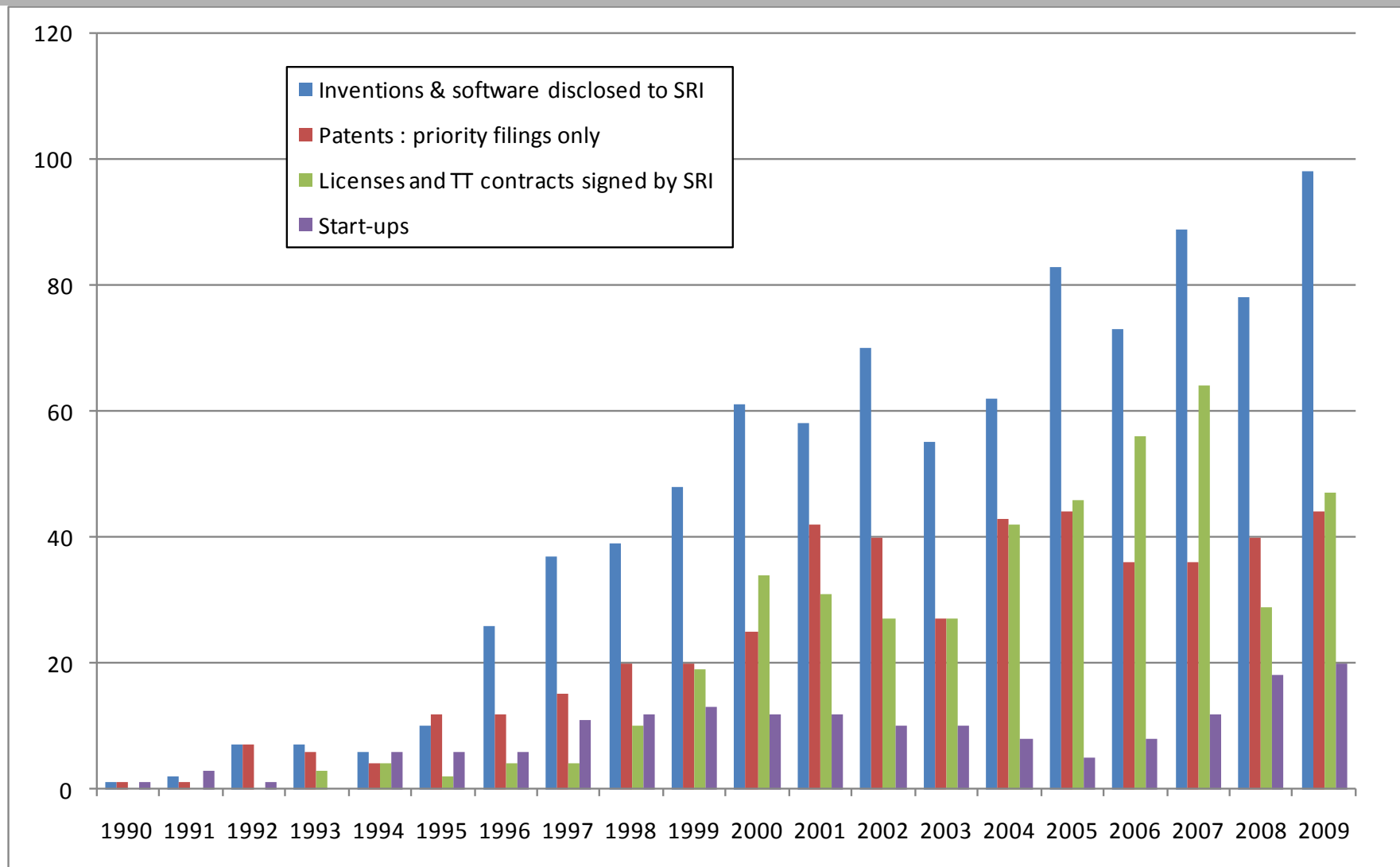


# Start-Up

## Managing Intellectual Assets & Intellectual Property

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Where to find SRI?

The Industrial Relations Office is located at Centre Midi, 2nd floor (CM) just above the Information Point (i) and the visitors parking

[www.epfl.ch/sri](http://www.epfl.ch/sri)



**Hervé Lebret**  
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Students, researchers, professors,  
you think your idea has unique potential.  
We offer you the possibility  
to develop it with our INNOGRANTS.



<http://vpiv.epfl.ch/innogrants>

A financing tool for innovative ideas:  
the **INNOGRANTS**

A encouragement to entrepreneurship through  
events and a network.



venture ideas @ EPFL  
Entrepreneurs' journey with impact

## Speakers



**George Candea,**  
Founder Aster Data  
«The Silicon Valley  
Startup: A Personal  
Journey»



**Rémi Walbaum,**  
Founder Ieshop.ch  
«The entrepreneur's  
dilemmas»

**November 10th, 2010**

from 5pm to 7pm,  
Auditorium CO1, EPFL

Pitches & panel with the laureates  
of the **Rolex Awards Young Laureates**  
Programme



Online registration until November 8th 2010: [www.venturelab.ch](http://www.venturelab.ch) (ventureideas)



LES INNOGRANTS • Le Collège du  
Management de la Technologie •



- Intellectual Capital
- Intellectual Property
- Why Intellectual Property?
- How to build Intellectual Property?

**Baruch Lev**, a professor of accounting at New York University: “Intangible Assets ranging from a skilled workforce to patents to know-how account for more than half of the market capitalization of America’s public companies.”

**Accenture** calculates that “intangible assets have shot up from 20% of the value of companies in the S&P 500 in 1980 to around 70% today”.

