disciplines / Context / Culture / Level / Content /

Disciplines:
- Politics
- High-Technology
- Finances
- Trade
- Environment
- Energy
- Economics
- Construction etc

High-Tech:
- Research, Communication
- Project Mgt, Processes, Systems

Culture:
- Culture of Learning
- Mentoring
- Coaching
- Facilitating

Democracy
- Socialist
- Dictatorship

Content:
- Big Picture
- Strategy
- Vision
- Leadership
- Asking the right Q
- Knowledge management
- Nurturing of creativity
- Prepared for Paradigm shift

Employees / Coworkers
- Enabled / empowered
- Etc etc

National
Industry
Company
3. Current Leaders of Innovation (some examples)

1. Bill Gates
2. Richard Branson
3. Steve Jobs
4. Peter Thiel
5. Elon Musk
6. Google, Facebook etc
7. TED Talks
Bill Gates
Richard Branson

- Virgin Airlines
- Virgin Rail
- Virgin Galactic
Steve Jobs

- APPLE
- NEXT
- PIXAR

“Do you want to produce bottled sugar water, or change the world?”
Peter Thiel

- PayPal (with Elon Musk and Max Levchin)
- Palantir
- Clarium, Mithril Capital
- Valar Ventures
- Facebook Investor
- Futurist
Elon Musk

- PayPal
- TESLA
- SPACE X
- SOLAR CITY
- HYPERLOOP

- Does not patent new ideas!
Larry Page, Sergey Brin
Mark Zuckerberg

Facebook
But is a successful Internet-based Enterprise INNOVATION?
TED Talks

- Multitude of talks on diverse topics
- Many innovative ideas, implemented in many cases
- Eg Evelyn Glennie: How to Listen
- Eg Research on cockroach mobility for miniature robots
- Eg Management and Marketing Ideas, Seth Godin
- E.g. Tony Hsieh of Zappos: Innovation Leadership, Culture, collisions per sq foot and Downtown Project
- Eg on teaching, on dying, on everything.

**Point:** Create awareness as to what people are doing and achieving
INNOVATORS called by Different Labels

<table>
<thead>
<tr>
<th>Labels</th>
<th>Names</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explorer</td>
<td>Thomas Edison</td>
</tr>
<tr>
<td>Inventor</td>
<td>Albert Einstein</td>
</tr>
<tr>
<td>Pioneer</td>
<td>The Wright Brothers</td>
</tr>
<tr>
<td>Genius</td>
<td>Maxwell, Faraday, Gauss</td>
</tr>
<tr>
<td>Street-wise Entrepreneurs</td>
<td>Richard Feynman</td>
</tr>
<tr>
<td></td>
<td>Igor Sikorsky</td>
</tr>
<tr>
<td></td>
<td>Francis Collins</td>
</tr>
<tr>
<td></td>
<td>“Un-named”</td>
</tr>
</tbody>
</table>
4. Requirements for Innovation

Example Elon Musk: What needs to happen to make the Future worthwhile?

1. **Ask the right Questions** - Serious sustainability challenges to humanity: Energy generation, -storage,-consumption; Transportation, Space exploration

2. **Vision** - TESLA, Batteries,
   - Solar Power
   - SPACE X

3. **Projects of Passion** - a giant distributed utility, low energy usage, re-usable

4. **Persistent / Resilient**

5. **Courage to act** on their idea - turn a large fortune into a smaller one.

6. **What is the impact of the innovation in space and over time?**
“Virtually all economic growth in last century is attributable to innovation”

#1 characteristic associated with success

#2 characteristic for most consistent growth

#3 fundamentally innovation is entrepreneurship

In a world of shorter product cycles, innovation becomes the KEY!
Highly structured, stable industries/countries generally diminish innovation while more casual but disciplined instances combined with knowledge, research, inquisitiveness and will can accomplish remarkable innovation
Boeing Dreamliner, TESLA car....

...incorporate thousands of innovations in terms of systems, products, assemblies, processes, materials, design.......

## Classifications of Innovations

<table>
<thead>
<tr>
<th>Innovations</th>
<th>Influence in space and over time</th>
</tr>
</thead>
<tbody>
<tr>
<td>E.g. Morse Code</td>
<td>✓ Wide app / time ltd</td>
</tr>
<tr>
<td>E.g. Valves and transistors</td>
<td>✓ Electronic app / time ltd</td>
</tr>
<tr>
<td>E.g. Steel making</td>
<td>✓ Industry specific / time unlt</td>
</tr>
<tr>
<td>E.g. Newton’s Laws</td>
<td>✓ Widest application / time unlt</td>
</tr>
<tr>
<td>E.g. Hand-washing (Semmelweis)</td>
<td>✓ Medical – Hygiene app / time unlt</td>
</tr>
</tbody>
</table>
How do we handle / build models / create frameworks for innovation? Is it actually useful?

**Process:**

- Manufacturing Industry
- Airlines, Uber
- Apple – Design
- Flash Memory
- Zappos
- Viral Marketing (Music, Kindle)
- Facebook
- Modern Medicine
Innovation Systems Levels

- **Paradigm Innovation** – mental models
- **Product Innovation** – changes in things
- **Position Innovation** – changes in context
- **Process Innovation** – changes in creation and delivery
Innovation can arise out of untested opinion or detailed research.

Toward practical management application.
IAMOT 15 Headings of Sessions:

- Emerging Technologies
- Innovation and Sustainable Growth
- Innovation Systems and Networks
- Management of Innovation
- Economic and Social Impact of Technology
- Education and e-Learning
- Plus 9 others. 15 in total!
Do we have a clear innovation strategy?

Roaming - How do we find opportunities for Innovation?

Selection - what are we going to do and why?

Implementation - how are we going to make it happen?

Capture - how we going to get the benefits from this action?

More important: Do we have an innovative organization?
Fundamentals to “release” Innovation

- Ask Questions
- Apply in-sight and whole-sight
- Apply System Thinking
- Apply an open company culture
- Awareness of developments in space and time
- Adaptability and flexibility
- Artful
- Authentic
- DESIGN
Changing context for Innovation

1. Acceleration of knowledge production
2. Global dispersion of knowledge production (even especially developing nations)
3. Market fragmentation
4. Market virtualisation (new marketing channels)
5. Rise of active users (Linux, YouTube, Facebook)
6. Development of new infrastructure (alternative social networks, user and producer move closer together)
awareness FRAMEWORK (no recipe!)

- **Time:** The moment of time and its contemporariness
- **Business Space:** A three-dimensional space in which the three spatial axes define the business environment
- **A System Framework:** The broad challenges – or literacies – which every business has to be able to handle effectively
- **A Process:** The four-step process *Imagine-Shape-Deliver-Support*
- **An Integrator:** Integrating all concepts and sub-models on a continuous basis
Innovation Competence requires a Systems Thinking Approach: Integrated and Cyclic

Awareness, Personal Competence and Ability to implement **ALL OF THESE**
Global Warming, Social Responsibility, Energy and Sustainability as well as demographics of the future, how we will live, technology “explosion”, food production and transportation are key aspects/challenges setting the stage for some significant paradigm innovations across many sectors in the near future.

Look what others are doing, be aware of new Clusters, new applications of existing technology, marketing etc and apply to your business in another step of innovation.
Thought has the potential to become something significant.

Whenever Thinking happens, Big Ideas follow. Go For It.