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# Strategies for effectively managing SME innovation: Innovating within low-tech SME's

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# Overview

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1. Understanding innovation
2. Innovation importance of the lower-tech firm
3. Exemplar cases
4. Innovation practices and routines of the lower-tech firm
5. Moving towards a *roadmap*

# What do we mean by innovation?

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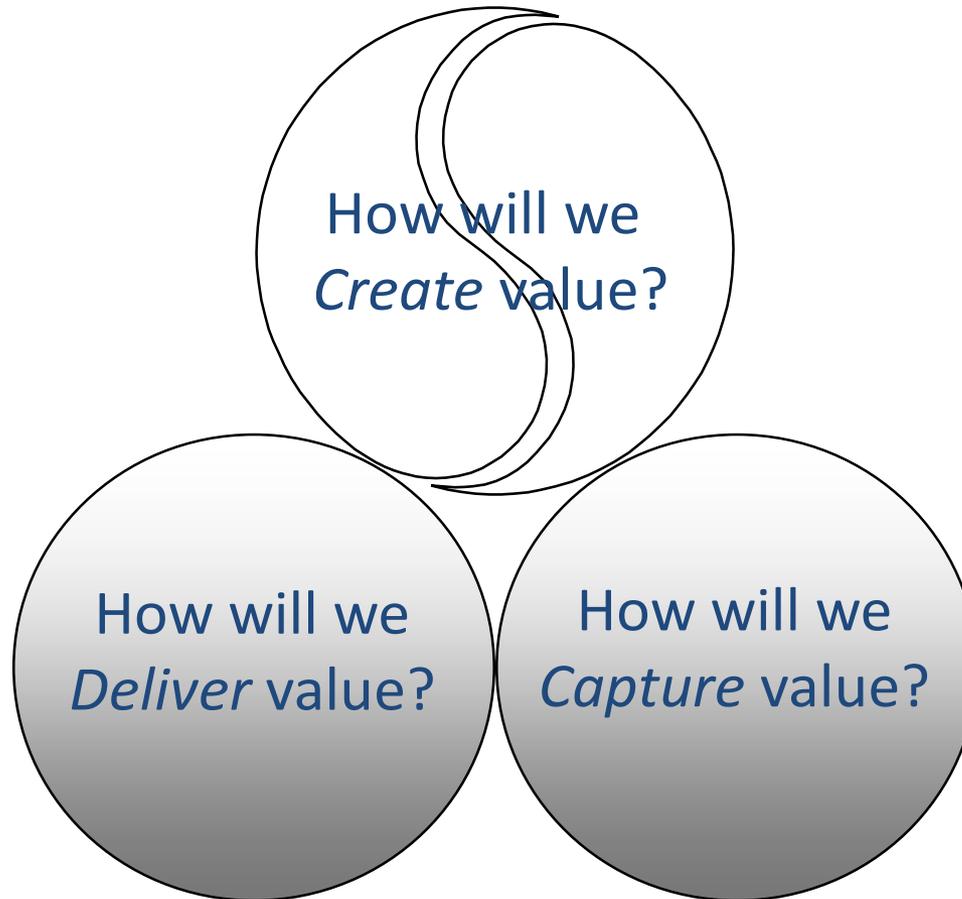
# Not just world firsts



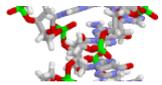
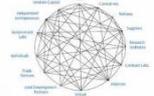
*“Innovation is the process by which firms master and get into practice product design and manufacturing that are new to them, whether or not they are new to the universe or even the nation” (Nelson and Rosenberg, 1993: 4)*



