17th November 2014

Product Discovery

&

Concept Development

Me

Cambridge 2007-2012 – Natural Science & MET Tripos

Rolls Royce, The Technology Partnership, PwC

November 2012 - Founded Baltic Blue Energy

Board Member of British Estonian Chamber of Commerce

Supervisory board member of TFTAK

@DaveEstUK

The Company
Laser Diagnostic Instruments

Estonian SME, established in 1991
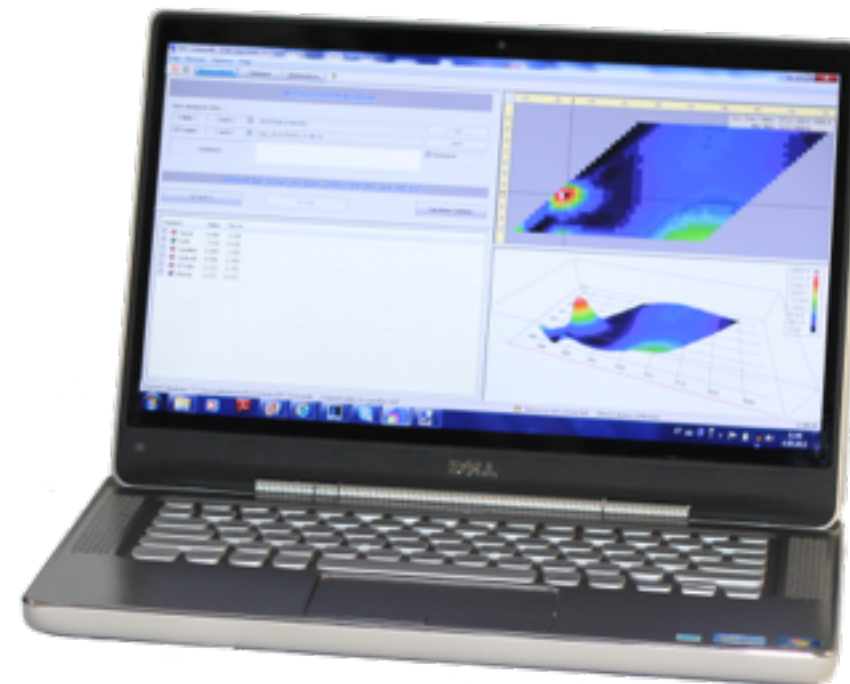
ISO 9001 certified

World recognition and 20+ years experience in Laser Remote
Sensing and Spectral Fluorescence Analysis

