Vrije Universiteit Brussel

2nd edition

# Intensive Training

B-PHOT BRUSSELS PHOTONICS TEAM

ESP SOLVAY

17 - 28 January 2011

# Entrepreneurship in Photonics

A modular training for everybody who is interested in entrepreneurship in photonics.

Vrije Universiteit Brussel, Pleinlaan 2, 1050 Elsene, BELGIUM

Co-organised by: photonics 4 life, ACT MOST

SEVENTH FRAMEWORK PROGRAMME

## Module 1 Introduction to Business Economics (3 days)

17-19 January 2011

The first module of this intensive training covers an introduction to business economics and high-tech entrepreneurship. It is aimed at young professionals with limited economic background. The module provides an introduction to a wide range of disciplines, including: understanding the structure and dynamics of industrial sectors, financial management and venture capital, intellectual property rights and other legal aspects, team and human resource aspects, entrepreneurial marketing, strategy and management.

## Module 2 Business aspects of Photonics (4 1/2 days)

20-26 January 2011

Module 2 provides young professionals with an overview of the photonics markets and the typical business aspects associated with these markets. Several sectors, where photonics plays an enabling role, are addressed, including those related to health and life sciences. In order to get a better understanding and to establish links with real situations, testimonials and business cases are included in the program. Here photonics entrepreneurs & professionals will share their ideas and experiences with you.

## Module 3 Starting a Technology Venture (2 days)

26-28 January 2011

In this 2-day module we look at different aspects related to starting up a technology venture. We cover topics such as IP strategies and financial planning. We study how potential investors will look at your (financial) plan, and which elements they will raise in a negotiation. We meet a number of seasoned Venture Capitalists in person; participants have the opportunity to present their project to them.

| Registration fees* | M 1 | M 2 | M 1+2 | M 2+3 | M 1+2+3 |
|---|---|---|---|---|---|
| Academic** | 1.000 € | 1.250 € | 1.850 € | 1.500 € | 2.000 € |
| Industry*** | 1.300 € | 1.650 € | 2.250 € | 2.000 € | 2.500 € |

* Registration fees include course notes, breakfast, lunch and receptions. Please note that housing is not included in the registration fee! However, we can offer rooms close to the university at very beneficial rates (25-38€/night), to the first 16 subscribers.

**Special rates:**

** The first 10 young researchers of Photonics 4 Life and NEMO will receive a reimbursement of up to 400 €.

*** Members of the Photonics 4 Life Industrial User Club can participate at academic rates.

For a detailed programme and for registration, please go to the following link:
http://www.b-phot.org/www/Events

For more information, please send an e-mail to Tom Guldemont, the coordinator of this intensive training (tguldemo@b-phot.org) and to Bernadette Callebaut (bcalleba@b-phot.org).

# Agenda Intensive Training Entrepreneurship in Photonics

Courses will be lectured by members of the Solvay Business School VUB, while keynote addresses will be given by experts in the field of photonics research, industry and sales.