# Effective Innovation: three key questions



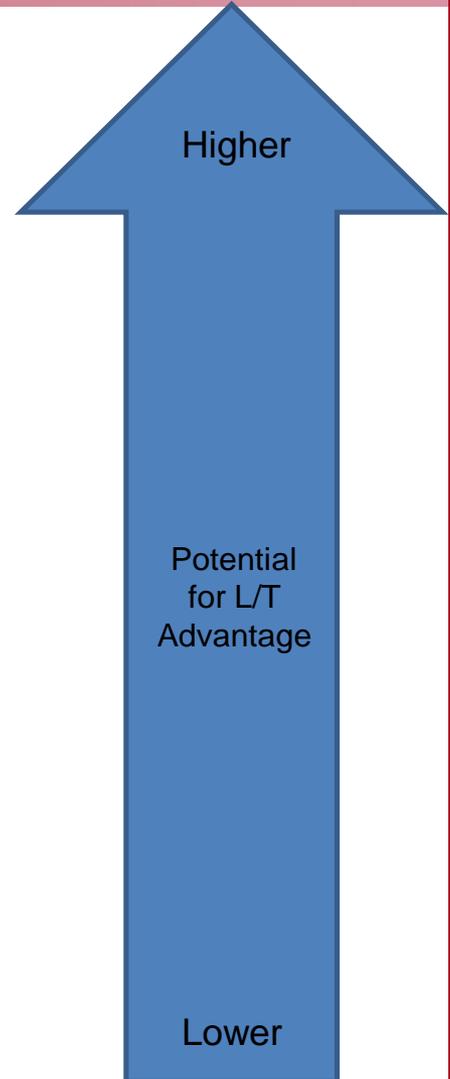
# Innovation Categories



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- Management model innovation
- Business Model Innovation
  - Ryanair and low-frills model
- Position/ Market Innovation
  - Black & Decker and Medical Market?
- Product and Service Innovation
  - Amazon and stuff
  - Apple and the iPod/iTunes
  - Dyson and the Cyclone
- Process Innovation
  - Technological
  - Operational



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# Definitions of lower tech (LMT)

## ISIC REV. 3 TECHNOLOGY INTENSITY DEFINITION

Classification of manufacturing industries into categories based on R&D intensities

**Sectoral classification bas  
on BERD from OECD 1997  
and revised 2011 (R3)**

### High-technology industries

Aircraft and spacecraft  
Pharmaceuticals  
Office, accounting and computing machinery  
Radio, TV and communications equipment  
Medical, precision and optical instruments

### Medium-high-technology industries

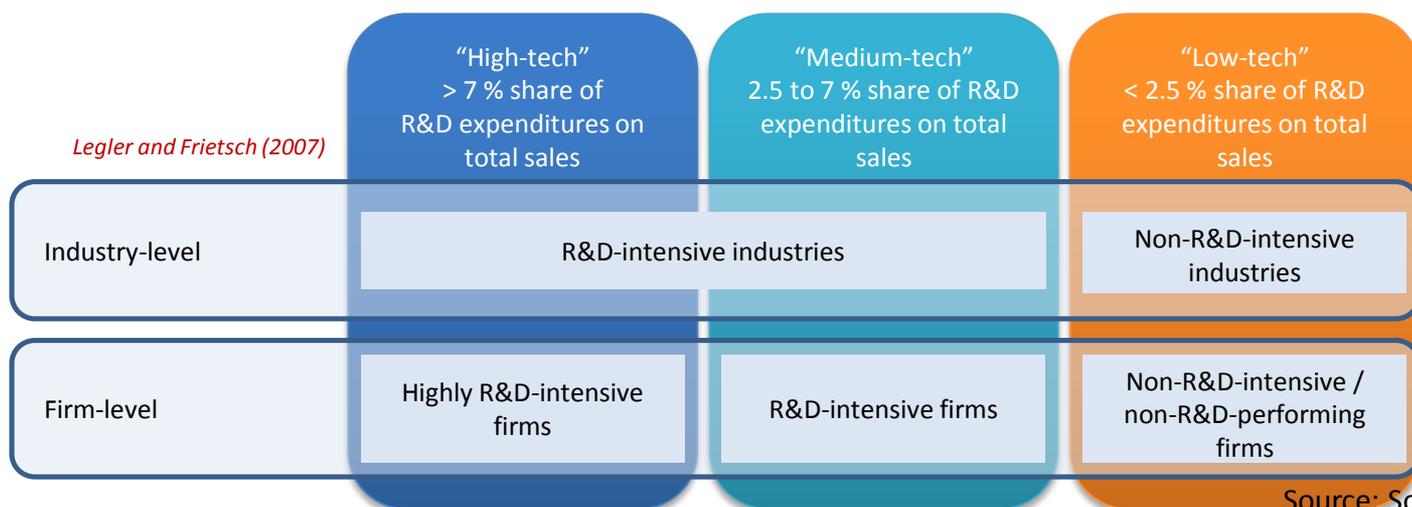
Electrical machinery and apparatus, n.e.c.  
Motor vehicles, trailers and semi-trailers  
Chemicals excluding pharmaceuticals  
Railroad equipment and transport equipment, n.e.c.  
Machinery and equipment, n.e.c.

### Medium-low-technology industries

Building and repairing of ships and boats  
Rubber and plastics products  
Coke, refined petroleum products and nuclear fuel  
Other non-metallic mineral products  
Basic metals and fabricated metal products

### Low-technology industries

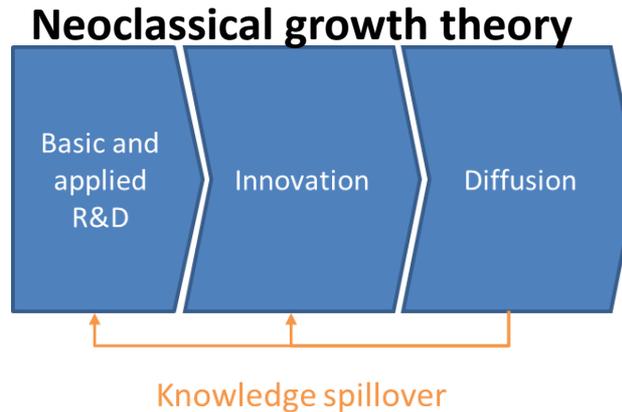
Manufacturing, n.e.c.; Recycling  
Wood, pulp, paper, paper products, printing and publishing  
Food products, beverages and tobacco  
Textiles, textile products, leather and footwear



