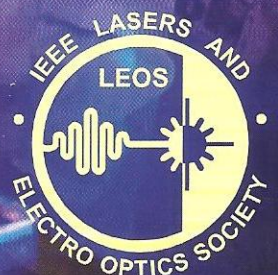


ECOC
2002

*Second
European LEOS
workshop on
Photonic
Start-ups*

Sunday 8 September 2002
Bella Center
Copenhagen, Denmark

Organised by the European IEEE/LEOS Chapters
with support from the LEOS Society



ECOC'02

Copenhagen

International workshop

2nd European LEOS-Workshop on Photonic Start-ups

Sunday, September 8, 2002
Bella Center, Copenhagen

*organised by European IEEE-LEOS chapters
in conjunction with ECOC 2002 in Copenhagen*

Organisation

Roel Baets, Ghent University - IMEC, Benelux LEOS-Chapter
Erik Pennings, ThreeFive Photonics B.V., Benelux LEOS-Chapter
Martin Dawson, University of Strathclyde, Scottish LEOS-Chapter
Alessandro Nocivelli, Luceat, Italian LEOS-Chapter
Giancarlo Reali, University of Pavia, Italian LEOS-Chapter

The cover of this digest was designed by Wim Bogaerts of Ghent University

Content

The objective of the workshop is to provide a usable insight in the process of creating a start-up company in the field of optical communications in the current economic climate. The workshop will focus on the European context. A number of speakers from various start-ups will share their hands-on experience on the major challenges they have encountered in building a start-up company. The workshop is targeted at all photonics engineers and scientists with an entrepreneurial interest. There will be ample opportunity for questions and discussion.

Program

- 14.00-14.10** Welcome and introduction
- 14.10-14.50** Johan E. van der Linden (European Patent Office, The Netherlands)
"Intellectual Property Rights - your major concern"
- 14.50-15.20** John Marsh (Intense Photonics Ltd, UK)
"Intense Photonics: creating competitive advantage"
- 15.20-15.45** Michael Kjaer (Crystal Fibre A/S, Denmark)
"Market diversification as a growth strategy"
- 15.45-16.15** Coffee Break
- 16.15-16.40** Wouter Deelman (ThreeFive Photonics B.V., The Netherlands)
"Out of the university lab into fabless production"
- 16.40-17.05** Patrik Evaldsson (Optillion AB, Sweden)
"Challenges and strategies in building a company in today's financial and market climate"
- 17.05-17.30** Panel discussion

Intellectual Property Rights - your major concern

Johan E. van der Linden
(European Patent Office, The Netherlands)

Abstract

Once you have an idea which you intend to commercialise, it is equally important to protect it. As a start-up company, in particular, this may be your most important possession. This talk will focus on how to seek legal protection for your inventions and highlight the latest developments in the patenting system.

CV

Johan E. van der Linden obtained a B.Sc. degree in Electro-Mechanical Engineering from School for Industrial Engineering, Antwerp (Belgium) in 1990. In 1994, he obtained a M.Sc. degree in Engineering Physics from Ghent University (Belgium) and spent a year at the Research Institute for Solar Energy of the Polytechnical University in Madrid (Spain). He obtained a Ph.D. degree in Engineering Physics from Ghent University based on his work in the field of guided-wave integrated optical components, which spurred a number of patent applications over the world. In 1999, he joined the European Patent Office in The Hague (Netherlands) where he is responsible for optoelectronics-related applications. After three years in the search and documentation division, he now carries out both patent search and substantive examination. Dr. van der Linden is also a freelance scientific reporter for the Institute of Physics.

Intellectual Property Rights – your major concern

Johan E. van der Linden, European Patent Office

Introduction

Intellectual Property Rights (IPR) covers the field of patents, utility models, trade marks, industrial designs, and copyright. Although IPR have existed since the 15th century, major changes have taken place in the last decade. Faced by increased competition in a global economy, IPR have become a business driver and strategic weapon for companies.