# Start-Up | Intellectual Capital

---

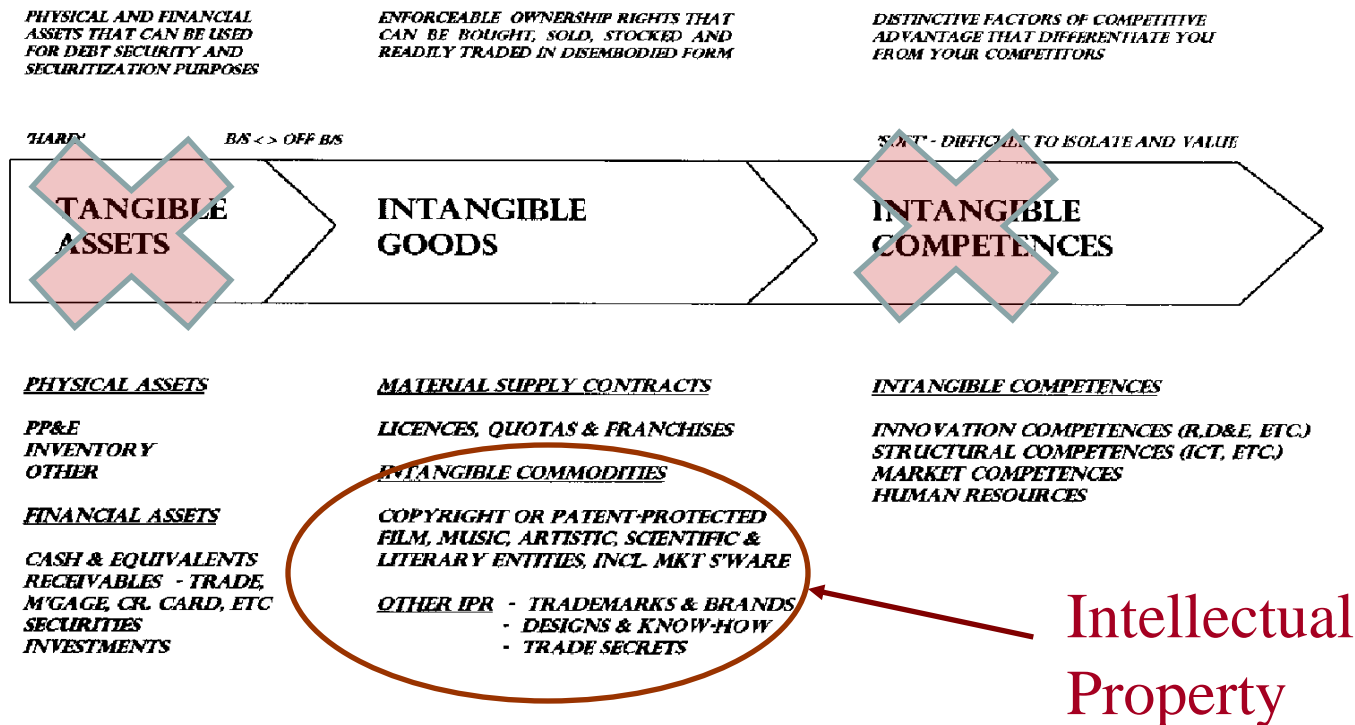
- **Human Capital**  
competences and know-how, experience, culture and values (trust, leadership, common goals...)
- **Knowledge Capital**  
capitalized know-how and experience, documentation and tangible information and data;
- **Process Capital**  
the formalization of the business processes, the activities, the roles, the responsibilities and the flow of information;
- **Network Capital**  
relations between actors (procurement, sub-contractors, partners, distributors, institutions...);
- **Customer Capital**  
the customer and reference list, the name, the brand visibility;
- **Innovation Capital**  
the technology portfolio, the innovation processes and methods;
- **Brand Capital**  
the brand value which represents the performances of the products and services *and the dream generated for customers...*

# What is IP?

*An asset? An investment?*

- It is a part of intellectual capital
- It is an intangible (immaterial good)

*(The essential link between tangible assets and intangibles)*



# Start-Up | Forms of Intellectual Property

- Know-How

1886: 'Coca-Cola' is made using a unique combination of natural flavorings. The formula for 'Coca-Cola' is a closely guarded secret and it is stored in a bank vault in Atlanta, Georgia, USA.

- Trademark <sup>TM</sup> ®

1893:



- Design/drawings

1937: Coca-Cola received a "design patent" for the contour bottle



- Patent

June 5, 2002 - P&G Sues Coca-Cola Over Patent - Procter & Gamble Co. last week sued The Coca-Cola Co. alleging that its former joint venture partner is infringing on patented technology that adds calcium to fruit juices, ... seeking an injunction to stop the alleged violation of its patent, which has been in force since 1988.

- Copyright ©

It represents all technical know-how which is not patented.

There is no ownership right on know-how.

But it may benefit from some legal protection (e.g. unfair behaviors, unfair competition).

Condition: Know-how must remain secret.

## Conditions to register:

- Novel (not identical or similar to a prior-registered one)
- Non-descriptive
- Not in the public domain

## How to register a trademark

1. Look for prior art
2. Choose one or several fields of products
3. Define the geography
4. Register to the adequate office

France Telecom intends to retain its Orange brand in Russia

[SKRIN Newswire](#) — December 21

France Telecom has announced arrival on the Russian market of the communication services via the Equant, Russian affiliated company, with the brand Orange Business Service back in autumn of 2005. However, the rights to Orange trademark in Russia already belong to two Russian companies: Jumax+ and since 1993 - to Lamport (affiliated company of eHouse). Lamport is assembling and selling computers and telephones for IP-telephony with the brand "Orange", also manufactures payment plastic cards and undertakes electronic trade with the help of them. Lamport intends to apply to court, if Equant does not stop using Orange trademark in Russia. In turn, Equant filed an application for registration of trademark Orange with the Russian PTO.

## Rights on design

- No need for formal registration
- Deals with internal and external features of a product or a design
- Protection: 10 years from market entry

## Registration

- Deals specifically with the external appearance of a product
- Protection: 5 years, renewable 4 times x 5 years

## Advantages :

- free,
- no registrations.

## Weaknesses :

- protects the software, the code
- but not the basic idea, the concept, the algorithm

## They give the following exclusive rights :

- Reproduction
- Modification : adaptation, evolution, translation
- Circulation : distribution, licenses and sale

© Copyright, free, mentions year and author

™ The author announces and claims rights on trademark, but it may not have been registered

® Trademark has been registered and authorized.

# Start-Up | An example (1/4)

---

Start-Up Google™

-----Message d'origine-----

De : Google Print Permissions [<mailto:Brand-permissions@google.com>]

Envoyé : jeudi, 4. octobre 2007 01:52

À : Lebret Hervé

Objet : Re: [#193530961] New Permission Request

Hi Herve,

Thank you for your request. You may use the image you sent me in your book. I do not think it constitutes a copyright infringement.