Source: Som, 2016



# Obsession with R&D



- Low and Medium-low technology (LMT) sectors not fitting this model (Arundel et al. 2008; Barge-Gil et al. 2008).
- Dominated by SME firms, often based in indigenous sectors.
- Highly important to economic well-being and employment but become the 'forgotten sector' (Hirsch-Kreinsen, 2008).
- Today, 95% of all empirical innovation research is focusing on R&D as an explanatory variable (Becheikh et al. 2006; Barge-Gil et al. 2008; Arundel et al. 2008)

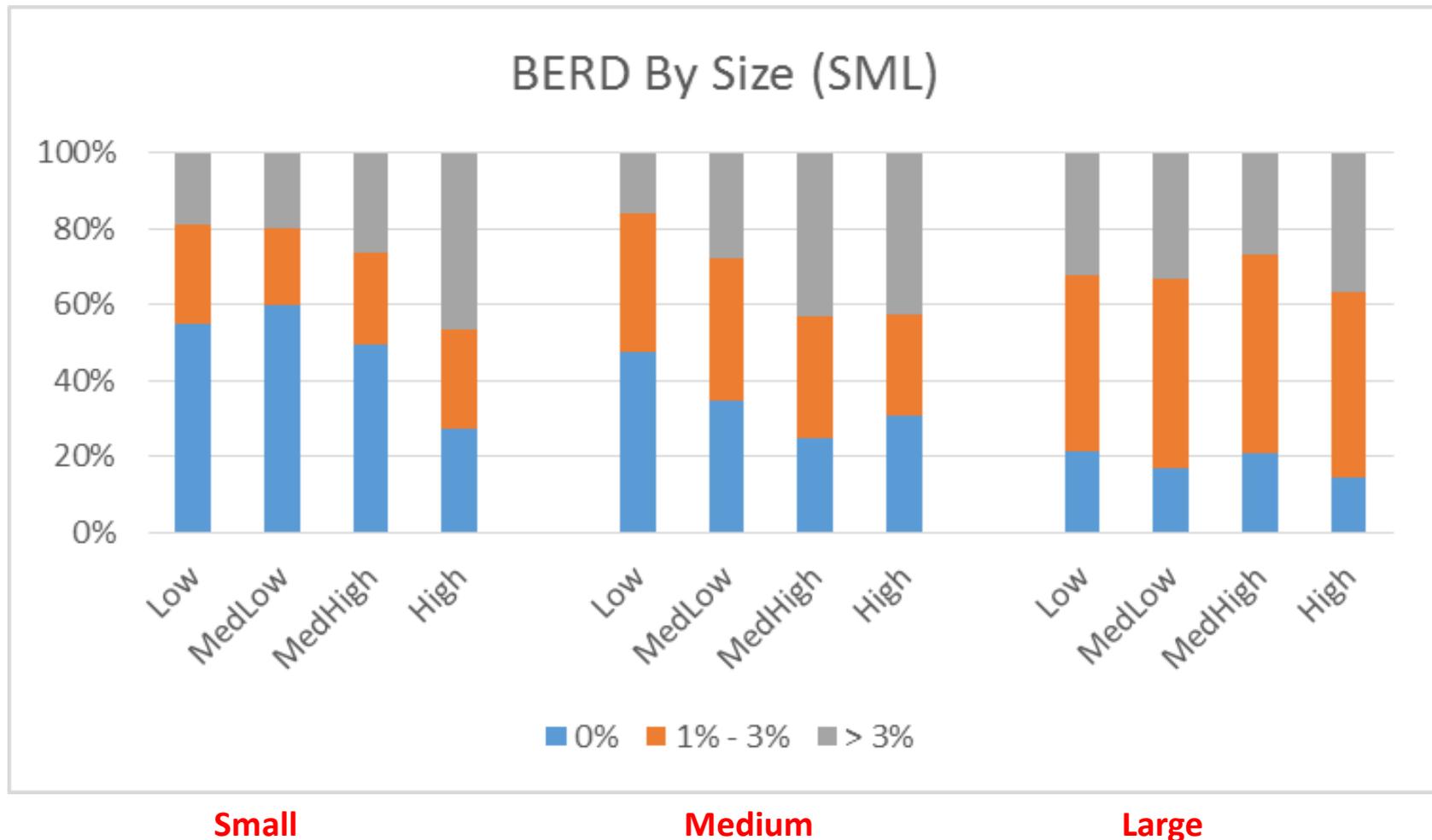
Incomplete understanding of innovation management and especially for SME community