Definition

A patent is an industrial property right for an intangible asset, the invention, but does not allow for its proprietor to use the patented technology. It is basically a right to exclude others from performing certain acts for a limited period in a certain geographical region. The grant of a patent does furthermore not confer a positive right to commercialise the invention without complying with all applicable rules of the legal system. Regardless of whether or not a patent is granted, the inventor has to respect all legal provisions that might possibly prohibit the working or marketing of the invention (e.g. approval of the competent authority). By the same token, the refusal of a patent application does not mean that the invention cannot be exploited at all. It is then merely in the public domain and as such can be used by anyone – subject again to the law in general.

Requirements

Above all, the invention must be new, i.e. it may not be made public by written or oral description, by use, or in any other way before the date of filing the application. In the case that it is new, the invention must also represent an inventive step, i.e. from the point of view of a person skilled in the relevant area of technology, it does not obviously follow from the state of the art. Furthermore, the invention must meet the criterion of industrial applicability, meaning that it can be used or produced industrially.

Procedure

In order to get a patent an application complying with some basic requirements should be filed at a national, regional or international office. After a prior art search is performed by a competent authority, the application is published and a request for examination should be filed, leading to the grant or refusal of the patent application. The procedures before the European Patent Organisation (EPO) and World Intellectual Property Organisation (WIPO) will be explained in more detail.

Disclosure

A patent specification must be enabling, i.e. the description and drawings should allow for someone skilled in the art to carry out the invention. As a consequence, patents hold an enormous resource of information – representing about 70% of all publicly available technical information. The European Commission and the EPO are actively co-operating to promote patent awareness and increase the dissemination of patent information via free-of-charge online access to over 30 million patent documents. A demonstration of this search tool will be given during the presentation.

Intense Photonics: creating competitive advantage

John Marsh

*(Intense Photonics Ltd, 4 Stanley Blvd, Hamilton International
Technology Park, High Blantyre, G72 0BN, Scotland, UK)*

Abstract

Intense Photonics is based in Hamilton, close to Glasgow in Scotland. The company, founded in 2000, is developing high-performance low-cost active components, incorporating progressively higher degrees of chip integration, for the communications component market. A sound technology base and funding are clearly prerequisites for an emerging technology company. However many other factors are vital in building a successful enterprise – these include the development of a product roadmap that addresses market needs; establishment of a production system based on quality processes; a top quality management team; building integrated teams with clearly defined roles and objectives. The presentation will describe how Intense Photonics has developed from a concept to a company capable of competing in the world market.

CV

John H. Marsh is the Chief Research Officer and Co-Founder of Intense Photonics. He also holds the post of Professor of Optoelectronic Systems at the University of Glasgow. In 1996 he was the Founding Chair of the Scottish Chapter of LEOS. He has served as LEOS Vice President for Membership in Europe, Mid-East, Africa (1999-2001) and is currently an elected member of the Board of Governors (2001-2003). His research interests are particularly concerned with linear and nonlinear integrated optoelectronic systems. He has developed photonic integrated circuits based on quantum well devices and quantum well intermixing, and built an extensive programme of work at Glasgow on III-V based photonic integrated circuits for high-speed digital optical communications. He is author or co-author of more than 300 journal and conference papers. He is a Fellow of the IEE, the IEEE, and the Royal Society of Edinburgh.

Introduction

Intense Photonics' mission statement states that the company 'will become a world-leading force in the communications component market serving the market with high performance low cost active components delivering ever higher degrees of chip integration'. There are many facets to building such a company and, in order to build a company that will be successful in the long run, a business enterprise model is needed from an early stage.

Business Enterprise Model

Intellectual property is widely seen as the key asset in a high-technology start-up business, especially by the technical founders and the early-stage funders. Indeed, at the peak of the 'telecom bubble', certain investors were prepared to fund start-ups with vacancies even at CEO level. However, successful start-ups evolve into emerging companies in a timescale of months, and deficiencies in the management structure of a

business very quickly result in problems. In reality, the senior management team and their vision and effectiveness are factors rivalling the generic IP in importance.

From the start, Intense Photonics had the priority of putting together a management team with the capability of building a company with strength across the key business areas. In addition to technology development, in which start-ups tend to be strong, Intense has identified its key business areas as marketing, engineering operations, funding, leadership and human resources. The company has a Business Enterprise Model and a reporting structure that ensures all areas are monitored and developed as the Company develops.