Please respond to this message; any emails sent directly to brand-permissions@google.com will not be received.

Thanks,

Joscelin

# Start-Up | An example (2/4)

---

Start-Up Google™

-----Message d'origine-----

De : Google Print Permissions [<mailto:Brand-permissions@google.com>]

Envoyé : lundi, 12. novembre 2007 22:20

À : Lebret Hervé

Objet : Re: [#204684227] New Permission Request

Hi Herve,

Thanks for your request. The copyright over the Google logo includes the font and color scheme. The 'look' of the Google logo is copyrighted as well and it is forbidden for you to reproduce words, images or web pages imitating Google brand features for your own commercial or public use.

Please do not use the attached image for your book.

Please respond to this message; any emails sent directly to [brand-permissions@google.com](mailto:brand-permissions@google.com) will not be received.

Thanks,

Joscelin

Start-Up

Experts' advice (jurist, biz. lawyer, IP lawyer):

- There is probably no infringement
- Google gave its blessing anyway
- However the second email is an issue and it is never easy to fight a powerful player.

Start-Up

What we may still learn  
from Silicon Valley

Hervé Lebre

De: Google Print Permissions [Brand-permissions@google.com] Date: jeu. 29.11.2007  
 À: Lebrete Hervé  
 Cc:  
 Objet: Re: [#204684227] New Permission Request

Hi Lebrete,

Thanks for your response. Your request has been approved by my manager. I don't know whether she will be in touch or not but you may consider my first response to your request sufficient permission.

Please respond to this message; any emails sent directly to [brand-permissions@google.com](mailto:brand-permissions@google.com) will not be received.

Thanks,

Joscelin

Original Message Follows:

From: Lebrete Hervé<herve.lebrete@epfl.ch>  
 Subject: RE: [#204684227] New Permission Request  
 Date: Wed, 21 Nov 2007 08:48:05 +0100

Joscelin

I doubt you will receive this email but I try. My apologies for the tension I probably created but I hope you understood my disappointment, I hope you will not suffer from all this as it is not a big thing. It is just a book. I have not heard or read from your manager yet, but will wait for his final answer.

regards

Herve

-----Message d'origine-----

De : Google Print Permissions [mailto:Brand-permissions@google.com]  
 Envoyé : mardi, 20. novembre 2007 21:12  
 À : Lebrete Hervé  
 Objet : Re: [#204684227] New Permission Request

Hi Lebrete,

I believe my manager has responded to you by now concerning your request. Apologies for the confusion. I received your duplicate requests a month apart and did not recall approving it before.

Best of luck with your book.

Please respond to this message; any emails sent directly to [brand-permissions@google.com](mailto:brand-permissions@google.com) will not be received.

Thanks,

Joscelin

# Start-Up

## Start-Up: the book

What we may still learn from Silicon Valley



This blog contains original articles as well as articles from the book "Start-Up", which exists both in English and French. To buy it, [click here](#).

## University licensing to start-ups

May 4th, 2010

There's been a long standing and passionate debate about what universities "deserve" when they license technologies to start-ups. There is the famous Google vs. Yahoo comparison where Google is an official Stanford spin-off which brought \$336M in revenue from the equity the university owned in the start-up whereas Yahoo was considered as a hobby of the founders and no intellectual property was owned by the university. However one [Yahoo founder gave some \\$75M to Stanford](#).

So what is a typical license between a university and start-up? Well there is no clear answer but the [attached pdf file](#) may be of help. I have done some search and found some info, mostly from US universities. I have also tried to find the rationals for or against such deals. The debate remains open and I do not expect a general agreement any time soon.

### Links

» [Voir la version FRANCAISE](#)

### Pages

» [Start-Up: the book](#)  
 » [Content and summary](#)  
 » [Media and "Start-Up"](#)  
 » [About the author](#)

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» [University licensing to start-ups](#)  
 » [Survival or failure - which success?](#)  
 » [Gazelles and Gorillas - part 2](#)  
 » [Gazelles and Gorillas - high growth startups](#)  
 » [Apple Computer to acquire FontSelf?](#)  
 » [Maxlinear IPO and shareholders](#)  
 » [A Swiss in Silicon Valley](#)  
 » [Tesla Motors and Paypal, a tale of two founders](#)  
 » [The crisis and the American model](#)  
 » [A123, Boston and Atlas](#)

A patent protects an invention which is defined as a technical solution to a technical problem.

In order to be patentable, an invention must be novel, non-obvious (not be simple evolution of prior art) and can be applicable (it must have a practical utility)

The protection lasts twenty years if the maintenance fees are paid in each individual country where it is protected.

A patent has an owner - who is not always the inventor(s) – it can be sold, transferred, licensed (rented).

# Start-Up | What is patent useful for?

---

- It prevents others from using the technical solution
- It gives the right to grant licenses
- It is a currency, it can be traded
- “It favors technical development”
- It is useful to obtain financing (for start-up for example)

# Start-Up | The drawbacks of a patent

---

- The invention is disclosed
- It does not give a right to use
- It is often difficult to understand
- It is costly!

- A patent must have a technical feature
- Exceptions
  - Discoveries
  - Esthetic creations
  - Games and software
  - Methods of treatment and diagnostics
  - Inventions contrary to ethics/morals
  - Animal and vegetal species
- A practical utility
- Newness/novelty
- Inventiveness (« non obviousness »)