(N= 876 Manufacturing firms)

# CIS 2014 data

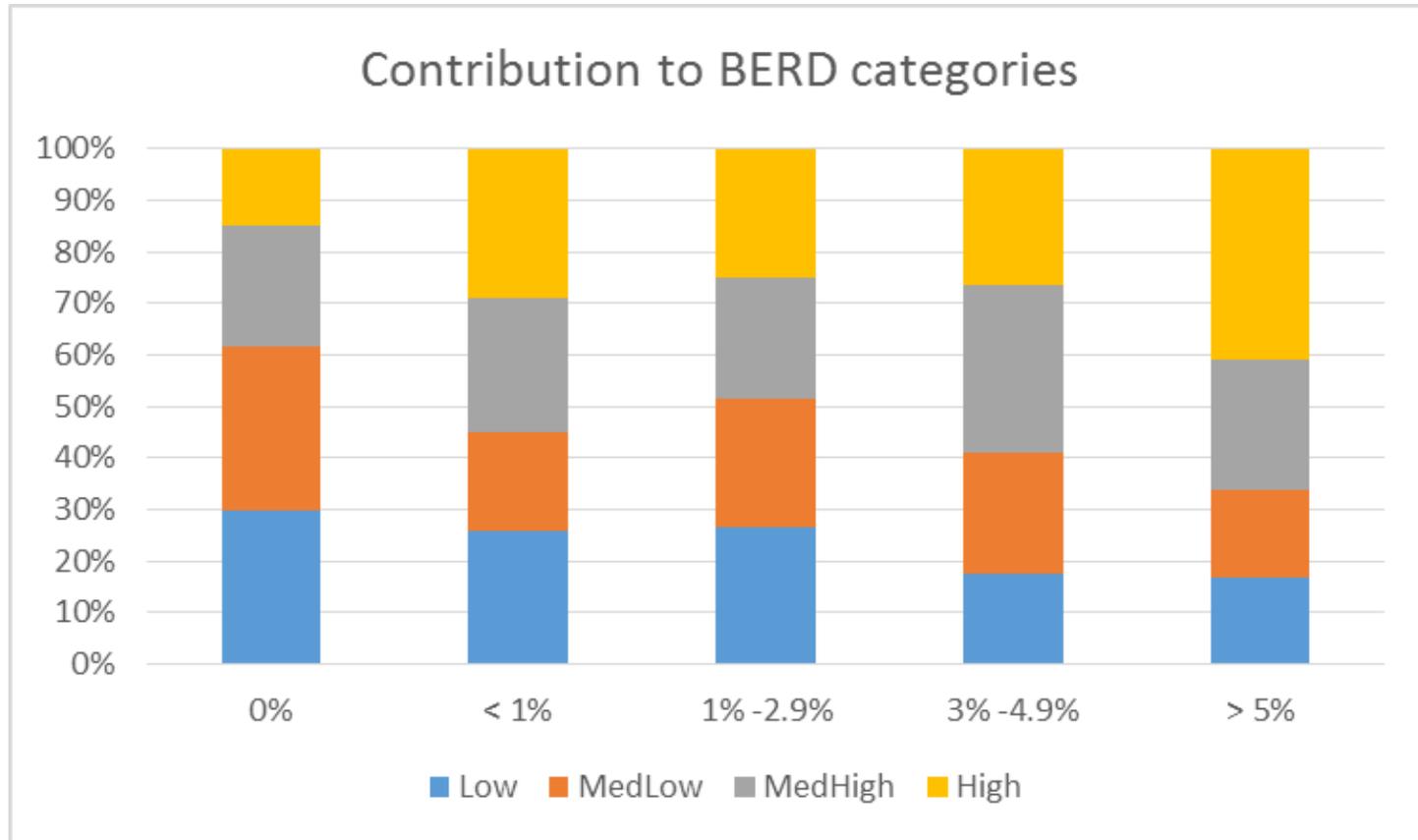
OECD 2011 NACE 2	Low Tech	Medium-Low	Medium-high	High tech	Percentage total
Indigenous	82%	83%	71%	55%	78%
Small	58%	66%	54%	37%	57.4%
Medium	28%	31%	35%	31%	30.2%
Large	14%	3%	11%	32%	12.3%
Percentage total	46.6%	24.5%	19.5%	9.5%	N= 867

# Studying non R&D innovation matter



Irish Data (N= 876 Manufacturing firms)

# Non R&D impacts all industries



Irish Data (N= 876 Manufacturing firms)

# Irish LMT context (Quant.)

- Dominated by indigenous, small scale firms (58% vs. 37%)
- Geographic constraint (EU focus: 43% vs. 91%; Outside EU focus: 52% vs. 92%)
- Reporting less Product Innovation (\*46% vs. 71%) and Service innovation (12% vs 27%)
- Less novelty of innovation (69% vs. 79% NMkt)
- Internal R&D reported (68% vs. 85.3%)
- Funding support (33% vs. 51% Nat; 6.5% vs 12.3% EU)
- Collaboration for innovation (33%vs 57%)

\* Comparison of low-tech vs. high tech sample)

# Research aim

A firm's competitiveness is provided by the heterogeneity of its resource configuration (Penrose 1959) and its ongoing *“ability to reconfigure, redirect, transform and appropriately shape and integrate existing core competences with external resources”* for innovation purpose (Teece et al., 2000: 339).