R&D, manufacturing, application

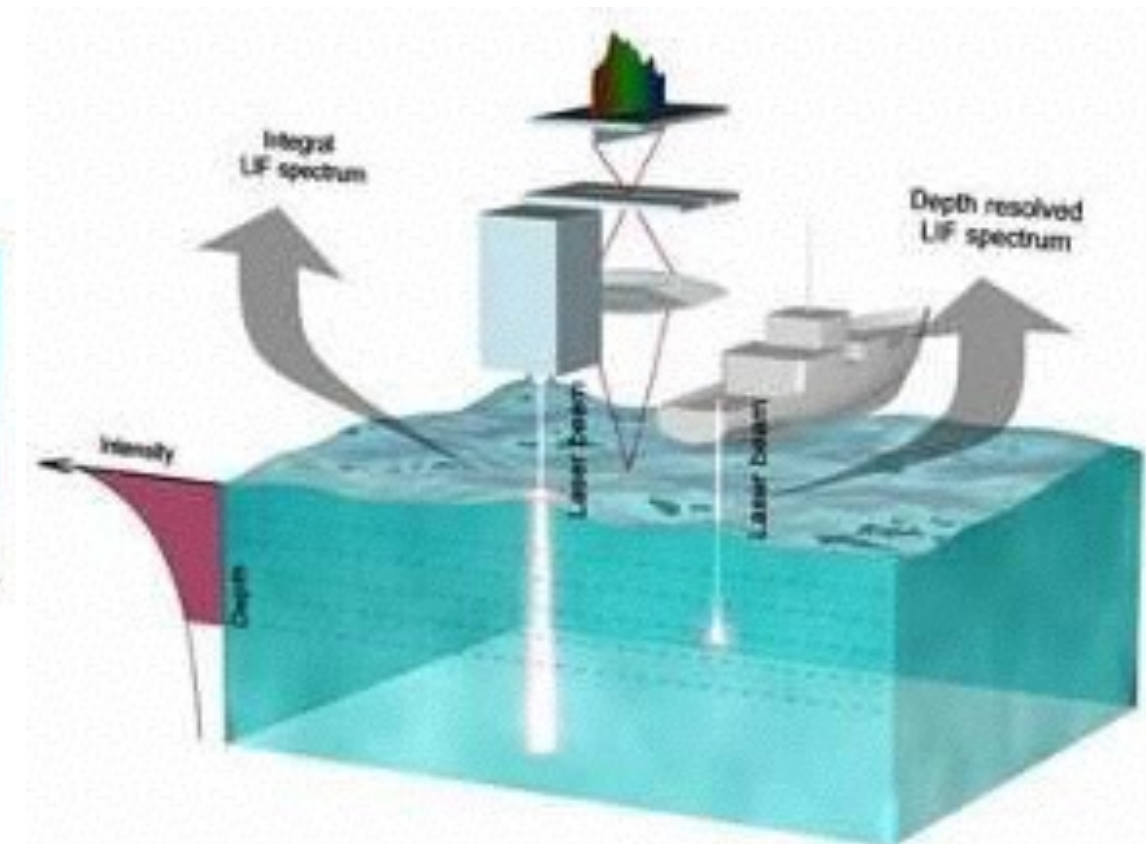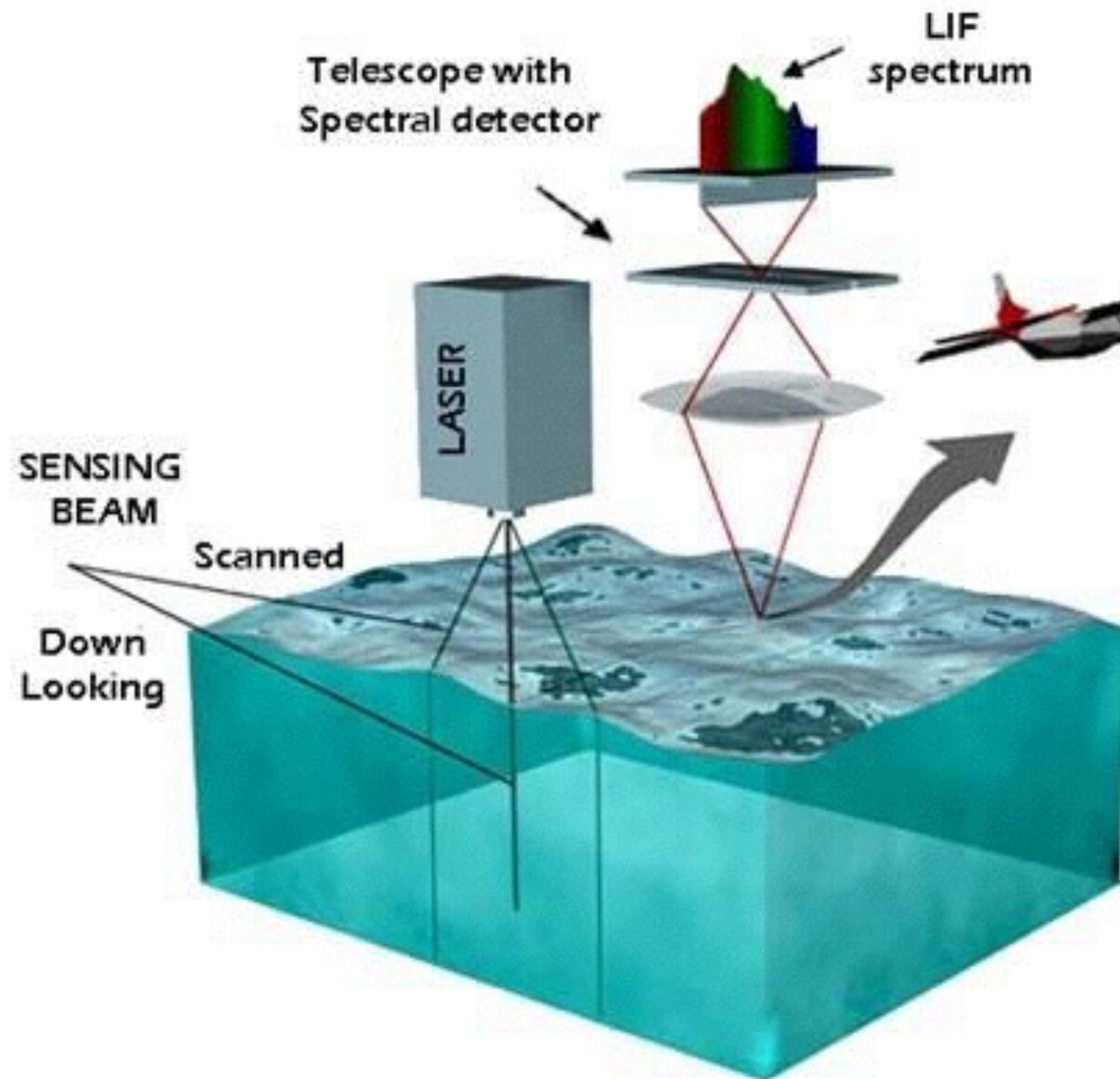Privately held, 20+ people organisation
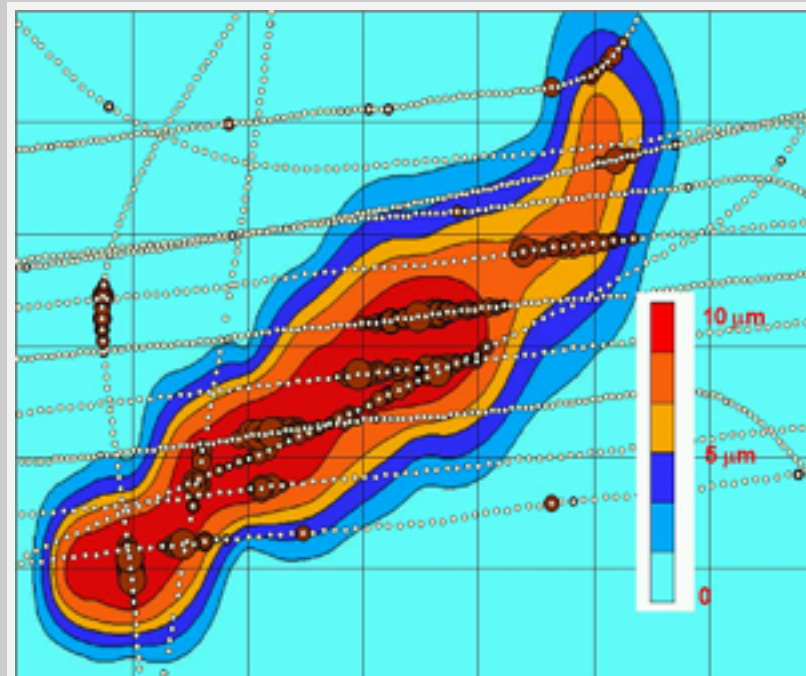
The Products
Spectral Fluorescence Signatures (SFS)