Funding and Recruitment

Other than IP, the other absolute prerequisite a company needs is funding. Intense received seed corn funding from 3i and ACT in June 2000 and the 'A' round closed in June 2001, raising £7.5m from the same two investors. Venture leasing from European Venture Partners and grants from the Scottish Executive took the total to £10m. In August 2002, Intense closed a further £10.5 million series 'B' funding round. Cazenove Private Equity led the round with a syndicate containing first round investors, 3i and ACT Venture Capital, together with two further European venture capital funds, FNI Venture Capital and TTP Ventures.

The two technical founders (Chief Strategy and Research Officers) were joined by the CEO, as a co-founder, and by the VP Sales and Marketing and the Chief Personnel Officer in the seed phase. The senior management team was completed by the CFO and Chief Operations Officer in the 'A' round phase. The early appointment of the CPO and VP S&M has enabled Intense to become an outward facing organisation with a well defined company culture. There are currently 46 employees, from a diverse range of backgrounds.

Technology and Operations

In technology terms, Intense uses a proprietary development and manufacturing technique known as Quantum Well Intermixing (QWI). QWI allows multiple optical functions such as lasers and amplifiers to be fabricated on a chip in a single processing stage. In June 2001 Intense Photonics acquired Du Pont Photo Masks (UK) Ltd for the purpose of obtaining a facility in Hamilton that includes a class 1 clean room. This now contains a fully operational fabrication facility and producing multi-function optical chips. These multi-function chips provide significant cost advantages for telecommunication and other systems vendors through the reduction in component count and enable the creation of completely new functionality. Developing such components in the current market requires close interaction with customers and a flexible technology base. In addition to addressing the telecom market, the flexibility of the QWI process has enabled the company to address opportunities outside telecommunications.

Conclusion

Intense now has a complete management team, bringing strength to all the major areas of the business. It is trading successfully world-wide in both the telecom and non-telecom areas. It has funding in place that, against almost all planning scenarios, sees the company through to the generation of positive free cash flow.

Market diversification as a growth strategy

Michael Kjaer
(Crystal Fibre A/S, Denmark)

Abstract

The situation facing new optical communication start-ups has changed dramatically over the last two years.

In the past, being able to show the possibility of creating a competitive advantage for one specific product or service was enough to attract venture capital.

Being the first to achieve the competitive advantage was usually enough to create a successful company.

Today, start-ups are faced with difficulty in attracting new venture capital and with the severe depression in the market.

This talk will explore market diversification as a possible strategy for overcoming the current market conditions.

Effects resulting from changing strategy such as shifting market focus and changes in "cash burn" rate will also be explored.

CV

Michael Kjaer is CEO of Crystal Fibre A/S in Denmark. He received his M.Sc.E.E. from the Technical University of Denmark in 1994 and his BBA from Copenhagen Business school in 1996. From 1994 to 2000 he worked at Lucent Technologies Denmark in various positions as sales engineer, product manager and sales manager for the Specialty Fiber Division. In September 2000 he left Lucent to join Danish start-up Crystal Fibre as CEO.



CRYSTAL FIBRE

Revolutionizing optical fiber technology

Booth # 7

www.crystal-fibre.com

- Introduction to Crystal Fibre
- Venture Capital Situation
- Challenges encountered
- Market Diversification
- Conclusions

Introduction to Crystal Fibre

History:

- Based on ideas developed at the COM Center on the Denmark Technical University
- Company founded in December 1999
- Production facility completed June 2001
- First company to sell micro-structured fibers on a commercial basis.