## Objectives

- How do SME's non-active in R&D innovate to remain sustainable?

## Method

- Qualitative approach necessary
- Development of more than 30 growth SME cases across the R&D intensity spectrum?
  - Animal feed, meat processing, food, brewing, furniture, steel fabrication, apparel, plastics, agricultural machinery, specialist engineering, medical devices, ICT.

# LMT innovation exemplars

## Firm #1

Animal feed Inc  
Ireland

- Supplier for animal feed for regional agricultural base
- 70 employees
- Family & professional mgt.
- Technical process specialist



Product extension and process 'licencing' out



## Firm #2

Bakeware Inc  
Spain

- Bakeware producer for EU supply chain
- 150 employees
- VC acquisition
- Established reputation in bakeware production



New product range and transition to B2C



## Firm #3

Bra Wire Inc  
Germany

- Supplier of bra wires, corsage, bra fasteners,... for global supply chain
- 80 employees
- Family owned & managed
- Specialised supplier



New market, co-creation and new network



**All financially constrained and markets tending towards commodization  
Very limited history of R&D (e.g. technological SOA)**

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# Irish SME case analysis

*Tidd and Bessant's 4P's model of innovation trajectory*

*- Product, Process, Position, Paradigm*

# Product innovation

- Customer responsiveness main driver of NPD (Reactive)
- Struggle for novelty reinforcing cost dimension and lack of clear value added impacting IPR
- Strategies
  - (1) Typically incremental in nature, heavily skewed toward core business (non-horizontal) and reliant on internally controlled resources
  - (2) Process innovation capability spill over (experimentation)
  - (3) End-product producers increasing technological base\ servization of products to avoid 'commodity hell' (higher tech firms)
- Advantage:
  - Close to customer and creative experimentation
  - Flexibility, design and process knowledge
  - Challenge of SKU proliferation and low volume



# Process innovation

- Necessity driven process innovation
- Heavy customisation of plant and purchase of 2<sup>nd</sup> hand equipment (*Creative adaption*)
- Key innovation capability but often under appreciated due to long-term evolution
- Advantage
  - Tacit knowledge underpinning problem solving & innovation capability
  - Deep relationships with supplier base
  - Challenge of investment costs, absorption and training



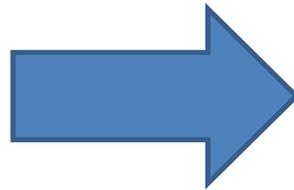
# Position innovation

- Limited and primarily vertical or niche in nature
- Usually consequence of last resort and discovering ‘true’ value added
  - Project based evolution
- Curana.com
  - From commodity to desirable design
  - Legacy investment in plant acted as barrier to entry (tea)
  - Leverage of personal ties to bring external parties together
- Advantages
  - Close to customer
  - Process expertise
  - Trust and relations
  - Downside of ‘fear of loss and vulnerability’



# Paradigm innovation

- Prolonged impact of a growing product or positional innovation rather than ‘road to Damascus moment’
- Emergent as opposed to strategic trajectory consequence of operational focus
- Success based on opportunity recognition for re-applying core process capabilities and product values to higher value added areas.



**Learning by doing**  
**Learning by using**  
**Learning by interaction**

# Innovation management across R&D intensity spectrum

Innovation trait	LMT	HMT
<b>Management experience</b>	More on-job and insular	More varied and dynamic
<b>Product offering</b>	More toward commodity	More towards novel
<b>Market served</b>	Closer to base	More global orientated
<b>Customer focus</b>	More B2C orientated	More B2B orientated
<b>Innovation Management</b>	More unstructured and informal	More structured and systematic
<b>Innovation order winner</b>	Cost efficiency and responsiveness	Value-adding opportunity
<b>Locus of innovation activity</b>	Process	Product
<b>Innovation frequency: Product</b>	More incremental and sporadic	More radical and routine
<b>Innovation frequency: Process</b>	Ongoing	Ongoing
<b>Perception of patents, etc</b>	Not really relevant to business	Necessity for growth (Financing cycle)
<b>Innovation culture/ routines</b>	More tacit and champion based	More explicit and systematic
<b>Open Innovation</b>	Limited and necessity driven	More exploratory and purposive