SFS-Scanner

The Products

The Products
Laser Induced Fluorescence LIDAR technology

New Product Introduction Process

Key: | TRLs | MRLs | Tools

Tools

1. Proposal | **2. Scoping** | **3. Investigation** | **4. Development** | **5. Validation** | **6. Launch**

1. Principle Observed

1. Market Observed

Isaep

2. Application formulated

2. Market Needs Assessment, concepts formulated

Scenario Fomulation, Basic Customer research, survey existing client base if poss.

3. Proof of Concept

3. Market Assessment

Porters 5 forces, PESTLE, SWOT, Porters Generic Comp Strategy, Improved Assessment of Market and needs

4. Component validation in lab

Component validation in rel. environment

4. Customer Assessment

5. Strategic Planning

6. Lead Users

Garvins Quality Framework, Kano Model, (QFD?), confirm hard spec. "whole" product design

7P's considered, competitive priorities, BP drawn up, Financials better known, KPIs agreed

Experimentation and iteration, refine softer tech spec details

6. Prototype validation in rel. environment

7. Key Partners

Checklist

Prototype validation in use environment

8. Promotion

Implement 7Ps, Use responses to target efforts for launch

8. Actual system completed and fully tested/demonstrated

9. Validation

Feedback all responses from promotion, distributors confirmed

10. Launched

KPIs monitored and acted upon. Any support issues resolved

9. System successfully launched into market

11. Post Project Review

Review

iSaep

iSAep

isAeP

isaEp

Risk/Reward Matrix, Scoring on balanced Scorecard, Risks scored, Ansoff matrix for option generation

Update all previous tools and check, PM tools drawn up(Critical Path Analysis etc), Basic Sensitivity Analysis

Update all previous tools and check, CPA detailed for remaining stages, V.detailed risk analysis, v.detailed sensitivity analysis. Tech Risk V low to proceed

Update all previous tools and check. ALL business areas prepared for processes under LDI's control to be validated

Update all previous tools and check. ALL business areas validated and prepared for launch