Current size:

- 20 employees (8 Ph.d)

Mission statement:

- To be the Worlds leading and preferred supplier of micro-structured optical fibers



Introduction to Crystal Fibre

Ownership:

- NKT-Holding
- NKT Photonics group
 - Crystal Fibre
 - NKT Integration
 - Koheras
 - NKT Research and Innovation
- NKT Academy



Introduction to Crystal Fibre

Business Focus:

- Micro-structured Optical Fibers
- Allows novel and/or improved fiber parameters

Potential Markets

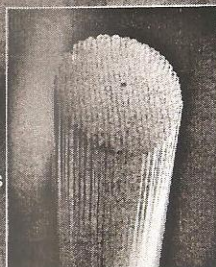
- Substituting standard optical fibers
- Novel optical fibers

Sustainable Competitive Advantage

- Intellectual Property Rights on fiber design
- Intellectual Property Rights on production processes
- "Experience Curve" advantages

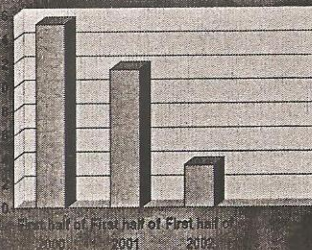
Temporary Competitive Advantage

- Experienced fiber designers
- Market knowledge
- Part of NKT "competence net"



Venture Capital Situation

Venture capital invested in technology startups in Europe [billion EUR]



Decline due to:

- Lower valuation of technology companies
- Resources required to keep current portfolio alive
- Expect both amount of funding and chance of getting funded to be reduced

Challenges Encountered



- Primary Success factors
 - Business idea
 - Venture Capital
 - Key Employees
- The Business Plan should combine all factors and give the company **strategic direction**:
 - Forces you into disciplined thinking
 - Forces you to think evaluate the risks
 - It is important to communicate the direction to everybody in the organization



Challenges Encountered



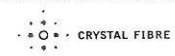
- Hiring
 - Key competences must be present as early as possible
 - Design
 - Patenting
 - Production
 - Measurement
 - Packaging
 - Sales and Product Management
 - But you are only as strong as your weakest link
 - Expect to spend a long time on hiring

Challenges Encountered

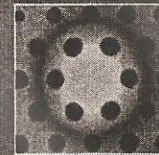


- Friction in Development
 - Start up process takes a long time
 - Negotiations between Venture Capitalists and Founders
 - Establishing facility
 - Standard work procedures
 - Regulations
 - As teams grow work becomes more specialized and coordination and communication suffers
 - Look out for signs that it is beginning to happen
 - Potential customers concerned about new technology

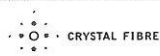
Challenges Encountered



- Psychological factors
 - In the beginning everybody is focused on possibilities; problems tend to be forgotten

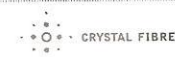


Challenges Encountered



- Rapidly changing market conditions:
 - Optical communication markets
 - Greatly reduced market size
 - Greatly increased price pressure
 - Greatly reduced interest in new technology
 - Less venture capital available for both new and existing ventures
- Possible solutions
 - Increase short term sales by expanding product line to include non-telecom business
 - Cutting costs

Diversification as a growth strategy



- Expand product line to include non-telecom business
 - If market opportunities exist that are **easier to reach** than focus products
 - Typically much smaller market size
 - Knowledge of new business areas usually small
 - "Easier to reach" usually means existing markets and competitors
 - Time to market for focus products will be increased
- Cost cutting
 - Focuses the company on cost base and critical areas instead of development speed.

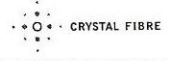
Diversification as a growth strategy



– Implications of product diversification

- Reduces focus
- Dilutes the resources that can be spent on each product
 - Design
 - Development
 - Production
 - Measurement
 - Sales
- All company activities will be hurt by reduced focus
- Makes development in all areas more complicated and tend to reduce development speed even further

Diversification as a growth strategy



– Implications of product diversification

- Short term increase in sales – long term decrease ?
- Design
 - Broader understanding of basis technology
- Patenting
 - New ideas likely to come up
- Production
 - “experience curve” advantages will aid development of all products types
- Measurement
 - “Experience curve advantages”

Diversification as a growth strategy



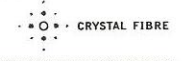
– Implications of product diversification

- Reduced Cash burn
 - Available funding will last longer
 - Easier to attract new funding

– Market Selection

- Understanding potential of technology
- Stay close to your customers
 - Best source of information
- Resources
- Time

Conclusion



- Challenges in Building a start up company
 - Business plan
 - Hiring
 - Friction in development
- Diversification strategy
 - All activities becomes more complicated
 - Coordination becomes increasingly important
 - Diversification is a survival strategy
 - But long term sales need not be reduced

Out of the university lab into fabless production

Wouter Deelman

(ThreeFive Photonics B.V., The Netherlands)

Abstract

Having a great technology is one thing, building an industrial company is something else. ThreeFive Photonics is a fabless developer and supplier of monolithically integrated optoelectronic chips. As a spin-out of Delft University, the company was established in February 2001 and introduced its first product -a multiwavelength receiver- in March 2002.