# General

- LMT cases regional embedded & established reputation in region.
- Strong family dimension and B2C focused when exclude HT firms.
- As move up technology intensity spectrum then market less geographically constrained and more explicit value-added of product.
- Unstructured, informal innovation process with strong emphasis on individual project cases rather than cohesive portfolio
- Implicit correlation between firm size and evident management capability
- Presence of high tech firms in low-tech industries (trend towards more professional management and serving niche markets through process specialization)
- HMT closer in innovation approach to LMT firms than to HT firms

# Routines within cases

- All cases exhibit high empathy and responsiveness to customer problems driven by agility and problem solving.
- LMT cases have relatively low product novelty, resulting in high awareness of tight margins and risk of 'commodization hell'.
- Product innovation more step-by-step for less R&D intensive firms and more niche for more intensive firms as they fine-tune value added for increasingly distant target customer.
- R&D investment term encompasses very broad spectrum of activities as opposed to science-driven stimuli.
- Process innovation core to LMT sustainability, driven by cost and agility.
- Significant process investment is 2<sup>nd</sup> use, involving high adaption and latent capabilities stimulating new products, excluding HT firms.
- Ad hoc innovation processes driven by key individuals
- Not leveraging external resources in terms of breadth or depth.

# Discussion

- Industry sectors not homogeneous (firm level analysis)
- LMT innovative success based on customer empathy, problem solving & experimentation and embedded process capability.
- Lack of explorative focus linked to emergent strategy
- Growth linked with increased process specialization, niche target markets and more geographically distant markets.
- OI leveraged for necessity rather than strategic purpose and default is to rely on internal capabilities
- Dialectical tension between
  - innovation systemization and agility
  - entrepreneurial and professional management capability

# Conclusion

- LMT SME's highly innovative, with an innovation process unstructured and project dominant perspective (ABHT)
- Firm scale, management capability, process specialization and internationalization= indicators of innovativeness.
- LMT sectors have broader definition of what constitutes as R&D expenditure and are highly process focused- issue of under-reporting.
- Operational,  $T_{now-1}$  perspective as opposed to  $T_{2-3}$
- Majority of innovation 'hidden' in enhanced process capability and creative adaption of equipment from analogous sectors (DUI).
- Open innovation leveraged but scope for increased exploratory focus and wider diversity of engagement to build collaborative capabilities.
- Need for increased attention by policy makers (AMT) and widening of tax credits on BERD.