Plan for handover / disseminate key learning points / update NPI process

The funnel of development

Matt May eld, 2008

Proposed NPI Stages

1. Proposal

1. Principle Observed

1. Market Observed

2. Application formulated
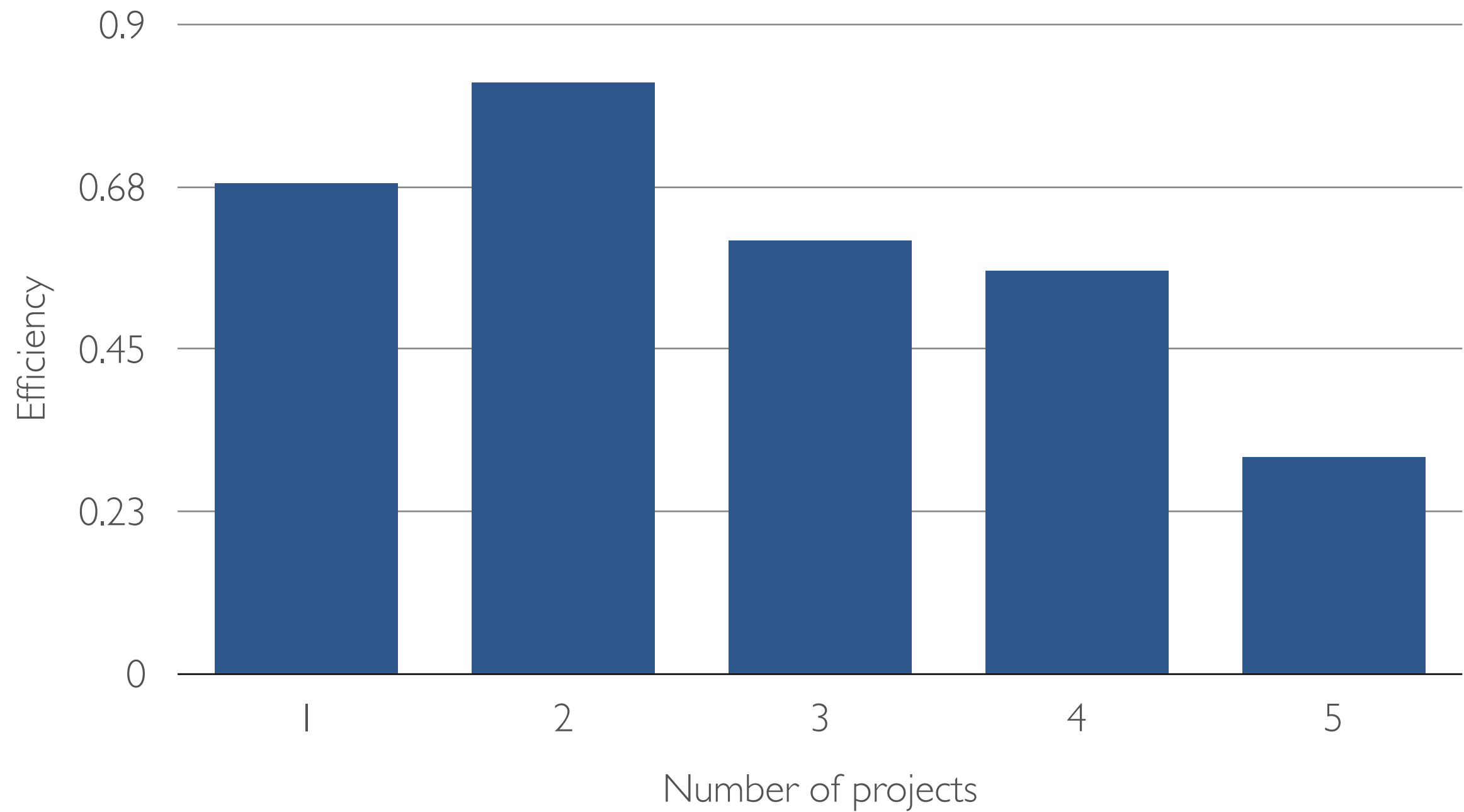
2. Market Needs Assessment, concepts formulated

Scenario Formulation, Basic Customer research, survey existing client base if possible

Project Scorecard, Ansoff Matrix

International academic conference on complicity methods

复杂性方法国际学术讨论会

Central south university,Changsha,Hunan,China

中南大学·湖南长沙·中国

foreclosure.com

21 September 2000

nature

International weekly journal of science

www.nature.com

Structure of the 30S ribosomal subunit

nature insight

Taiwan

Taiwan
Regional Insight

Metallurgy
Electrochemical production of titanium

Functional genomics
Chemists join the action

Postdocs
A good career move?

new journals review

Create a culture of excellence

Entrepreneur

UP NEXT

A NEW BREED OF FORWARD-THINKERS IS GIVING TRADITIONAL BUSINESS THE BRUSH-OFF. HOW THESE TECH INNOVATORS ARE REINVENTING THE FAMILIAR AND EMPOWERING THE LITTLE GUY.

