Pisa Ideas Factory: Evaluation, Planing & Scoring

ITN Coherence Workshop in Pisa

17.9.- 20.9.2012

Dr. Patrick Leisching, VP R&D, TOPTICA Photonics AG

Personal history:

1992: TU München, Physics, Diploma thesis:
Ti:Sapphire laser & bulk GaAs

92-95: RTWH Aachen, Electronical Engineering, PhD:
Bloch Oszillations in GaAs/AlGaAs Superlattices (Excitons, Biexcitons)

96-97: Ecole Polytechnique Paris, AvH Feodor-Lynen Fellow:
Spin dynamics in CdMnTe quantum wells

1998: Max-Born-Institut in Berlin, ramp-up of fiber optic laboratory:
Er:fiber laser and Faraday rotation in HeMnTe

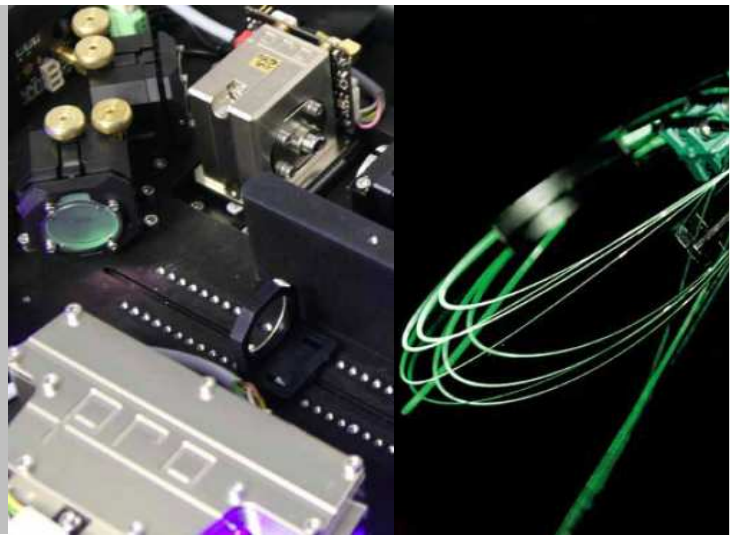
99-09: SIEMENS & Nokia Siemens Networks: Researcher, project leader, head of R&D department, portfolio manager, VP product management

2010-: TOPTICA: VP R&D

TOPTICA: Key Figures

Technology:

Diode Laser Systems	205 – 2880 nm & 0 – 2 THz
Ultrafast Fiber Lasers	485 – 2200 nm



Key Figures 2012:

Employees:	130
Sales:	24 Mio €
Founded:	1998
Locations:	Gräfelfing (Munich)
	Victor (NY/USA)

Ideas Factory Agenda:

Monday lecture: Introduction Idea Factory

- What is the point
- Generation of ideas
- Matching ideas and groups: 10x3 pre-assigned teams

Tuesday lecture: Idea „process“ @ industry

- Pre-reading of „module 4“ and BC required
- 60 min presentation
- 30 min walk through: „idea conversion status“, grant or business plan

Wednesday: SWOT poster or idea presentations

- SWOT poster session or e.g. 10x8+4 min presentation (6 slides max.)
- Evening: Fine tuning of presentation

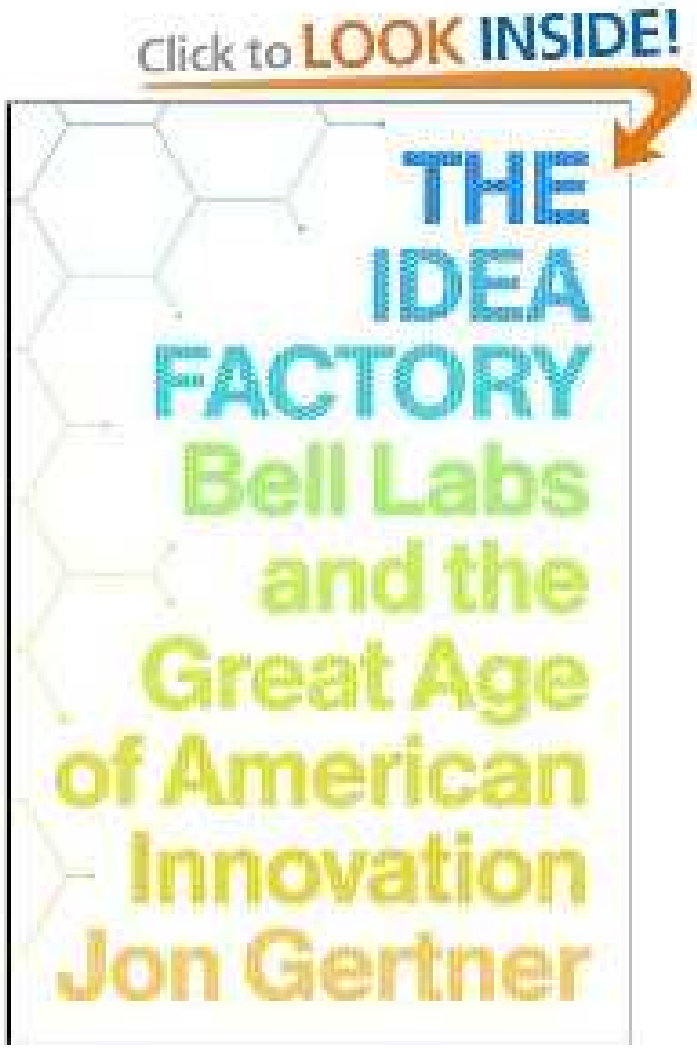
Thursday: Idea presentation, scoring & feed-back