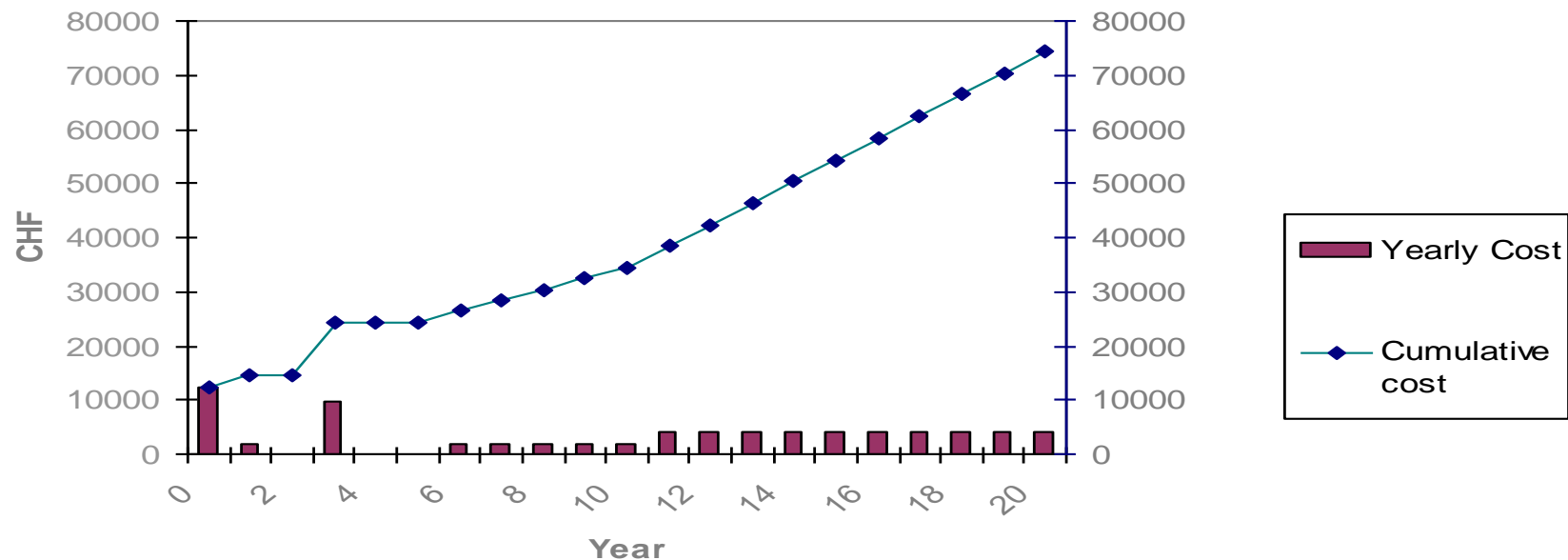
- **Product**  
Object or material element which is new
- **Process**  
Means to obtain a product or a result (method, indication)
- **“Product by process”**

# Start-Up IP has a cost

(... and a duration)

- Trademark : about CHF10k in Europe/USA, 10 years, renewable
- Copyrights: free, 50 to 70 years after the death of the author
- Know-how: free without limitation; but difficult to protect
- Patent : several tenths of kCHF, 20 years

## Example: Cost of a European Patent (6 countries)



Intellectual property:

- has many forms
- is dynamic
- is complex
- is costly

**therefore,  
it is essential to know why  
one wishes to own IP**

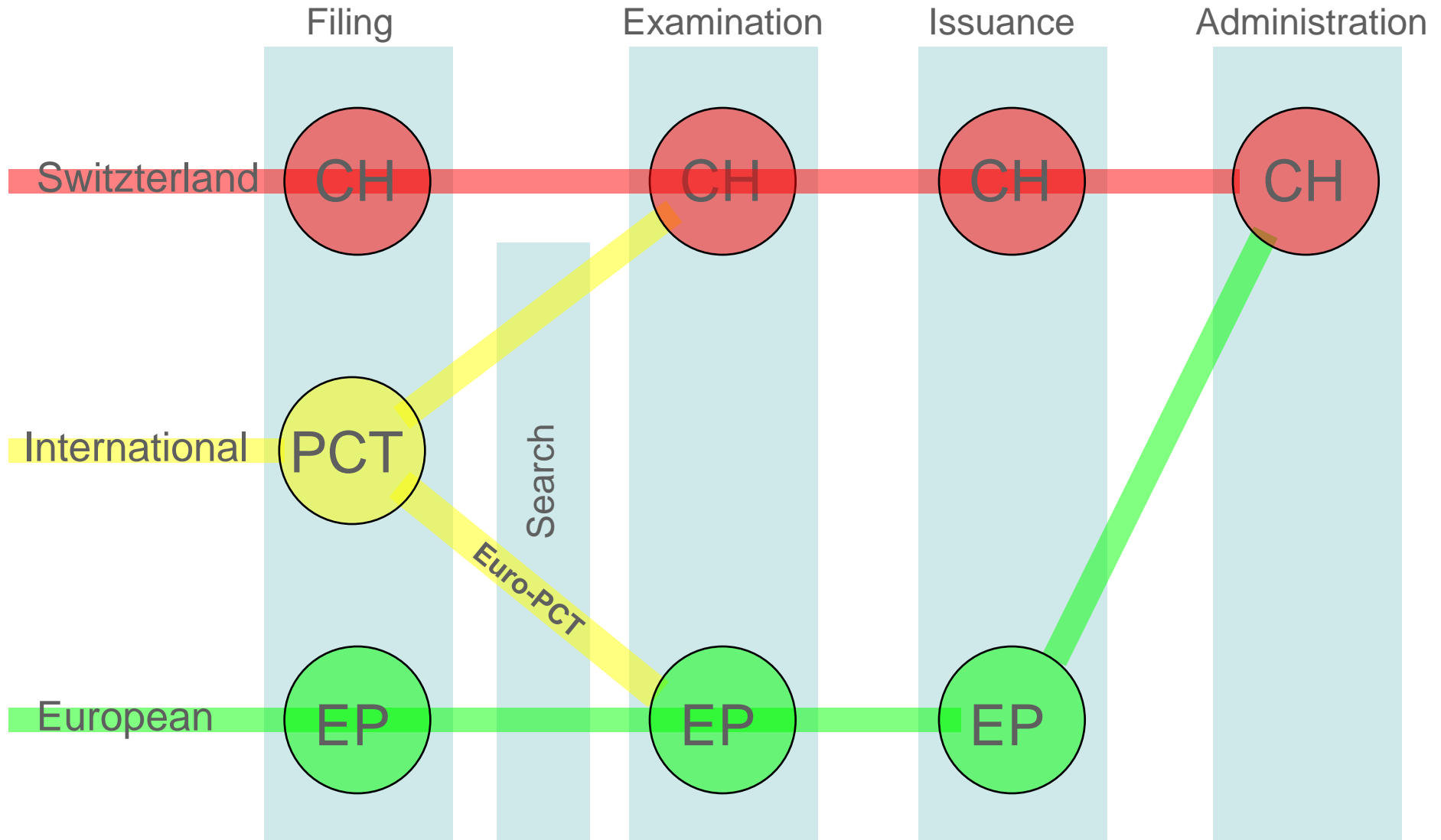
# Start-Up | **How to build IP: the patent case**