The presentation will cover the choice to go fabless and topics related to running a company of this nature.

- University relationships: defining new common ground
- From research mode to product engineering and production
- Going fabless: pro's and con's
- Turning IPR into patents
- Time as a scarce good
- Managing cash and raising capital in current environment
- Great technology, but what are customers looking for?

CV

Wouter Deelman is CEO and co-founder of ThreeFive Photonics. He has twenty years of telecom industry experience. He was a management consultant advising telecom equipment manufacturers and network operators, and worked at AT&T/Lucent in several positions, including Director Marketing Europe, Middle East, Africa. Prior to AT&T, he set up a European business unit for Sony in b-to-b videoconferencing systems.

Challenges and strategies in building a company in today's financial and market climate

Patrik Evaldsson
(Optillion AB, Sweden)

Abstract

Optillion develops, manufacture and sells fiber optic transceivers to networking equipment manufactures and the first line of products are targeting the 10 Gb/s Ethernet market. In this presentation we will discuss some of the challenges that faces a company in the current financial and market climate.

CV

Before joining Optillion Dr. Patrik Evaldsson was responsible for developing IP routing protocols, building Ethernet test-based MAN test beds and an Optical WDM field trial, and developing strategies for next generation IP and Optical Networks in his work at the Ericsson Group. Prior to Ericsson, Dr. Evaldsson spent six years at AT&T Bell Labs, working on the design of semiconductor lasers, transistors and optoelectronic components. Dr. Evaldsson has a Doctorate in Electrical Engineering from the University of Bradford, England and a Master of Science in Electrical Engineering and Applied Physics from the Linköping Institute of Technology in Sweden.

August 30, 2002



Challenges and strategies in building a company in today's financial and market climate

Optillion develops, manufactures and sells fiber-optic transceivers to networking equipment manufacturers. As the first company with a XENPAK product portfolio that supports both 10 and 40 km 10 Gb/s Ethernet long and extended reach XENPAK transceivers, Optillion has powerfully demonstrated the strength it gained through early and clear focus.

Optillion was founded in December 1999 by Jan Nilsson, a distinguished IT entrepreneur, and professor Christer Svensson and professor Lars Thylén, both world authorities in their respective fields of high-speed electronics and high-speed optics. It has grown rapidly to become an international company, with headquarters in Stockholm, Sweden and Sales office in Pleasanton, California.

Optillion has developed their first family of products to capitalize on the near-term demand for 10 Gigabit Ethernet XENPAK transceivers in enterprise, metropolitan area and cable television networks. To control the costs associated with optoelectronic integration, Optillion has implemented a vertically integrated manufacturing model, which incorporates in-house optical component design and manufacturing capabilities, automated sub-assembly production, and the outsourcing of all non-core manufacturing processes and the procurement of electronic materials and packaging.

This presentation will highlight some of the challenges Optillion has faced since the inception of the company start. During this period we have seen the almost total collapse of the Telecom market, and naturally this has had consequences on our business. To build a successful company you need a great technology, a great product and a great team including management, employees and investors, and you also need to be first to market with your products. Because of the market collapse in telecom other key things have become increasingly important, such as cost-efficient manufacturing and minimizing market risk by targeting multiple market segments.

A key question is how to get the customers to buy from your company. In this presentation we will discuss the advantages and challenges of Multi-Source Agreements (MSA) in reducing the market acceptance risk. Optillion was one of the founders of the XENPAK form factor MSA for 10Gb/s pluggable modules, and more recently the X2 form factor MSA.

Patrik Evaldsson
CEO and President
Optillion

www.optillion.com