- 10 min presentation or extended feed-back per idea
- Scoring and hand-over of price

Tuesday agenda:

- Industrial „Gold standard“ for Idea Factory
- Ideas @ industry processes
- Rating and selection of ideas
- What ideas did TOPTICA select?
- Technical planning
- Business case planning
- Conclusion
- Group work: Which ideas shall be analyzed

Gold standard for Idea Factory 1960-1990: Bell Labs



Transistor

Solar cell

Radar & Maser

Digital & Mobile communication

Fiber optics

Lesson learnt from Gold Standard:

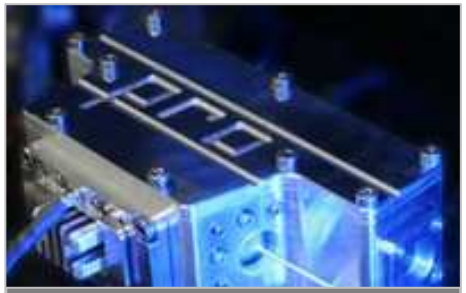
Industry innovation at ATT: Leap Frog

- Technology push as market does not yet exist
- Requires 10 years research, development & manufacturing
- Constant cash-flow, monopoly works best (today: Google)
- Teams driven by curiousity, knowledge, 20% freedom

CA venture capitalist innovation: Incremental

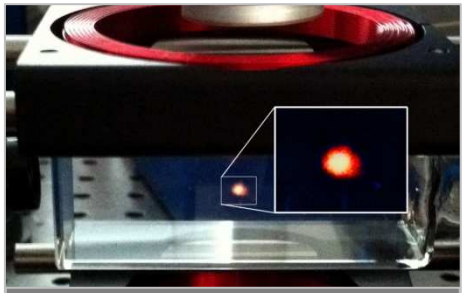
- Technology push or market pull
- Requires pre-existing IP, max. 3 years to product
- Venture capital €
- Teams driven by making money

TOPTICA: Latest Product (Idea) Releases



pro – all wavelengths up to 2W

589 nm (2 W / 20 W)

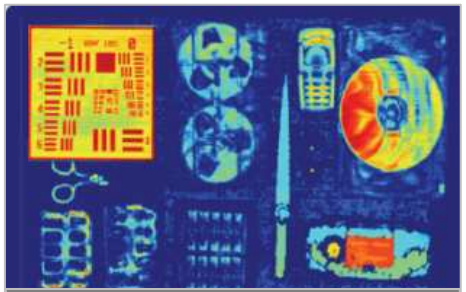


Rubidium-MOT

BlueMode & CHARM

TeraBeam + Antennae (1550 nm)

FemtoFErb (1560 / 780 nm)

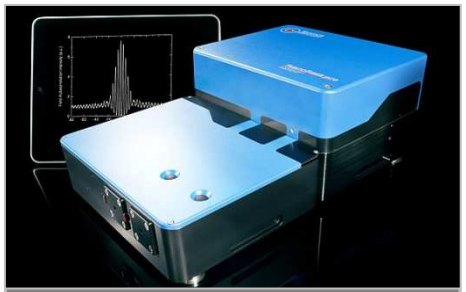


THz imaging (Synview)