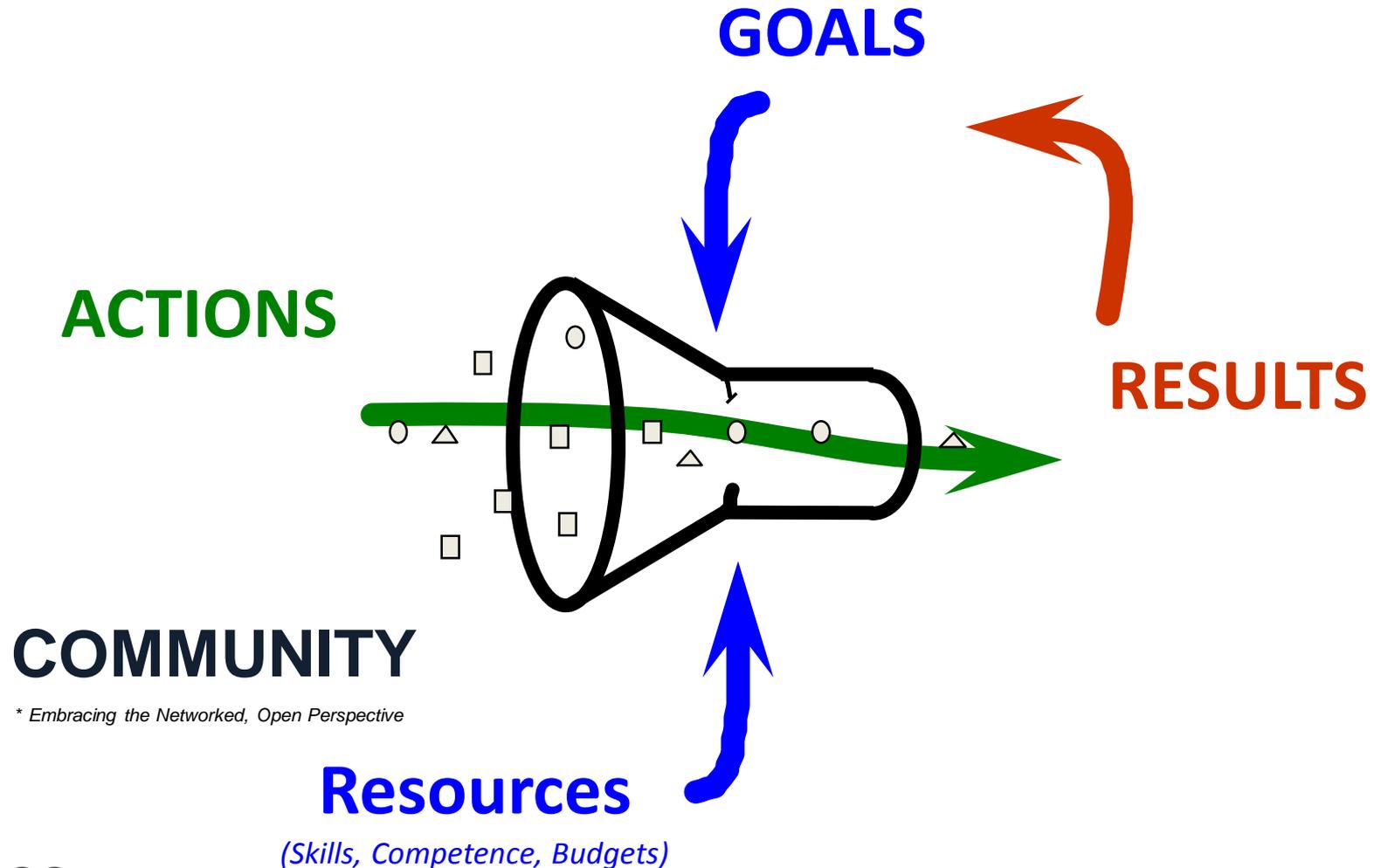
*“Mama always knows best”*



# LMT SME roadmap forward

1. Greater systemization of innovation process
2. Enhancing breadth and depth of management capability
3. Identification value adding capability (Know-what,-why,-who,-how)
4. Building (wider and deeper) alliances and collaboration capability (Confidence and capability).

# Structuring innovation management



# Management capability

- Increased management training
  - External exposure
  - Transition from operational to strategic remit
  - Networking and international linkages
- Increased delegation
  - Diversity and due diligence
  - Identifying value adding capability (Process capability)
  - Opportunity scanning of analogous industries (time)
  - Defining and resourcing strategic trajectory (championing)
- Systemic entrepreneurial focus