## Module 1 — Introduction to Business Economics (3 days)

## Module 2 — ($4^{1/2}$ days)

| | Monday 17 January 2011 | Tuesday 18 January 2011 | Wednesday 19 January 2011 | Thursday 20 January 2011 | Friday 21 January 2011 |
|---|---|---|---|---|---|
| 08.00 - 08.45 | Registration & Breakfast | Registration & Breakfast | Registration & Breakfast | Registration & Breakfast | Registration & Breakfast |
| 08.45 - 10.30 | Introduction and Business Ecosystems (Marc Goldchstein - VUB) | Finance 1: Accounting (Diane Breesch - VUB) | Finance 3: Financial Analysis (Diane Breesch - VUB) | Introduction, Setting and History (Tom Guldemont - VUB) | Evolution of $\mu e^-$ industry (Kevin Douven - VUB) |
| 10.30 - 10.45 | Coffee Break | Coffee Break | Coffee Break | Break | Break |
| 10.45 - 12.15 | Innovation and Life Cycles (Marc Goldchstein - VUB) | Finance 2: Accounting (Diane Breesch - VUB) | Finance 4: Selected Topics (Diane Breesch - VUB) | Photonics research: Business as usual?! (Hugo Thienpont - VUB/B-Phot) | Lighting & Displays (Tom Guldemont - VUB) |
| 12.15 - 13.30 | Lunch | Lunch | Lunch | Lunch | Lunch |
| 13.30 - 15.00 | Funding of high-tech companies (Marc Goldchstein - VUB) | Human Resources (Ingrid De Clercq - Congaz) | Strategy & Management (Marc Goldchstein - VUB) | Solar Energy (T. Guldemont & M. Goldchstein - VUB) | Display Cases (Marc Goldchstein - VUB) |
| 15.00 - 15.15 | Coffee Break | Coffee Break | Coffee Break | Break | Break |
| 15.15 - 17.00 | Intellectual Property Rights (Hugo Loosvelt - VUB TTI) | Human Resources (Ingrid De Clercq - Congaz) | Sales and Marketing (Marc Goldchstein - VUB) | Lasers (T. Guldemont & Kevin Douven - VUB) | Case Displays - Barco (Jan Willem Brands - CTO Barco) |
| 17.00 - 18.30 | | | Reception | | |

## Module 2 — Business aspects of Photonics ($4^{1/2}$ days)

## Module 3 — Starting a Technology Venture (2 days)

| | Monday 24 January 2011 | Tuesday 25 January 2011 | Wednesday 26 January 2011 | Thursday 27 January 2011 | Friday 28 January 2011 |
|---|---|---|---|---|---|
| 08.00 - 08.45 | Registration & Breakfast | Registration & Breakfast | Registration & Breakfast | Registration & Breakfast | Registration & Breakfast |
| 08.45 - 10.30 | Industrial automation & Telecom (Tom Guldemont & Kevin Douven - VUB) | Biophotonics - Medical Imaging (Johan de Mey - VUB) | Biophotonics - Clinical trials (Bernie Caessens - Cochlear) | The Financial Plan (M. Goldchstein & J. Langhendries - VUB) | Legal Aspects and Term Sheets (Elke Janssens - VUB/Nauta Dutilh) |
| 10.30 - 10.45 | Break | Break | Break | Coffee Break | Coffee Break |
| 10.45 - 12.15 | Case Image Sensors - Optrima (Daniel Van Nieuwenhove - Optrima) | Biophotonics - Sales & Marketing (Hubert Raeymaekers - Philips Healthcare Belux) | B-Phot Industrial Research Lab Tour (SPIE Student Chapter - VUB/B-Phot) | The Financial Plan (M. Goldchstein & J. Langhendries - VUB) | Meeting with 2 Venture Capitalists (Ignace De Bock & Gerard Van Acker) |
| 12.15 - 13.30 | Lunch | Lunch | Lunch/Start Module 3 | Lunch | Lunch |
| 13.30 - 15.00 | Case Fiber Optic Sensing - FOS&S (Johan Vlekken - FOS&S) | Biophotonics - Intro to lab-on-a-chip (Ronny Bockstaele - Trinean) | Starting a Technology Venture: Overview (Marc Goldchstein - VUB) | Start-Up Valuation Techniques (Thomas Crispeels - VUB) | In the Dragon's Den (Participants) |
| 15.00 - 15.15 | Break | Break | Break | Coffee Break | Reception |
| 15.15 - 17.00 | Case Machine Vision - BEST (Christiaan Fivez - BEST) | Biophotonics - Trinean (Ronny Bockstaele - Trinean) | IP Strategies in Technology (Fabienne Brison - VUB) | Assessing Technology Ventures (M. Goldchstein & Dominique Buysse) | |
| 17.00 - 18.30 | | Reception | | | |

More than ever it is of essential importance for our economy to innovate and generate new growth-oriented businesses. Photonics is a major enabling technology and driver for innovations in a wide range of domains. Its core technologies, such as lasers, light emitting diodes, vision, displays, fibre optic cable, photovoltaic cells… translate into a wide range of industrial and consumer applications, of which several show exponential growth at a global level.