---

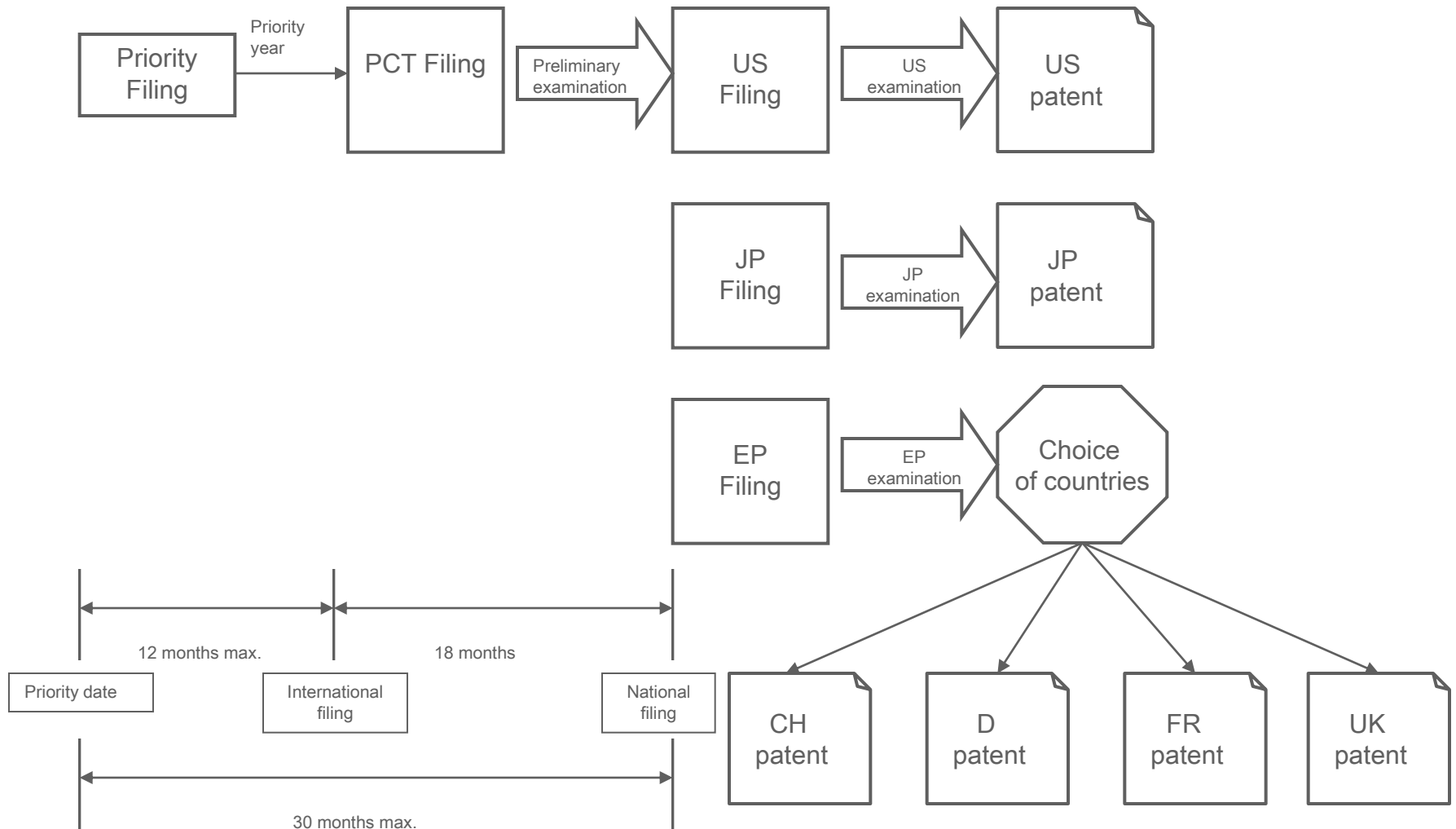
It is important to assess first an invention:

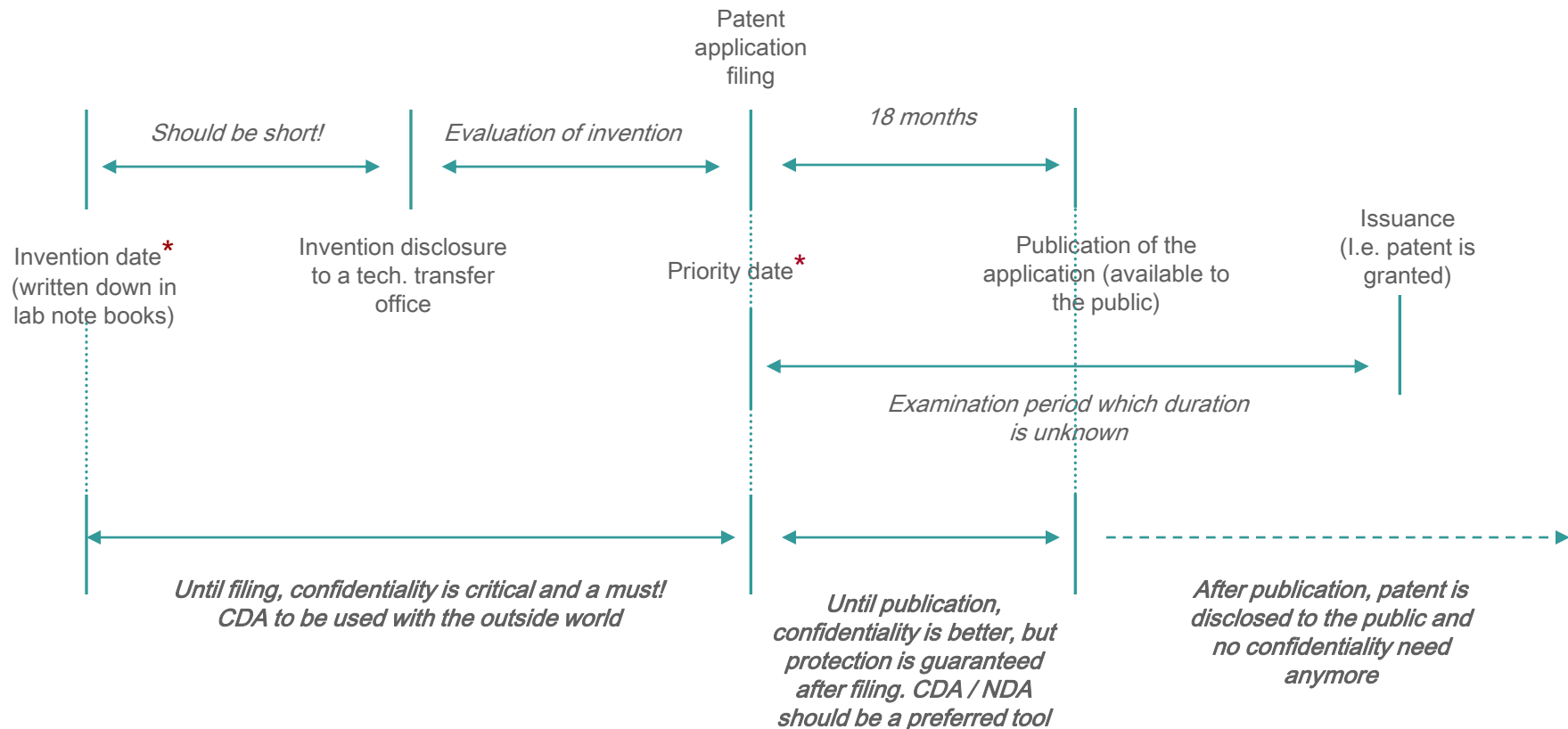
- can it be patented: new, non obvious, applicable?
- why a patent: which strategy?
- a patent filing will be a process with many constraints

# Filing: many possible choices



## A typical patent filing





**NB : the USA have a grace period. It is possible to file in the 12 months following a disclosure.**

**NB2 (\*) : in Europe the priority date gives anteriority; in the USA, the invention date is the final anteriority date in case of competitive application.**

# The beginning of an adventure

---

An IP strategy is usually built with one or several “patent attorney(s)”

- Writing an application is technical and legal
- To have a patent granted is a lengthy and very uncertain process
- A good strategy is critical
  - geography, portfolio
  - a constant competitive analysis is necessary
- A strategy of protection against competition and with partners is necessary (IP never gives direct rights but the rights to protect yourself against infringers)
- The commercial strategy has to be linked to the IP strategy

# Patent: a case study (1/7)

## The initial filing



US 2002/0131464 A1

(19) **United States**

(12) **Patent Application Publication**  
Sirbu et al.

(10) **Pub. No.: US 2002/0131464 A1**  
(43) **Pub. Date: Sep. 19, 2002**

(54) **VERTICAL CAVITY SURFACE EMITTING  
LASER AND A METHOD OF FABRICATION  
THEREOF**

(75) **Inventors: Alexei Sirbu, Ecublens (CH); Vladimir  
Iakovlev, Ecublens (CH); Alok Rudra,  
Blonay (CH); Elyahou Kapon,  
Lausanne (CH)**

**Correspondence Address:**  
**John Moetteli**  
**MOETTELI & ASSOCIATES**  
**Case Postale 486**  
**CH-1211**  
**Geneva 12 (CH)**

(73) **Assignee: Ecole Polytechnique Federale De Lau-  
sanne**

(21) **Appl. No.: 09/809,239**

(22) **Filed: Mar. 15, 2001**

### Publication Classification

(51) **Int. Cl.<sup>7</sup> ..... H01S 5/00; H01S 3/08**

(52) **U.S. Cl. .... 372/45; 372/96**

### (57) **ABSTRACT**

An electrically pumped VCSEL and a method of its fabrication are presented. The VCSEL comprises an active cavity material sandwiched between top and bottom DBR stacks, the top DBR having at least one n-semiconductor layer. The device defines an aperture region between the structured surface of the active cavity material and the n-semiconductor layer of the top DBR stack. The structured surface is formed by a top surface of a mesa that includes at least the upper n<sup>++</sup> layer of a p<sup>++</sup>/n<sup>++</sup> tunnel junction and the surface of a p-type layer outside the mesa. The structured surface is fused to the surface of the n-semiconductor layer of the DBR stack due to the deformation of these surfaces, thereby creating an air gap in the vicinity of the mesa between the fused surfaces. The active region is defined by the current aperture which includes the mesa surrounded by the air gap, thereby allowing for restricting an electrical current flow to the active region, while the air gap provides for the lateral variation of the index of refraction in the VCSEL.

- a title
- inventors  
(individuals)
- an owner  
(individuals or an institution)
- a geography
- a priority date
- a filing date
- a publication date

# Patent: a case study (2/7)

## The PCT filing

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
26 September 2002 (26.09.2002)

PCT

(10) International Publication Number  
**WO 02/075263 A1**

(51) International Patent Classification<sup>7</sup>: **G01J 3/26**,  
H01S 5/183, 5/187

(21) International Application Number: PCT/IB02/00682

(22) International Filing Date: 8 March 2002 (08.03.2002)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
09/809,236 15 March 2001 (15.03.2001) US  
09/809,239 15 March 2001 (15.03.2001) US

(71) Applicant (for all designated States except US): **ECOLE  
POLYTECHNIQUE FEDERALE DE LAUSANNE**  
[CH/CH]; Ecublens, CH 1015 Lausanne (CH).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **KAPON, Elya-  
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(CH).

(74) Agent: **MOETTELI, John**; Moetteli & Associés, Case  
postale 486, CH-1211 Genève 12 (CH).

(81) Designated States (*national*): AI, AG, AL, AM, AT, AU,  
AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU,  
CZ, DE, DK, DM, DZ, EC, EH, ES, FI, GB, GD, GE, GH,  
GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC,  
LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW,  
MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG,  
SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ,  
VN, YU, ZA, ZM, ZW.