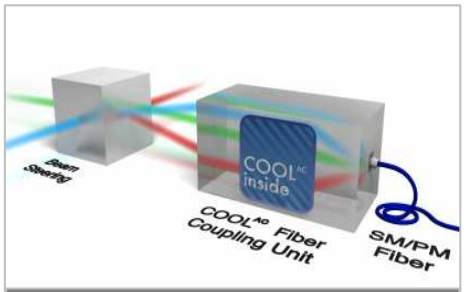
WS6 – 200 IR3

iBeam smart PT

iChrome MLE

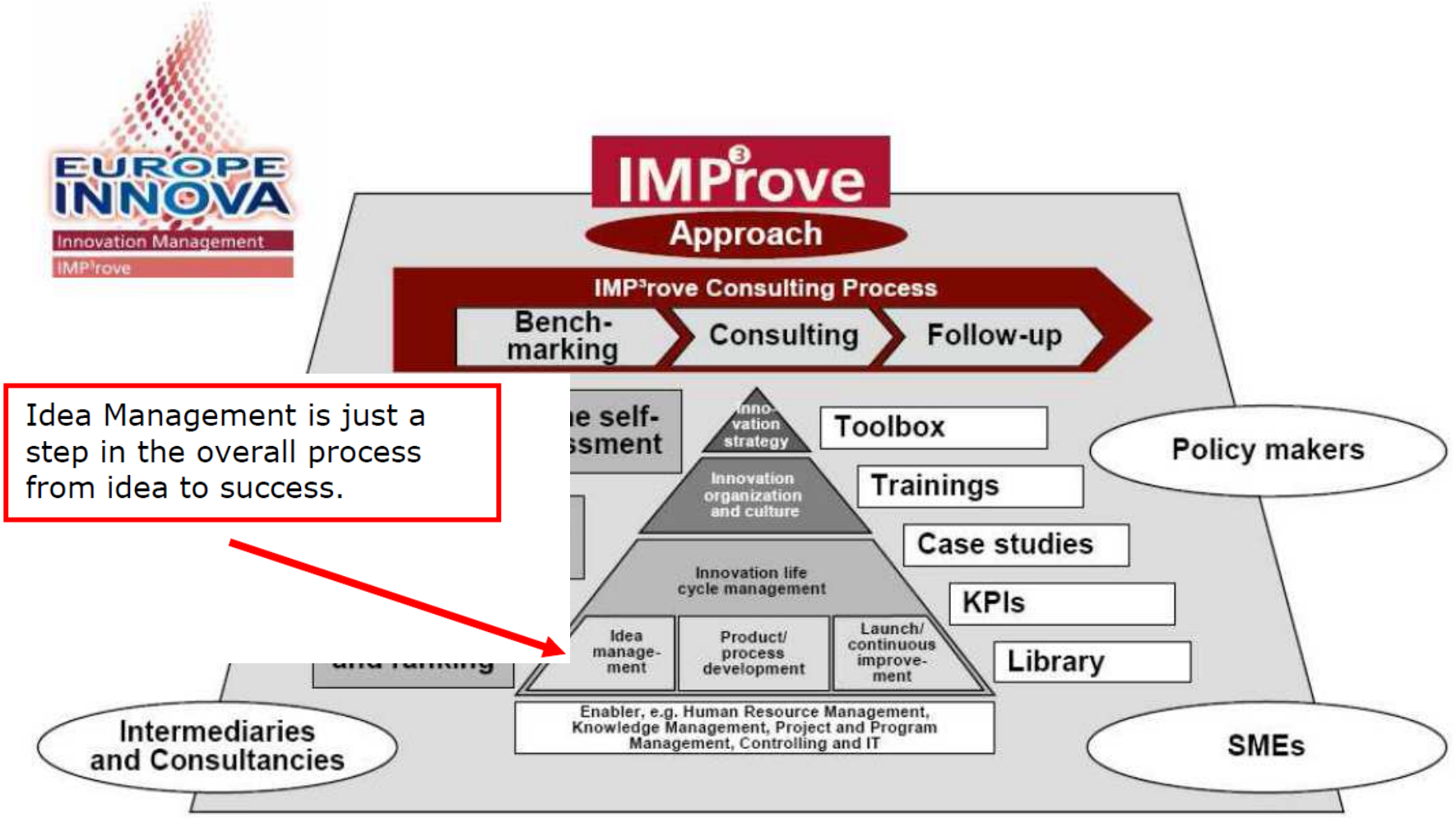


FemtoFiber UCP (< 25 fs)



COOL^{AC} Technology

Ideas are part of „Innovation Management“:



SME= Small and medium sized enterprise; IMC= Innovation Management Consultancy; KPI= Key performance indicator
Source: IMP³rove Core Team 2006

A.T. Kearney 29/03.2007/12482b 11

http://www.creative-trainer.eu/fileadmin/template/download/module_idea_evaluation_final.pdf

Ideas will trigger R&D developments @ SME:

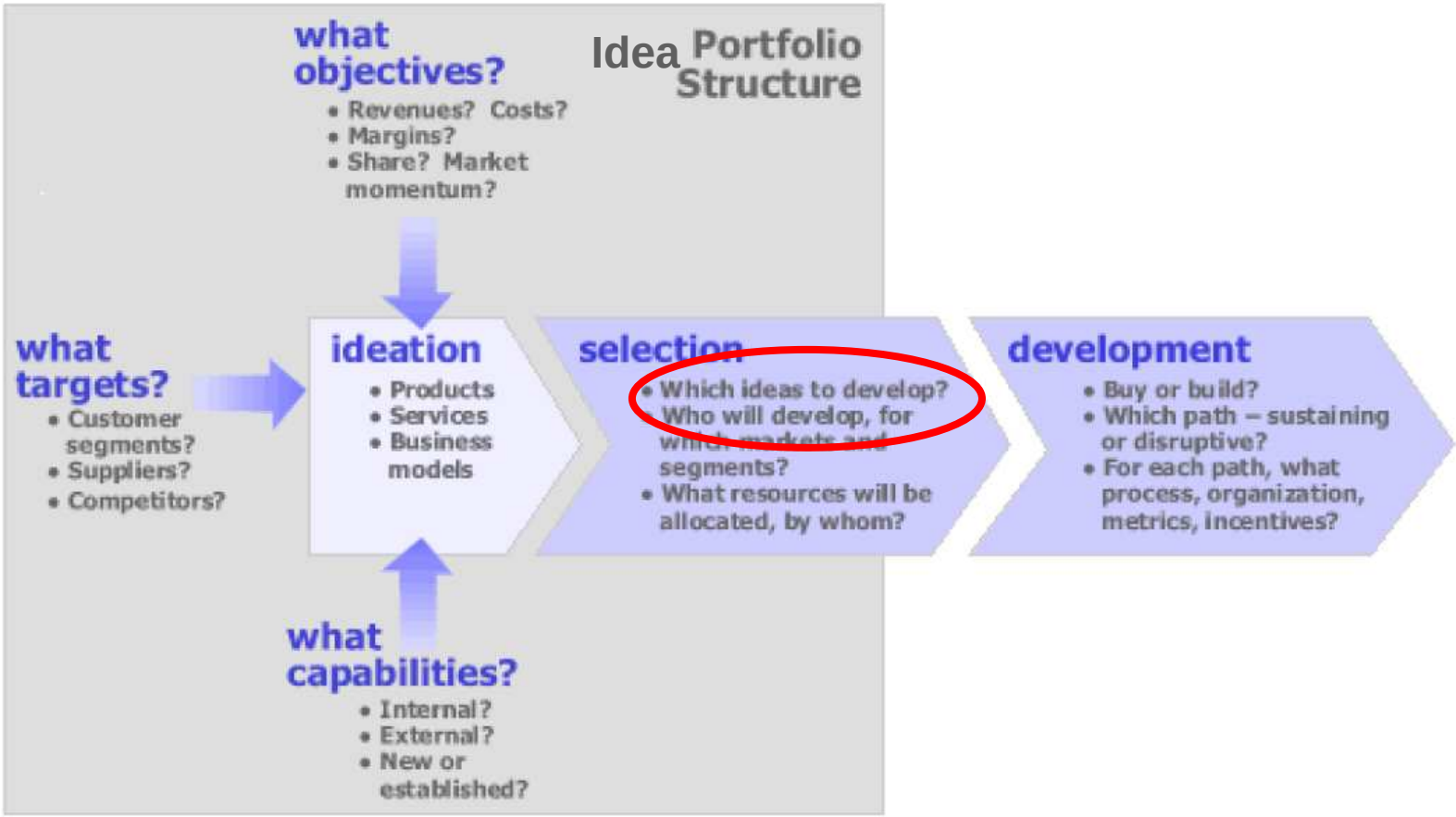


Figure 2: Portfolio Structure (by Eos Consulting)

http://www.creative-trainer.eu/fileadmin/template/download/module_idea_evaluation_final.pdf

More complex idea evaluation process at SAP:

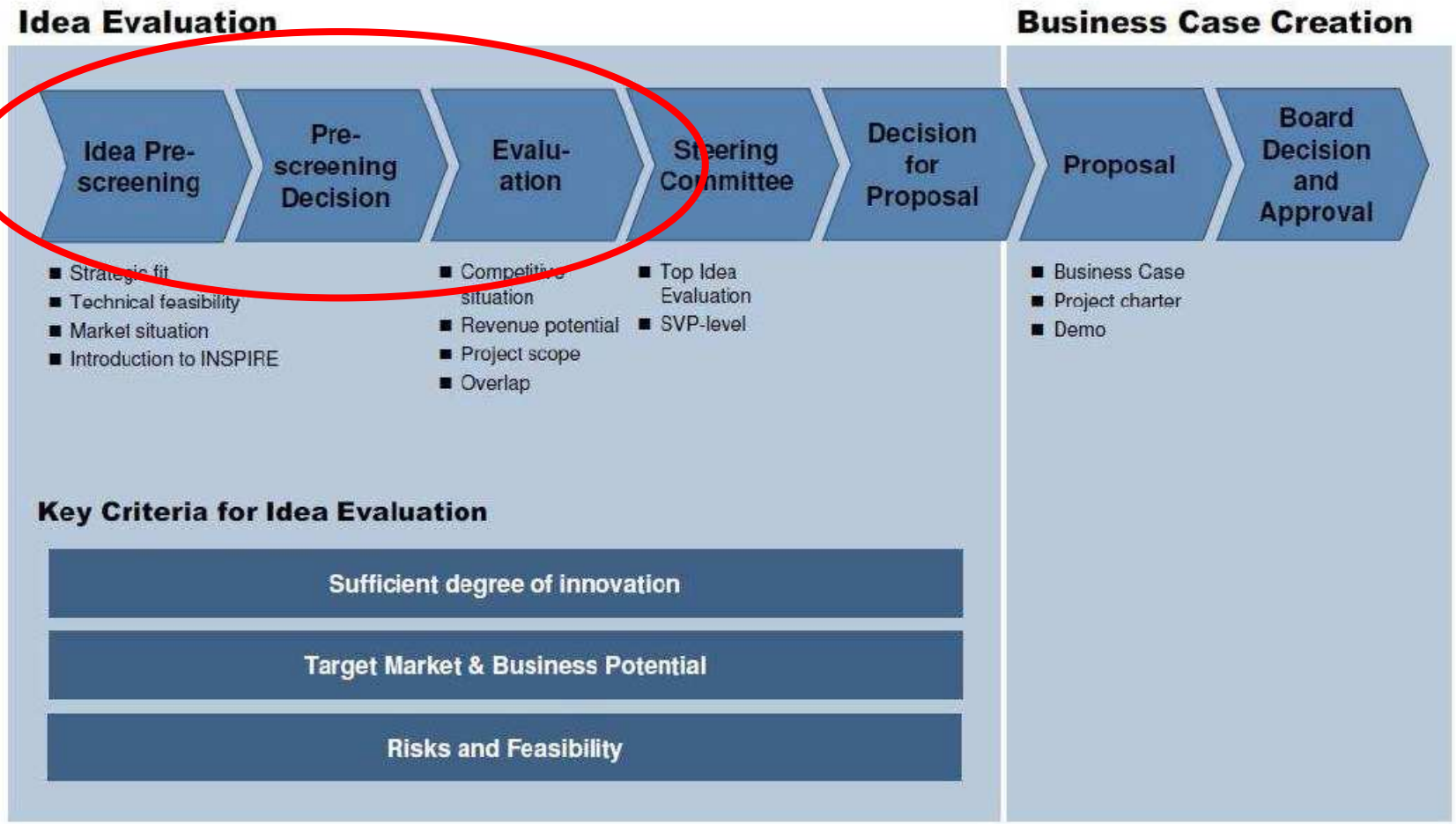


Figure 4: SAP approach to idea evaluation and business case creation

http://www.creative-trainer.eu/fileadmin/template/download/module_idea_evaluation_final.pdf

Final motivation: Ideas shall generate profit !