In order to stimulate and support innovative entrepreneurship in the domains of photonics, the VUB organizes the second edition of its "Intensive Training on Entrepreneurship in Photonics". This intensive course is targeted at researchers of universities and research institutes, young professionals, employees of photonics related companies, lawyers, business angels, consultants… active in the domain. In short: everybody who is involved with or interested in entrepreneurship in photonics.

It is a 2-week modular training course held in Brussels, starting on Monday, 17th January 2011, ending on Friday, 28th January 2011. The training adds to the already comprehensive expertise and educational program of VUB and is developed by the Business Economics Department (BEDR) and the Department of Photonics and Applied Physics (TONA/B-PHOT).

## Module 1 Introduction to Business Economics

**17-19 January 2011**

The first module is aimed at young professionals with limited economic background. The module provides a general introduction to a wide range of disciplines that all entrepreneurs will encounter in developing their business.

**Monday 17 January**

- **Business ecosystems, innovation and strategy:** During the first day we provide insights in how 'economic sectors' are organized into business ecosystems. We will study value chains, standards and network effects; we will identify different types of actors. We then study the different typologies of innovation and how innovations permeate in ecosystems.
- **Funding high tech startups:** In the first session on finance we discuss funding needs of high tech startups, and get an overall view on the alternatives and their implications.
- **Intellectual property rights:** Often patents are the most important asset of a high tech startup. In this session Hugo Loosvelt (VUB Technology Transfer Interface) presents key concepts of patents and other IP rights.

**Tuesday 18 January**

- **Accountancy and financial analysis I-II:** We allocate 4 sessions to the key topic of financial management. These sessions are taught by Professor Dr. Diane Breesch (VUB). In the first 2 sessions we study key financial reports (balance sheets and profit-and-loss statements) and accounting concepts (investment, depreciation, stock, accrual, …).
- **Human Resources & Team dynamics:** in these sessions we elaborate on one of the key challenges of entrepreneurship: building and holding together a team of top notch professionals, and working together as an efficient and effective team. We look at some aspects of human resources management. The session is organized by Ingrid De Clercq of Congaz, an experienced trainer/coach and HR professional.

**Wednesday 19 January**

- **Accountancy and financial analysis III-IV:** We learn to analyze financial accounts and cash flow planning. Finally, we cover specific aspects such as VAT, taxes, labour costs, insurance.
- **Sales and Marketing:** In this sessions we elaborate on sales and marketing aspects of high tech startups. First we study key differences between selling to consumers and businesses. We discuss how entrepreneurs can assemble knowledge about their markets. We touch on the role of product management and talk about pricing aspects. We discuss marketing communications for high tech entrepreneurs. We study the role of distribution channels and sales organizations, and learn about the role of customer service.
- **Strategy & Management:** Finally, we discuss the implications of the Monday sessions on the entrepreneurial strategy.

**Examination**: There will be an examination on this course on Saturday, the 22nd of January, for those participants who wish to earn 3 ECTS-credits (prerequisite: general economics course).

# Module 2 Business aspects of Photonics

**20-26 January 2011**

General: Module 2 aims to provide young professionals with a top-level overview of the photonics markets and the typical business aspects associated with these markets. Several sectors, in which photonics plays an enabling role, are addressed. We regularly focus on aspects that illustrate the concepts taught in the first module. Business cases are provided, and photonics entrepreneurs & professionals will share their ideas and experiences with you.

**Thursday 20 January**

- **Setting & History of Photonics:** The 2nd module starts with a general introduction to Photonics. We will give you an overview of important photonics organizations and a description of the diverse photonics markets.

- **Research in Photonics: Business as usual?!** In less than 15 years, the photonics research department of VUB evolved from seeing the daylight to a team with more than 50 co-workers. Prof. Dr. Ir.Hugo Thienpont will explain how he coordinates and manages this organization as an emerging SME.

- **Solar energy:** Renewable energy sources are becoming more widely accepted of which solar energy is a front runner. One of the key drivers for the growth of this energy source are governmental incentives. Other topics that will be addressed include the solar energy history, current and emerging technologies, production processes, a value chain analysis and applications. A special case session will be devoted to venture capital (VC) investments in the solar energy sector.