Tomorrow Lab's
Ted Ullrich

Totally buzzed:
The right way to energize a meeting

Tit for tat:
Do's and don'ts of the barter economy

"All the News That's Fit to Print"

The New York Times

VOL. CLIV ... No. 53,279

Picking Up the Sword, Purely for Recreation

By TANYA MOHN

Proposed NPI Stages

1. Proposal

1. Principle Observed

1. Market Observed

2. Application formulated

2. Market Needs Assessment, concepts formulated

Scenario Formulation, Basic Customer research, survey existing client base if possible

Project Scorecard, Ansoff Matrix

Why is Selection important

No Portfolio Management means	Immediate Result	End Result
Many projects added to list	Resources thinly spread	Inefficiency, Increased time to market
Weak decision points/ poor Go/No Go decisions	Too many mediocre projects, good projects starved	Too few real winners
No rigorous selection criteria,	Wrong projects are selected	Many failures
No strategic criteria for project selection	Projects lack strategic direction	New products do not support business strategy

David Probert, Cambridge 2012 et al

Too many projects = inefficiency

Efficiency

0.9

0.68

0.45

0.23

0

1   2   3   4   5

Number of projects

David Probert, Cambridge 2012 et al

Goals of Selection & Portfolio Management

- Maximise ROI of the limited resources which can be applied to new developments
- To achieve balance and focus to the portfolio
- To reflect the organisation's strategic needs
- Fast, efficient, transparent decision making

- Score project proposals on aspects other than just financial estimates

- Use as the basis for discussion and differentiating between options

- Focus on relative scoring, not actual score

Market Opportunity - Reward

	Rating / Key Items	0	2	4	8	14
"HARD"	Increased Sales / decreased costs in first 3 years after launch	None / None	€1 million / 10%	€3 million / 15%	€5 million / 20%	€10 million / 30%
	Competitive Intensity of Market	Market saturated by all large competitors	At least 1 large competitor with signifcant market share (>s%)	Many competitors but none of the big brands / medium market penetration (x%)	Some competition but low market penertation (<x%)	LDI only company that can enter market
	Market Profitability	A lot worse that in our main business	Slightly worse margin	Similar margin to main business	Improved margin	Significantly better margin
	Opportunity to enter new market / Learning	Old Market & Old Technology	Time limited Market Opportunity & Old Technology	Old Market & New Technology	New Market & Old Technology	New Market & New Technology
"SOFT"	Future Synergies	Certainty over dead end / one off product	Not certain but little evidence for future prospects	At least 1 product affected	Entire group of products affected	All business areas and product lines affected
	Customer need / Customer Impact	No interest & No needs expressed / No unique benefits	Little interest, needs mainly guessed / some minor benefits	Passive Interest, some general needs expressed / Some unique benefits but need to explain them	Enquireries from potential users with specific needs indentified / Clear unique benefits	Demanding product / Eye-catching benefits. Talking point at conferences

Technical Feasibility - Risk

	Rating Key Items	0	2	4	8	14
"HARD"	**Time to Market**	Market / Technology likely to have moved on before product is realised	> 5 years	5 years > and > 2years	2 years > and > 1 year	< 1 year
	Fit to existing Supply Chain	No fit with current chain. No knowledged of possible suppliers	Many key components required from new suppliers, few to choose from	At least one key component required from a new supplier, many to choose from	Few required, but none for key components	No new suppliers required
	Skill and Labour requirement / Manufacturing process availablity	All key skills missing and absent from local labour market, very labour intensive / no in-house manufacturing process capable	Most key skills missing, some absent from local labour market / can produce at least 1 key component	Many key skills missing, all avaliable in local labour market / manufacturing capability for key component cannot be introduced	Some new skills required but readily obtainable in the local labour market / can produce all but one key component but capability can be introduced	All key skills already acquired / processes available full production if required, outsourcing production not an issue
	Routes to Market / Channel Capability	Unknown / None existing	Key players poorly undertstood / At least channel exists but uncerntainty over suitablitiy	Entire route understood but no direct experience or contacts / Existing channels could become capable, new channels identified	Direct experience and good relationship with some key players in the chain / Current channels probably capable	Experience of and good knowledge of entire route to market / Current channels more than capable
"SOFT"	**Strategic Fit / Impact on existing business**	Inhibits strategy / Negative impact on existing business	No impact / All impact coincidental	Weak alignment to strategy / Some impact, exact impact unclear	Alignment to long term strategy / Steady long term positive impact but unquantifiable	Required to realise both immediate and long term strategy / Large measurable postivie impact, likely to lead to a direct increase in sales of other products
	Knowledge of the Market	No experience, only gut feeling. No idea how to gather information	Some formulated ideas but sources unreliable and weak understanding	Some areas known well but many gaps. Own sources of information are no	Experience and knowledge attained but requires updating, know where to find reliable sources	Active participant in current market, have good sources of information actively feeding updates to the company

Exercise

- What considerations must you bear in mind in the design of a scoring system to prioritise projects?