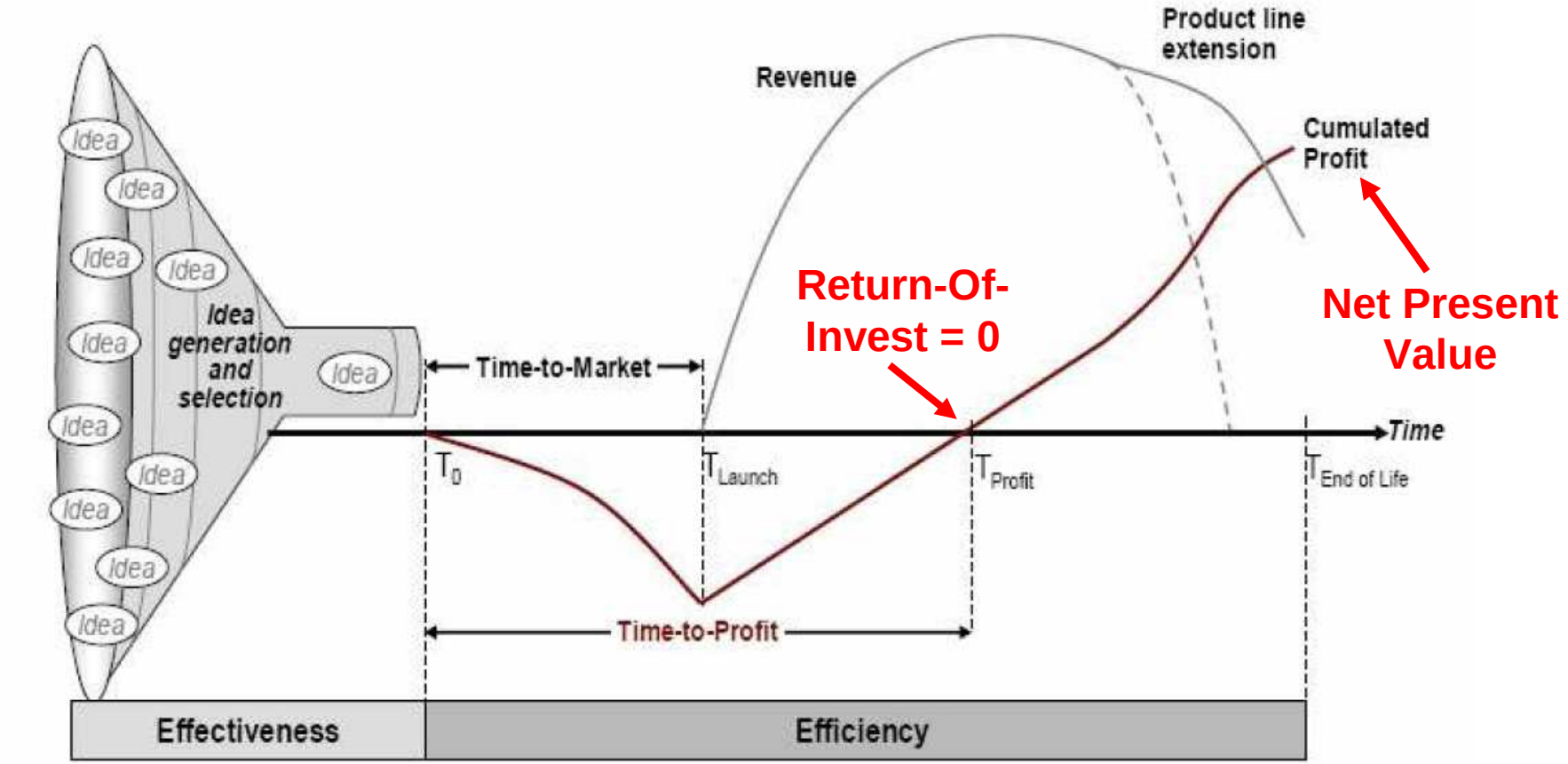


Figure 3: Time span form idea to profit (Wagner, 2007)