(84) Designated States (*regional*): ARIPO patent (GH, GM,  
KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW),  
Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),  
European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR,

[Continued on next page]

(54) Title: A MICRO-ELECTROMECHANICALLY TUNABLE VERTICAL CAVITY PHOTONIC DEVICE AND A METHOD  
OF FABRICATION THEREOF

- a title
- inventors  
(individuals)
- an owner  
(individuals or an institution)
- a geography
- a priority date
- a filing date
- a publication date
- finally (ideally!) date of issuance

# Patent: a case study (3/7)

## The search report -1

INTERNATIONAL SEARCH REPORT		International Application No. PCT/IB 02/00682
<b>A. CLASSIFICATION OF SUBJECT MATTER</b> IPC 7 601J3/26 H01S5/183 H01S5/187		
According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b> Minimum documentation searched (classification system followed by classification symbols) IPC 7 601J H01S		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practical, search terms used) EPO-Internal, WPI Data, PAJ		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 99 34484 A (CORETEK INC) 8 July 1999 (1999-07-08) page 10, line 1 -page 17, paragraph 2 page 34, paragraph 1 -page 40, paragraph 1 figures 1,3F,4G,6-8 ---	1,8
A	US 5 739 945 A (TAYEBATI PARVIZ) 14 April 1998 (1998-04-14) cited in the application column 7, line 19 - line 32 figure 7 ---	1,8
A	US 5 142 414 A (KOEHLER DALE R) 25 August 1992 (1992-08-25) column 4, line 27 - line 50 figure 3 --- -/-	1,8
<input checked="" type="checkbox"/> Further documents are listed in the continuation of box C. <input checked="" type="checkbox"/> Patent family members are listed in annex.		
* Special categories of cited documents: *A* document defining the general state of the art which is not considered to be of particular relevance *E* earlier document but published on or after the international filing date *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) *O* document referring to an oral disclosure, use, exhibition or other means *P* document published prior to the international filing date but later than the priority date claimed *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principles or theory underlying the invention *X* document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone *Y* document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. *S* document member of the same patent family		
Date of the actual completion of the international search 11 July 2002		Date of mailing of the international search report 22/07/2002
Name and mailing address of the ISA European Patent Office, P.O. Box 5818 Patentplan 2 NL - 2280 HV Rijswijk Tel: (+31-70) 340-2040, Tx: 31 651 apo st, Fax: (+31-70) 340-3016		Authorized officer Jacquin, J

Form PCT/ISA/210 (second sheet) (July 1992)

# Patent: a case study (4/7)

## The search report -2

<input checked="" type="checkbox"/> Further documents are listed in the continuation of box C.	<input checked="" type="checkbox"/> Patent family members are listed in annex.
<p>° Special categories of cited documents :</p> <ul style="list-style-type: none"> <li>*A* document defining the general state of the art which is not considered to be of particular relevance</li> <li>*E* earlier document but published on or after the international filing date</li> <li>*L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</li> <li>*O* document referring to an oral disclosure, use, exhibition or other means</li> <li>*P* document published prior to the international filing date but later than the priority date claimed</li> <li>*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</li> <li>*X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</li> <li>*Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</li> <li>* &amp; * document member of the same patent family</li> </ul>	
<p>Date of the actual completion of the international search</p> <p style="text-align: center;">11 July 2002</p>	<p>Date of mailing of the international search report</p> <p style="text-align: center;">22/07/2002</p>
<p>Name and mailing address of the ISA</p> <p>European Patent Office, P.B. 5818 Patentlaan 2          NL - 2280 HV Rijswijk          Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,          Fax: (+31-70) 340-3016</p>	<p>Authorized officer</p> <p style="text-align: center;">Jacquin, J</p>

# Patent: a case study (5/7)

## The Issued Patent

(12) **United States Patent**  
Sirbu et al.

(10) **Patent No.:** US 6,542,531 B2  
(45) **Date of Patent:** Apr. 1, 2003

(54) **VERTICAL CAVITY SURFACE EMITTING LASER AND A METHOD OF FABRICATION THEREOF**

(75) Inventors: Alexei Sirbu, Ecublens (CH); Vladimir Iakovlev, Ecublens (CH); Alok Rudra, Blonay (CH); Elyahon Kapon, Lausanne (CH)

(73) Assignee: Ecole Polytechnique Federale de Lausanne, Lausanne (CH)

(\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 40 days.

(21) Appl. No.: 09/809,239

(22) Filed: Mar. 15, 2001

(65) **Prior Publication Data**

US 2002/0131464 A1 Sep. 19, 2002

(51) Int. Cl.<sup>7</sup> ..... H01S 5/00

(52) U.S. Cl. .... 372/46; 372/96

(58) Field of Search .... 372/45, 46, 96

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S. Rapp et al., "Near Room-temperature Continuous-wave Operation of Electrically Pumped 1.55  $\mu$ m Vertical Cavity Lasers with InGaAsP/InP Bottom Mirror", Electronic Letters, vol. 35, No. 1, Jan. 7th, 1999.

W. Yuen et al., "High-performance 1.6  $\mu$ m Single-epitaxy Top-emitting VCSEL", Electronic Letters, vol. 36, No. 13, Jun. 22nd, 2000.

A.V. Syrbu et al., "30° C CW operation of 1.52  $\mu$ m InGaAsP/AlGaAs Vertical Cavity Lasers With In Situ Built-in Lateral Current Confinement by Localised Fusion", Electronic Letters, vol. 34, No. 18, Sep. 3rd, 1998.

(List continued on next page.)

*Primary Examiner*—Quyen Leung

(74) *Attorney, Agent, or Firm*—Moetzel & Assoc.; John Moetzel

(57) **ABSTRACT**

An electrically pumped VCSEL and a method of its fabrication are presented. The VCSEL comprises an active cavity material sandwiched between top and bottom DBR stacks, the top DBR having at least one n-semiconductor layer. The device defines an aperture region between the structured surface of the active cavity material and the n-semiconductor layer of the top DBR stack. The structured surface is formed by a top surface of a mesa that includes at least the upper n<sup>++</sup> layer of a p<sup>++</sup>/n<sup>++</sup> tunnel junction and the surface of a p-type layer outside the mesa. The structured surface is fused to the surface of the n-semiconductor layer of the DBR stack due to the deformation of these surfaces, thereby creating an air gap in the vicinity of the mesa between the fused surfaces. The active region is defined by the current aperture which includes the mesa surrounded by the air gap, thereby allowing for restricting an electrical current flow to the active region, while the air gap provides for the lateral variation of the index of refraction in the VCSEL.