- **Lasers:** Lasers are one of the building blocks of the photonics world. Invented in 1960, the laser celebrates its 50th birthday in 2010. In this session, the history and several types of lasers, including their applications, are discussed. We discuss several papers of Steven Klepper (Carnegie Mellon University) and Guido Buenstorf (Max Planck Institute of Economics) in which the influences on start-up location are analyzed for the German laser industry. Furthermore, a model of industry evolution is drawn to explain the creation, destruction and fusion of independent submarkets in the US laser industry. Similarities in the spin-off development process between the German and the US laser industry are explored.

**Friday 21 January**

- **Evolution of Micro-electronics industry:** What can we learn from the evolution in the (micro) electronics industry? The invention and continuous improvement of integrated circuits (IC's) has been a key driving force in the second half of the 20th century. Many lessons can be learned from this industry which may be applied to the emerging photonics industries. In this session we analyze the evolutions that took place in the electronics industry: we learn valuable lessons from the companies that shaped the industry (Intel, Apple, TSMC, ASML..) and discuss the rapid changes in the electronics value chain.

- **Lighting & Displays:**
  - Different kinds of light sources exist, both in nature, and manmade. The incandescent light bulb is at the end of its industrial life cycle, opening the way for newer technologies, like gas discharge lamps and solid-state lighting. The history and development of LEDs, another photonics building block, is discussed, including patent issues and applications. Organic LEDs (OLEDs), which are proving to be a competing and complementing technology for LEDs, are also covered.
  - Displays: Industry Overview & LCD Value Chain: Before the lunch break, the development and applications of several display technologies are presented. You are introduced to the value chain of LCDs, the market structure of LCD components, and a view on their suppliers. Other topics that are addressed include 'the rise of the East' and the impact of a recession on the LCD value chain.

- **Displays Cases:** in this session, competing technologies for LCD will be discussed in cases, amongst others E-Ink. E-Ink developed the technology found within e-books and e-readers. Through the years, the company had to make many strategic choices, like its place in the value chain and the cooperation with other companies.

- **Displays: Case: Barco:** The story of Barco is one of continuous change. As a company founded in 1934 and assembling radios, Barco developed to become a leader in the global display market. Over the last decades, Barco acquired and sold several business units, placing the focus on all sorts of displays. Jan Willem Brands, CTO of Barco, discusses the reasoning behind these strategic choices.

# Module 2 Business aspects of Photonics

**20-26 January 2011**

## Monday 24 January

- **Telecom + Industrial automation**
  - **Telecommunications:** This session elaborates on how photonics is used in our communication networks. A special focus is placed on Fiber-To-The-Home (FTTH), where the last mile of wire in our information networks has seen optical fibers replacing copper. We will examine the advantages of the FTTH technology, structures & standards and the European and global implementation.
  - **Industrial automation: Vision & Sensing:** This session explores how photonics plays a growing role in enabling machines and installations to sense their surroundings. It includes an introduction to image sensors, machine vision and its applications in manufacturing and non-manufacturing industries. A chapter will be devoted to a special type of Machine Vision, namely thermal imaging. Another type of sensing is provided by optical fibre sensors, which can be used to measure several parameters such as pressure, strain or temperature in all sorts of environments.

- **Case Image sensors: Optrima:** The story of the very recent VUB spin-off is told by Daniel Van Nieuwenhove, a researcher who developed the 3D camera the company commercializes. The options for the company are very diverse. This is a very welcome innovation in the world of interactive gaming and other fields, like industrial automation. The company recently closed an €8 million investment deal with European Telecom operator Belgacom.

- **Case Fibre optic sensors: FOS&S:** As a spin-off of the Vrije Universiteit Brussel, this company provides fibre optic sensing solutions in very demanding engineering environments. Johan Vlekken, the Chief Technology Officer of FOS&S, tells you about the history of this SME and explains how they try to enter new and existing market segments, which are currently served by traditional electronic sensors.

- **Case Machine Vision: BEST:** BEST is active in the food sorting business. It manufactures and sells sorting machines based on photonics technologies. Christiaan Fivez, the CTO of the company, will provide you with a guest lecture, where you will be confronted with, amongst others, a very special sales model. The session is then completed with a walk through the demonstration room where you can see the machines at work.