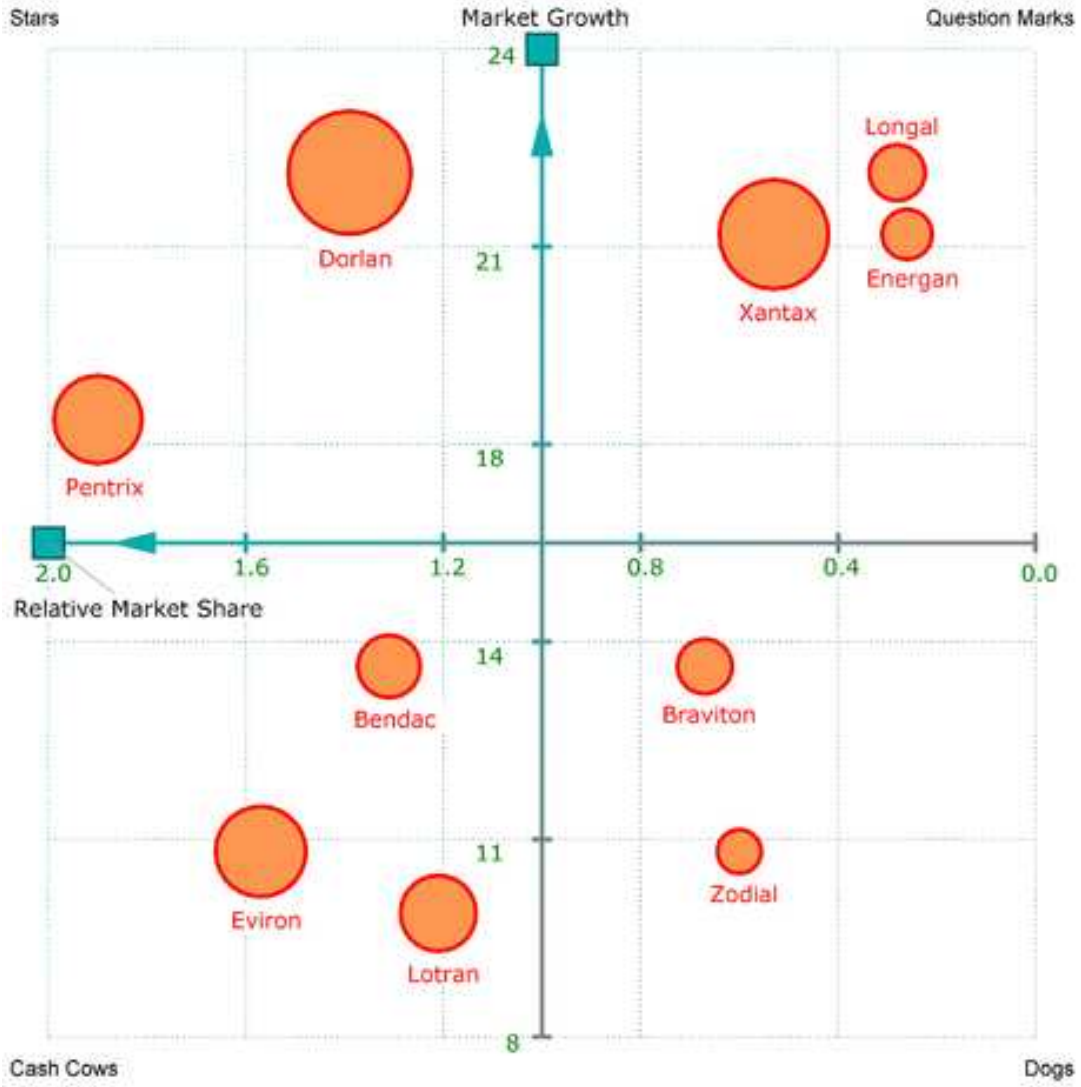
http://www.creative-trainer.eu/fileadmin/template/download/module_idea_evaluation_final.pdf

Mapping of ideas to markets and products:

	Existing Products	New Products
Existing Markets	1	2
New Markets	3	4

- **Analyse your idea:** how-to-compete in a niche market and a mass market may be completely different
- The **simplest business ideas** are Box 1 and the trickiest are likely to be in Box 4.
- **Rule#1:** Invest in fast growing markets, i.e., markest which grow faster than world wide GDP (gross domestic product)
- **Rule#2:** Concentrate rather on 2&3, 1 is evolution only, 4 is very challenging, you need to shape the market on your own like Steven Jobs

Defend your „star“ over the „cash cow“:



- Established businesses are cash cows, Return-of-Invest (ROI) is ca. 1 year
- Your idea is a „star“, ROI can be 3-5 years
- In an ideal environement, „Dogs“ will get no funding, „Question Marks“ may get some
- „Star“ vs. „Star“ is dependent on company strategy

http://en.wikipedia.org/wiki/Growth-share_matrix

Typical distribution of high-tech product costs:

Customer price > 2x bill-of-material (BOM)

- Bill-of-Material 1
- Cost-of-Goods-Sold: +10-50%
- Administration&Sales overhead: +10-20%
- OPEX=R&D cost recovery: +20-30%

Typical high-tech COGS to revenue factors:

- Apple & Microsoft 10
- ATT until 1984 5
- Cisco 3
- Laser industry is around 2
- Telco industry is today 1.3

Technical & market planning:

- Go stepwise: all 3 months a technology/market/financial milestone
- Show early prototypes to potential customers
- R&D planning: milestones every month (MS Project) show critical path/risks
- No best case or worst case planning in time and resources
- Do top-down and bottom-up planning !
- The total cost for an equipped PhD is 1/10/100k€ a day/month/year

Example: funding agreed at time=T0

- T0+3 months: Team in place
- T0+6 months: Discussions with min. 2 pilot customers
- T0+9 months: Technical proof of principle
- T0+12 months: First prototype @ trade fair
- T0+15 months: First prototypes at two customers
- T0+18 months: Order intake of min. two units
- T0+21 months: First beta-unit deployment
- T0+24 months: Pre-serial production ready for deployment
- T0+36 months: Operationally profitable
- T0+48 months: ROI = 0

Important parts of the business case:

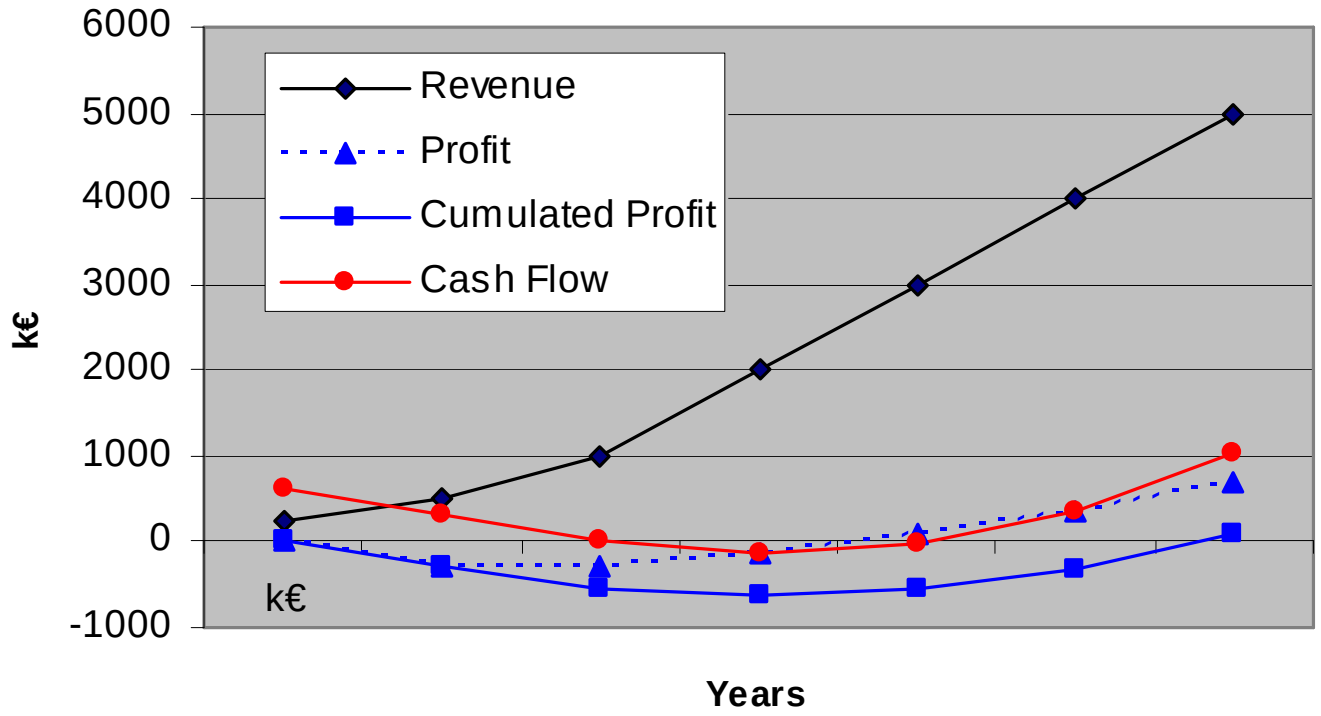
- **Market:** Shows how big the cake is and how good you perform compared to your competitors
- **Statement of Operations:** Shows revenues, gross-margin and operational cost, are you profitable ?
- **Accumulated profit and Cash Flow:** Shows what happens to your cash position and accumulated profit over time

Rating typical via Net Present Value after 3-5 years:

ΣProfit/ΣInvest (year of investment)

Template business case:

- Input: Market, revenue, gross-margin, operational expenses
- Output: Profit & Cash, cumulated profit (=NPV) as key number



SWOT template for Wednesday afternoon poster session:

Strengths	Weaknesses
Opportunities	**Threats**

Template for the grant proposal presentation:

- **Cover page:** Identifies your research project & list of participants
- **Table of contents:** Organizes information for the reader
- **Project decription:** Overal strategy and general description
  Concepts and objectives
- **Scient./Techn. Quality:** Advances over state-of-the art
  Contribution to S/T progress
- **Implementation:** Workplan with deliverables and milestones
  Overal budget breakdown for the project
- **Impact:** Performance/research indicators

Scoring criteria for scientific grant proposals:

Evaluation criteria applicable to **Collaborative project proposals (*full* STREP)**		
S/T QUALITY **"scientific and/or technological excellence" (relevant to the topics addressed by the call)**	**IMPLEMENTATION** **"Quality and efficiency of the implementation and the management"**	**IMPACT** **"Potential impact through the development, dissemination and use of project results"**
• Clarity of targeted breakthrough and its relevance towards a long-term vision. • Novelty and foundational character. • Specific contribution to progress in science and technology. • Quality and effectiveness of the S/T methodology.	• Quality of workplan and management. • Quality and relevant experience of the individual participants. • Quality of the consortium as a whole (including complementarity, balance). • Appropriate allocation and justification of the resources to be committed (person-months, equipment, budget).	• Transformational impact of the results on science, technology and/or society. • Impact towards the targeted objective in the workprogramme. • Appropriateness of measures envisaged for the dissemination and/or use of project results.
Threshold: 4/5 **Weight: 50%**	**Threshold: 3/5** **Weight: 20%**	**Threshold: 3.5/5** **Weight: 30%**
NO OVERALL THRESHOLD		

Template for the business plan presentation:

- **Cover page:** Identifies your idea/business & lists participants
- **Table of contents:** Organizes information for the reader
- **Executive summary:** “Big picture” & strategic view of the plan highlighting factors that will lead to success
- **Innovation quality:** Evolution, revolution, leap-frog
  IP in place?
- **Execution plan:** i) Marketing and R&D milestones
  ii) R&D cost, iii) main risks
- **Business case:** Illustrates how the business will perform financially based on the plan’s assumptions

Scoring criteria for business plan presentations

Rating of parameters from 1-5, 5 is best:

- **Innovation quality:** Do you have a great protected idea?
- **Execution plan:** Do I trust in your plan?
- **Business case:** Do I get my money back after 3-5 years?