- What difficulties might you encounter in applying the tool?

- Good for
  - Early appraisal
  - Supporting exploratory initiatives - Complex, multi-stage, projects
  - Relative ranking and selection

  - Must give way progressively to "harder" valuations as projects mature

Choosing Evaluation methods

Full business plan

Financial Valuation

Risk / reward analysis

Strategic balance

Scoring methods

Opportunity Identification

Basic research   Targeted research   Concept development   Product development   Commercialisation

David Probert, Cambridge 2012 et al

Proposed NPI Stages

2. Scoping

3. Proof of Concept

3. Market Assessment Macroeconomic

4. Component validation in lab

PESTLE Analysis

Porter's 5 Forces

Update all previous tools and check, PM tools drawn up e.g. Critical Path Analysis, Basic Sensitivity Analysis

PESTLE Analysis

- Political
  - Growing concern over security of supply
  - Natural Disasters, Terrorism, day-to-day
- Economic
  - Polluter Pays
- Social
  - Changing view on Health

- Technological
  - Gap in current capabilities
  - Number of suitable sensors, req. integration
- Legal
  - Regulations, standards
- Environmental
  - Limited water resources

Porter's 5 Forces

- Rivalry from existing competition
  - Large, state run, closed market, established
- Threat of substitution
  - Larger companies taking over, muscling out LDI
  - Competing technology
- Threat of new entrants
  - Rival standard
- Bargaining power of suppliers
  - Partners, Architecture suppliers, access to utilities
      - Bargaining power of buyers

        Govn't contracts

        LDI needs them, they don't need LDI

Minimum Viable Product

- The minimum set of features needed to learn from early visionary early adopters
  - Avoid building products that nobody wants
  - Maximise learning per euro spent

- Probably more minimum than you think!

- Applies to both internal and external product development

Specific concepts
Applied to ROW

Idea already developed

One of several products/projects in LDI's portfolio

Ansoff Matrix

Specific concepts
Applied to ROW

Disrupting Dominant design and incremental innovation
Technology S curve
Product attribute perceptions: Relative advantage, Observability, Trialability,
Compatibility, Complexity
ISAEP – Range finder
QCT
Over confidence in NPI

Competition

General concepts
Applied to ROW

Product redesign – metal, surface treatments, machining
Experiments
New Variants
Accessories
Kits
Quality Control (in house and in the field)

General concepts
Applied to ROW

Context - Where will the product be used? How? By Who?
Purchasing - Who will decide to purchase? Is this the same as the user?
Functionality - Minimum features required?
Use cases

Further development - which direction to move:

Turbo ROW, ATEX, Scanning, Identification

Product Discovery & Concept Development
Summary

Lots of places to get inspiration from - tricky part is selecting good ideas to pursue

Idea selection - No one way, assumptions important to revisit regularly

Idea selection - Move to more financial "hard" selection as product refined
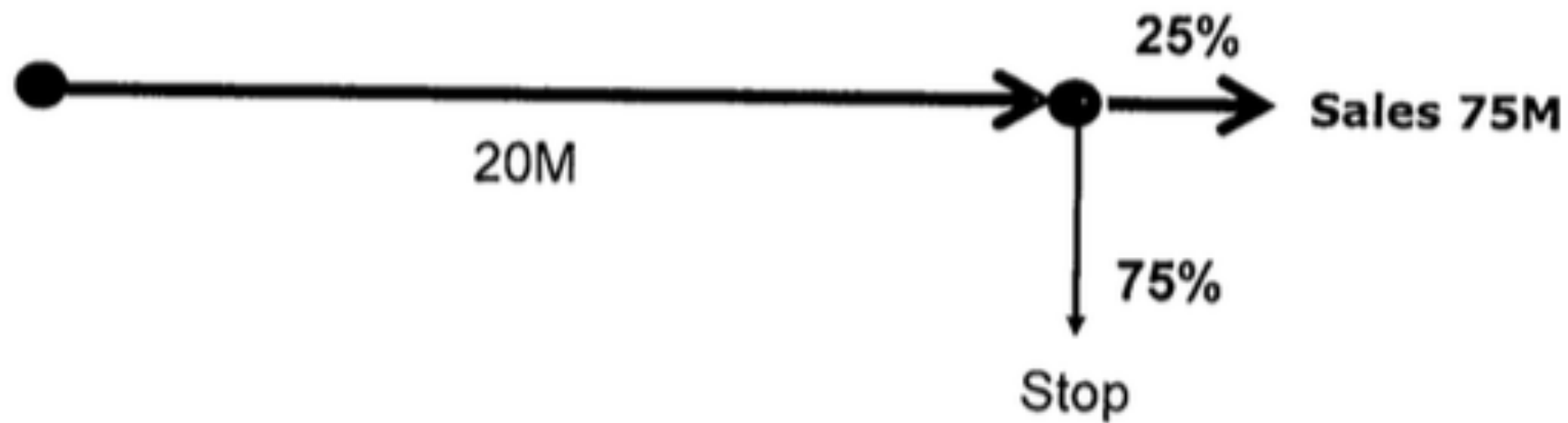
Concept development - Both Technology and Business side of product need to be developed in tandem