## Tuesday 25 January

- **Biophotonics; Overview of Medical Imaging:** Medical imaging is an important section in the biophotonics field. Johan De Mey, head of the radiology department of the University Hospital UZ-VUB, will provide you with an overview of the different technologies that are used, as well as the companies that supply these products.

- **Biophotonics; Case Philips: Sales & Marketing in Medical Imaging:** Medical imaging installations typically are products that you don't buy in a supermarket. So, how is the sales model of a medical imaging company structured? How do they market their products? The presentation of Hubert Raeymaekers, Country Director Belgium - Luxemburg at Philips HealthCare will give you an answer to these questions.

- **Biophotonics; Introduction to lab-on-a-chip:** An emerging life sciences market is point-of-care diagnostics & analysis. A key emerging technology in this field are lab-on-a-chip devices, where a photonics technology can be integrated to analyze a test sample. This session will present how these devices become more and more important in diagnostics.

- **Biophotonics Case: Trinean:** Trinean is a young Belgian company that develops and sells lab-on-a-chip devices. In its early years, it proved difficult to collect the necessary funding, but the company managed to survive. Ronny Bockstaele, one of the founders of Trinean, tells you his story and adventures.

## Module 2 Business aspects of Photonics

**20-26 January 2011**

**Wednesday 26 January**

- **Biophotonics; Clinical Trials:** One aspect that distinguishes the life sciences industry from other industries, are clinical trials. Any product that is to be used for medical applications has to go through this time-consuming process and has to be approved. In this session, Bernie Caessens (Cochlear) explains how these trials are organized, which steps are involved, and elaborates on the best way to approach and execute them.

- **B-Phot Lab Tour:** The Brussels SPIE Student Chapter will guide you through the labs where the B-Phot (industrial) research is conducted. While the research topics are presented to you, partnerships may arise during or as a result of your photonics business project.

## Module 3 Starting a Technology Venture

**26-28 January 2011**

In this 2-day module we look at different aspects related to starting up a technology venture. We cover topics such as IP strategies and financial planning. We study how potential investors will look at your (financial) plan, and which elements they will raise in a negotiation. We meet a number of seasoned Venture Capitalists in person; participants have the opportunity to present their project to them.

**Wednesday 26 January**

- **Starting a technology venture, an overview:** In this session we take a bird's eye on the process of preparing and executing a startup and zoom in some aspects.

- **IP strategies in technology:** In this session we discuss different IP strategies that technology startups can consider; we compare practices in different technological sectors. We discuss the nuts and bolts of these IP policies. This session is provided by Fabienne Brison, VUB Professor intellectual property rights and law of new technologies and partner of the law firm Howrey, together with Hugo Loosvelt, member of the VUB Technology Transfer Interface.

**Thursday 27 January**

- **The Financial Plan:** In these sessions we discuss the different steps of writing the financial plan of a startup. We learn to budget for investments, recurring and variable costs and how to integrate these in a financial plan. We look at (the difficulties of) forecasting sales.

- **Valuation Techniques:** Both at startup and in later stages investors will go through the exercise of setting a value for your venture. We study how they make these valuations, and the techniques that are used for this purpose.

- **Assessing Technology (Ventures):** One of the key challenges facing entrepreneurs and investors is assessing the business potential of new, unproven technologies. In this session we will discuss a number of perspectives that are used to perform such assessment. Dominique Buysse, partner at Addestino Innovation Management will provide us insights in the way they address the issue of assessing unproven technologies.

**Friday 28 January**

- **Legal aspects and term sheets:** In this session we discuss some contractual elements that Venture Capitalists will raise when negotiating with a technology venture. This session is provided by Elke Janssens, scientific collaborator of the VUB department of Economic Law and partner at NautaDutilh where she specializes in corporate and financial law.

- **A meeting with 2 Venture Capitalists:** IIn this session a panel of seasoned Venture Capitalists will present their insights on technology entrepreneurship; we will discuss a series of topics raised by the chair and participants.