Scoring is average over all, here: Equally weighted

(Weighting depends on: Venture capitalist, McKinsey, small/big company..)

Hint#1: Exceed your presentation time and I will not trust to your execution plan

Hint#2: There are prices for the best three teams, in case we have a great business plan or grant proposal TOPTICA will be delighted to back up the implementation

Wednesday afternoon:

- SWOT analysis and/or small group presentation
- Evening: Fine tuning of presentation

Thursday morning:

- 10+5 min presentation for each proposal
  (Cover, content + max. of 5 add. slides)
- Scoring and feed-back
- Prize ceremony

Conclusion:

Idea generation:

- Go for curiosity & critical mass
- Analyse critically via SWOT or other means

Idea handling in industrial / scientific environment:

- Check IP & Market / state-of-the art
- Excellent business plan / grant proposal
- Leap frog and incremental, both is fun but time scale different

Idea scoring:

The relative weighting may differ, but in all cases it‘s about:

- Outstanding scientific or innovation quality
- Convincing implementation or execution plan
- Significant impact in science/society or return of financial investment

Schedule of training:

	SUN 16/09	MON 17/09	TUE 18/09	WED 19/09	THU 20/09
Physics Department - University of Pisa	arrival	G1	G1	G1	G1
8:30 - 8:40		welcome			
8:40 - 9:00		Adams: IF intro			
9:00 - 9:45		Adams	Gallagher	Molmer	Ideas Factory: discussion
9:45: 10:30		Adams	Gallagher	Molmer	Ideas Factory: discussion
10:30-11:00		*coffee break*	*coffee break*	*coffee break*	*coffee break*
11:00 - 11:45		Saffman	Gallagher	Molmer	
11:45-12:30		Saffman	Pfau	Morsch	
12:30-14:30		*lunch*	*lunch*	*lunch*	*lunch*
14:30 - 15:15		Saffman	Pfau	Morsch	YEA
15:15 - 16:00	Pisa walking tour	Whitlock	Pfau	Morsch	
16:00 - 16:30		*coffee break*	*coffee break*	*coffee break*	
16:30 - 17:15		Whitlock	Ideas Factory: Leisching	Ideas Factory	
17:15 - 18:00		Whitlock	Ideas Factory: Leisching	Ideas Factory	

Presentations start 0900:
- 6x15 min
- coffee
- 4x15 min
- short break
1215: Award ceremony

Discussion

Quality Policy dedicated to industrial customers

- Quality management system certified to ISO 9001 since 2005

LGA InterCert
Zertifiziertes QM-System
ISO 9001:2008

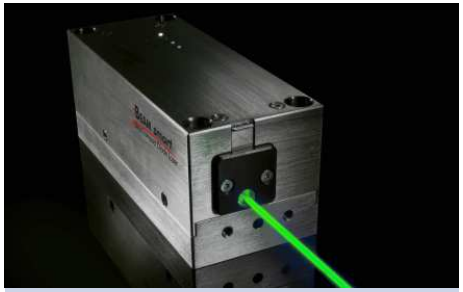
- Products follow EU and US standards:
  - CE (electromagnetic conformity, low voltage directive)
    - IEC 60825-1 (laser safety)
    - EN 61010-1 (laboratory equipment)
    - EN 61326-1 (EMC)
  - CDRH
  - RoHS, REACh, WEEE (hazardous substances and electronic waste)

TOPTICA: Technologies vs. Markets

Tunable Diode Lasers

- Tunable DL
- High Power DL
- NLO DL
- Photonicals

- Atomic Physics
- Laser Cooling
- cw Terahertz
- Spectroscopy
- Interferometry



OEM Diode Laser

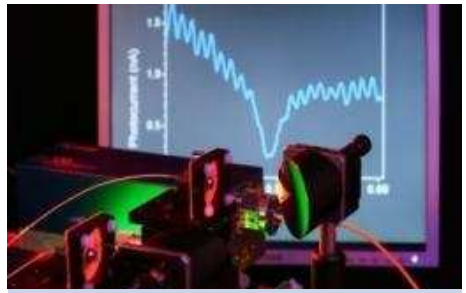
- Single mode
- Single frequency
- Multi-color

- Biophotonics
- Semicon
- Microscopy
- Mastering
- CtP Printing

Ultrafast Fiber Laser

- Picosecond
- Femtosecond
- Erbium-based
- Ytterbium-based
- Supercontinuum / discrete WL

- Microscopy
- Metrology
- Seeder for HP
- Spectroscopy
- Pulsed Terahertz



Terahertz

- 2-color cw
- Femtosecond
- Electronic emitters
- Antenna modules
- Spectroscopy Kits

- THz Spectroscopy (frequency-domain, time-domain)
- THz Imaging