All parts of the business / project plan must be good

Thank you for Listening
Any Further Questions?

@DaveEstUK

Value of a single-stage project with uncertain outcome

Net Present Value (NPV):
75 x 0.25 - 20 = -1.25M

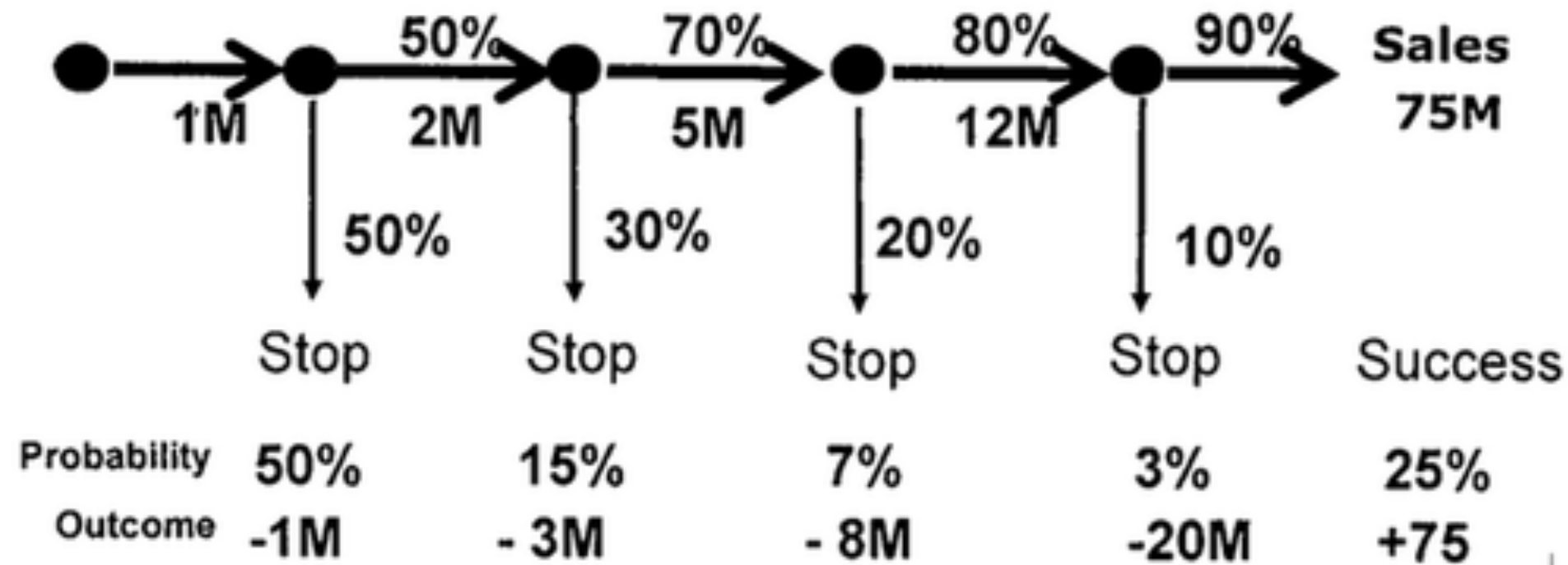# Expected Commercial Value (ECV):

better - NPV

75 x 0.25 -2.1 = <u>16.6</u>   (not -1.25)

(Because probability-weighted cost is
0.5 x1 + 0.15 x3 + 0.07 x8 + 0.03 x20 = (2.1))