- **Presenting your venture:** In this session participants get the opportunity to present their project to the panel of venture capitalists. Please inform us up front if you wish to use this opportunity to receive professional feedback on your project.

# Testimonials of previous participants

**Thomas Woggon**

**PhD Student, Karlsruhe Institute of Technology, Germany**
**Winner of the Photonics Europe Innovation Village award 2010**

"First of all, the location is beautiful, I would go to the VUB again just for the marvelous food. The training itself was, for me being a physicist, an enlightenment. I never imagined that it is possible to animate the facets of starting a business in such a diverting way as the speakers did. The numerous real life examples and first hand experiences given in the lectures helped me to avoid a lot of common mistakes on the path to entrepreneurship."

**Katherine Lau**

**PhD Student, Institute of Photonic Technology (IPHT), Germany**

"Very inspiring, informative and well put together. A foundation to business for every scientist."

**Oleg Guziy**

**PhD student,**
**TU Delft, The Netherlands**

"Entrepreneurship in Photonics" gave me both structured theoretical background of entrepreneurship and practical tips & tricks of business. The training was really intensive, but teachers/invited speakers and participants had fun even when it went far beyond the schedule! I've brought home 5 kg of course informational materials, which I still check from time to time when I need to remind key points or when I am looking for new ideas. Entrepreneurship is a life long journey, which begins from the first step and I consider this intensive training as a big and solid step forward for me!"

**Sirichanok Chanbai (Ms.)**

**Early Stage Researcher (ESR) and PhD. Student**
**NanoFocus AG**

"I found that the Intensive Training "Entrepreneurship in Photonics" was an enjoyable and compact training course. It was intensive however, and delivered much more than a standard training course. The course was tailored to meet specific needs in starting up a business for whom that has little knowledge about economics and business. The trainers and invited speakers had a real wealth of economic and industry knowledge, and brought the course to life with real case studies. In the end, I just felt that the only missing piece after the course was to bring all these knowledge into practice myself, whereas the corpus of the training documents from the course will be very best guidelines along the way."

**Dr. Fetze Pijlman**

**Project leader Embedded Unobtrusive Light Sources**
**Senior Scientist, Visual Experiences, Research**
**Philips Research Laboratories**

"The training addresses a wide range of topics that are especially relevant for startups in technology. Although working for a multi-national, I found it very useful and still use it every day."

# Testimonials of previous participants

**Prof. Dr. Thomas Durt** — **Ecole Centrale de Marseille**

I participated only to a reduced part of the training but I regret not to have followed the full package. During the time that I participated, I had a “first taste” of finance, marketing, patenting and even gestion of human resources (or applied psychology, call it as you want) that really opened my horizon. I am a hard scientist and because of that I always had a natural tendency to remain in my ``ivory'' tower, but the training revealed to me new perspectives and realities to an extent that I did not expect beforehand. The atmosphere was studious but at the same time friendly, the level was high, and I also enjoyed the cosmopolitan company of other participants. In one sentence, it was worth being there...

**ir. R.M. Oldenbeuving** — **Laser Physics and Nonlinear Optics group, University of Twente**

This workshop is a must for young scientists working in the field of optics (from designing new lasers to using new microscopy techniques), if you plan to startup a company with the knowledge you acquired during your research."

"I was impressed with the hands-on knowledge and the enthusiasm of the speakers, regarding all the aspects you need to know when you want to be an entrepreneur in the field of photonics.

**Omid Kokabee** — **PhD Student, ICFO, Barcelona**

First of all, this course gave me an updated and comprehensive information about the situation of all photonics-related technologies with both enough scientific and market elaboration. It gives a real picture about what is happening both in the universities and in the market with real figures. Another interesting part was the face-to-face encounter and friendly chat with real entrepreneurs and VC's who have made great moves in their careers which were explained to us in a simple language. I wished this course was longer.

**Ricardo Cicchi** — **PhD Student, LENS - European Laboratory for Non-linear Spectroscopy, University of Florence**

I found this training extremely interesting and very well organized. I could really improve my understanding of the high-tech company’s ecosystem.