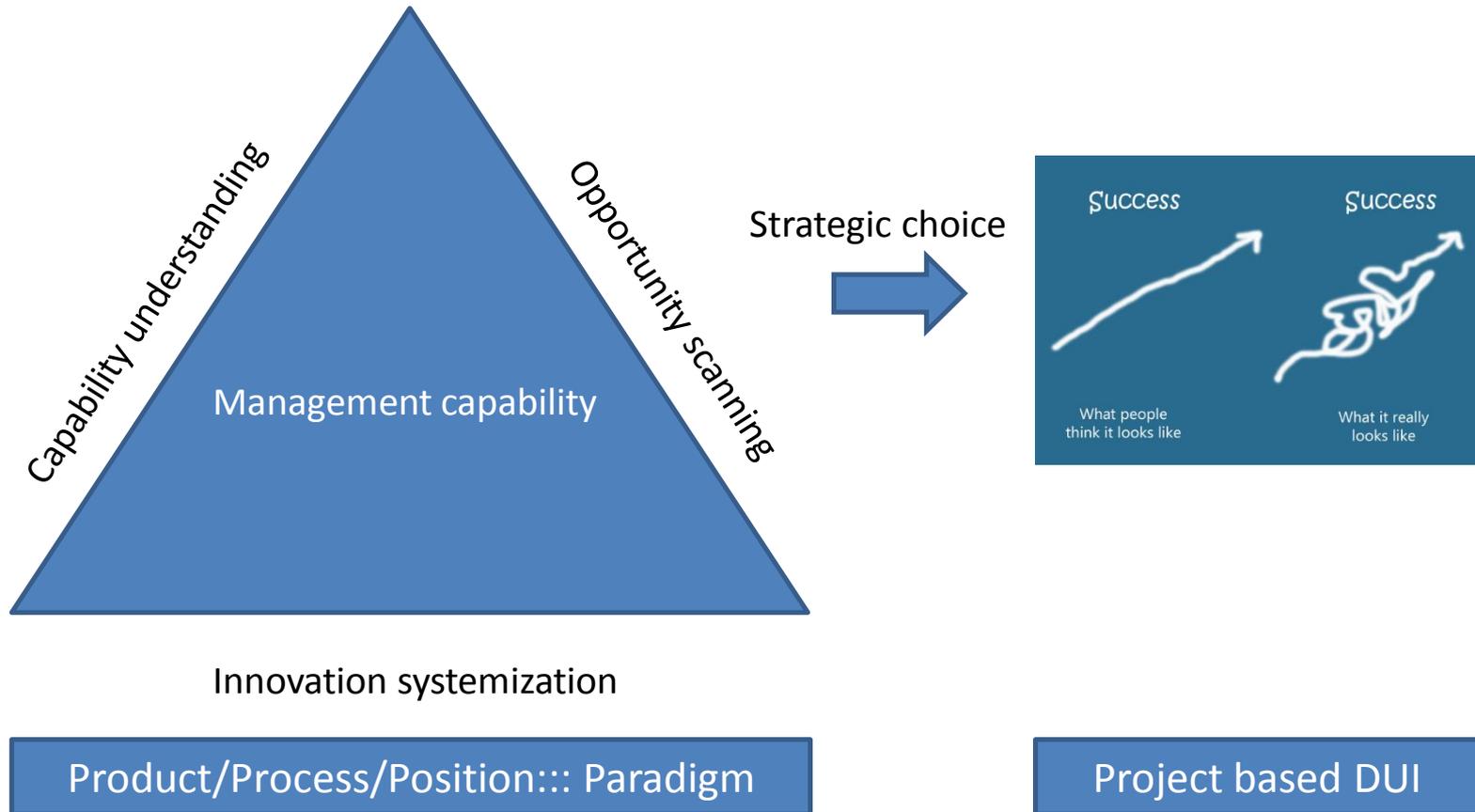
# Innovation Linkages

- Embracing wider and deeper linkages with external controlled resources rather than develop internal ones\*



Where	Who	Why	What (tools)
Search			
Select			
Implement			
Capture			

# Don't kill the golden goose!

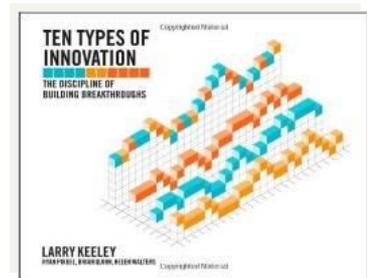
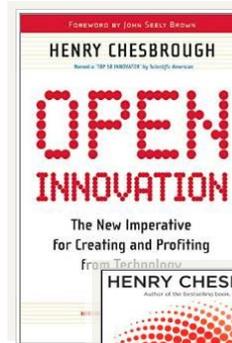
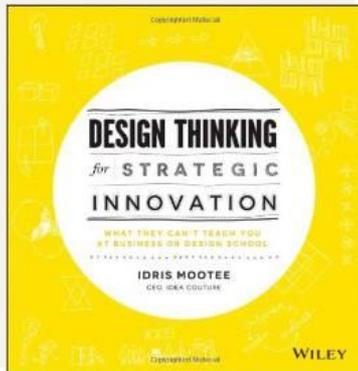
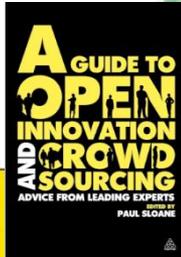
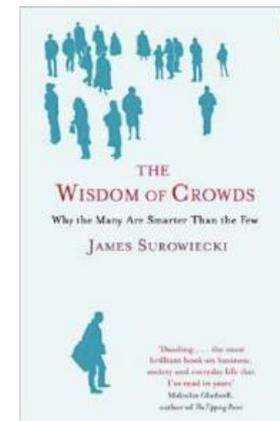
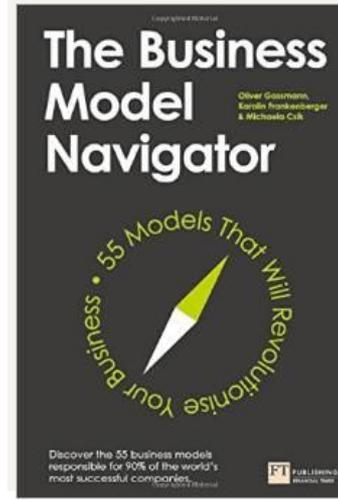
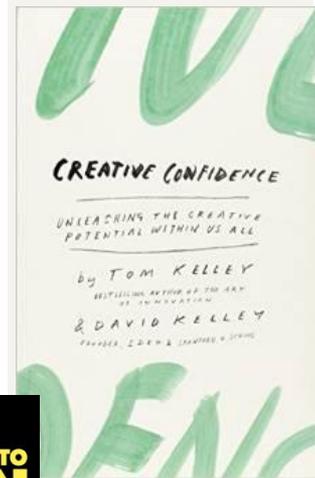
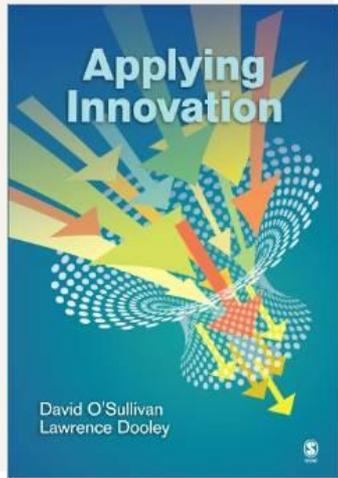


# Invite

- In search of cases for on-going study of ‘interesting’ SME’s.
  - Can be anyone... any industry... but especially lower tech cohort
- Have car and will travel...



# Useful texts





## Suggestions and Comments