	Stop	Stop	Stop	Stop	Success
Probability	50%	15%	7%	3%	25%
Outcome	-1M	- 3M	- 8M	-20M	+75
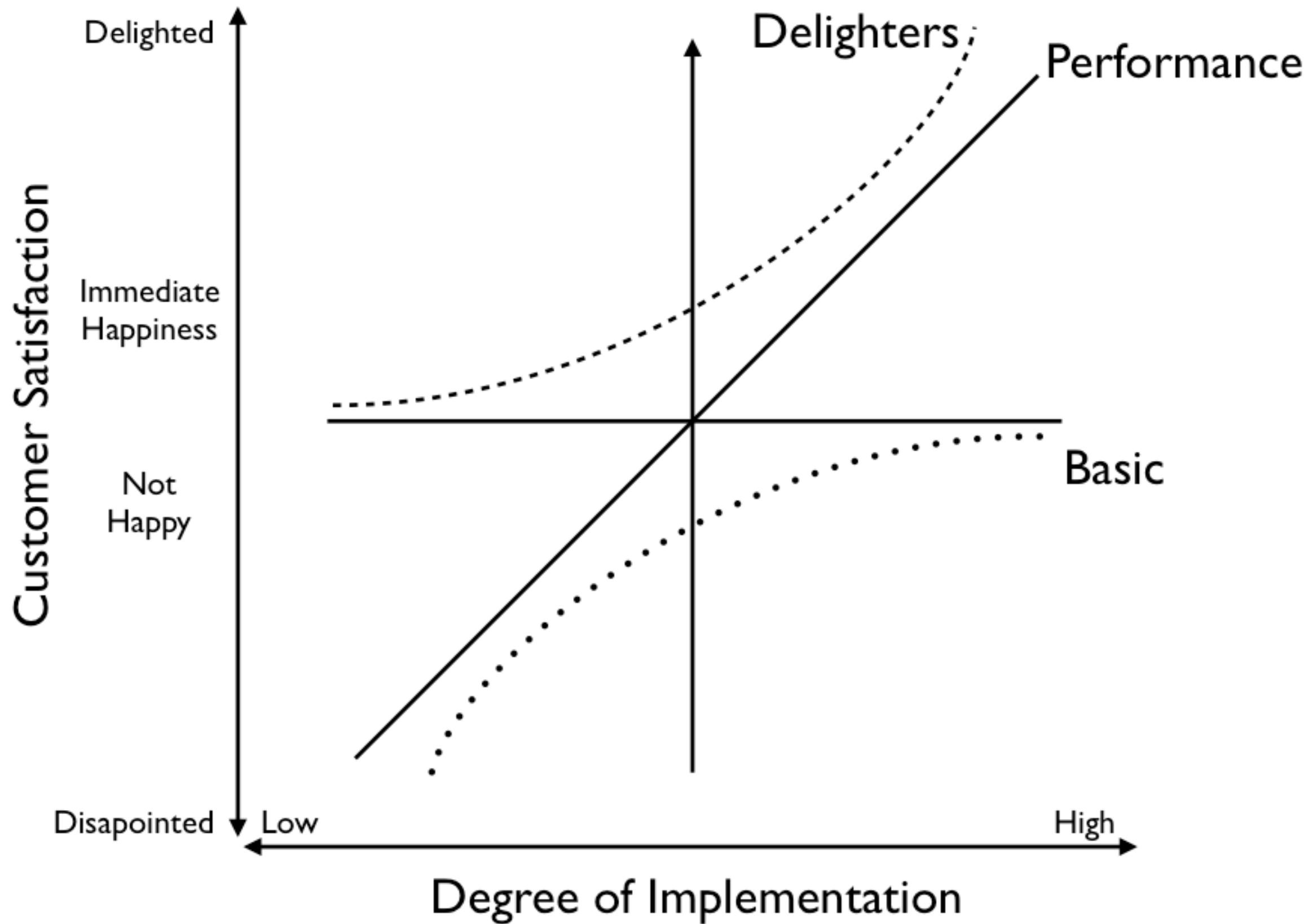
Kano model

Classifying Customer needs for SFS-portable with the Kano model

Customer Satisfaction

- Delighted
- Immediate Happiness
- Not Happy
- Disappointed

Degree of Implementation — Low ... High

Delighters
- One-touch operation
- Wireless data transmission
- Extra Sample Cells
- GPS location tagging

Performance
- Sensitivity
- Spectral Range
- Additional Sample Libraries
- Size
- Weight
- Improved Software
- Scan time

Basic
- Can operate for 1 day on 1 charge
- Standard Library
- Works in all operational environments
- Can connect to PC