**10 Claims, 9 Drawing Sheets**

# Patent: a case study (6/7)

## The regional and national filings

Patent Number	Publ. Date	Main IPC	Week	Page Count	Language
WO200275263-A					
WO200275868-A					
EP1368623-A					
US2002131464-A1	19 Sep 2002	H01S-005/00	200301	Pages: 17	
WO200275263-A1	26 Sep 2002	G01J-003/26	200301		English
WO200275868-A2	26 Sep 2002	H01S-003/00	200301		English
US6542531-B2	01 Apr 2003	H01S-005/00	200324		
EP1368623-A1	10 Dec 2003	G01J-003/26	200382		English
EP1378039-A2	07 Jan 2004	H01S-005/183	200404		English
KR2003083735-A	30 Oct 2003	H01S-005/183	200415		
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CN1524328-A	25 Aug 2004	H01S-005/183	200477		
JP2004538621-W	24 Dec 2004	H01S-005/183	200502	Pages: 56	

### Application Details and Date:

US2002131464-A1	US809239	15 Mar 2001
AU2002234837-A1	AU234837	08 Mar 2002
AU2002234838-A1	AU234838	08 Mar 2002
CN1509406-A	CN810125	08 Mar 2002
CN1524328-A	CN810122	08 Mar 2002
EP1368623-A1	EP701505	08 Mar 2002
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JP2004538621-W	JP574179	08 Mar 2002
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WO200275868-A2	WOIB00683	08 Mar 2002
KR2003083735-A	KR712016	15 Sep 2003
KR2003084994-A	KR712015	15 Sep 2003

### Further Application Details:

EP1368623-A1	Based on	Patent	WO200275263
EP1368623-A1	PCT application	Application	WOIB00682
EP1378039-A2	Based on	Patent	WO200275868
EP1378039-A2	PCT application	Application	WOIB00683
AU2002234837-A1	Based on	Patent	WO200275263
AU2002234838-A1	Based on	Patent	WO200275868
JP2004534383-W	Based on	Patent	WO200275263
JP2004534383-W	PCT application	Application	WOIB00682
JP2004538621-W	Based on	Patent	WO200275868
JP2004538621-W	PCT application	Application	WOIB00683

### Priority Application Information and Date:

US809236	15 Mar 2001
US809239	15 Mar 2001

# Patent: a case study (7/7)

## The content

(12) **United States Patent**  
Sirbu et al.

(10) **Patent No.:** US 6,542,531 B2  
(45) **Date of Patent:** Apr. 1, 2003

(54) **VERTICAL CAVITY SURFACE EMITTING LASER AND A METHOD OF FABRICATION THEREOF**

(75) Inventors: **Alexei Sirbu**, Ecublens (CH); **Vladimir Iakovlev**, Ecublens (CH); **Alok Rudra**, Blonay (CH); **Elyahou Kapon**, Lausanne (CH)

(73) Assignee: **Ecole Polytechnique Federale de Lausanne**, Lausanne (CH)

(\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 40 days.

(21) Appl. No.: **09/809,239**

(22) Filed: **Mar. 15, 2001**

(65) **Prior Publication Data**

US 2002/0013146A1 Sep. 19, 2002

(51) **Int. Cl.<sup>7</sup>** ..... **H01S 5/00**

(52) **U.S. Cl.** ..... **372/46; 372/96**

(58) **Field of Search** ..... **372/45, 46, 96**

(56) **References Cited**

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5,991,326 A \* 11/1999 Yuen et al. .... 372/96  
6,341,137 B1 \* 1/2002 Jayaraman et al. .... 372/50  
6,366,597 B1 \* 4/2002 Yuen et al. .... 372/96

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Y. Ohiso et al., "1.55  $\mu$ m Vertical Cavity Surface Emitting Lasers with Wafer Fused InGaAsP/InP GaAs/AlAs DBRs", Electronics Letters, vol. 32, No. 16, Aug. 1st, 1996.

S. Rapp et al., "Near Room-Temperature Continuous-wave Operation of Electrically Pumped 1.55  $\mu$ m Vertical Cavity Lasers with InGaAsP/InP Bottom Mirror", Electronic Letters, vol. 35, No. 1, Jan. 7th, 1999.

W. Yuen et al., "High-performance 1.6  $\mu$ m Single-epitaxy Top-emitting VCSEL", Electronic Letters, vol. 36, No. 13, Jun. 22nd, 2000.

A.V. Sirbu et al., "30° C CW operation of 1.52  $\mu$ m InGaAsP/AlGaAs Vertical Cavity Lasers With In Situ Built-in Lateral Current Confinement by Localised Fusion", Electronic Letters, vol. 34, No. 18, Sep. 3rd, 1998.

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An electrically pumped VCSEL and a method of its fabrication are presented. The VCSEL comprises an active cavity material sandwiched between top and bottom DBR stacks, the top DBR having at least one n-semiconductor layer. The device defines an aperture region between the structured surface of the active cavity material and the n-semiconductor layer of the top DBR stack. The structured surface is formed by a top surface of a mesa that includes at least the upper n<sup>+</sup> layer of a p<sup>+</sup>/n<sup>+</sup> tunnel junction and the surface of a p-type layer outside the mesa. The structured surface is fused to the surface of the n-semiconductor layer of the DBR stack due to the deformation of these surfaces, thereby creating an air gap in the vicinity of the mesa between the fused surfaces. The active region is defined by the current aperture which includes the mesa surrounded by the air gap, thereby allowing for restricting an electrical current flow to the active region, while the air gap provides for the lateral variation of the index of refraction in the VCSEL.

**10 Claims, 9 Drawing Sheets**

# Start-Up | The content of a patent application

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As a summary, a patent application includes:

- Claims
- Description
- Drawings
- Abstract
- Revendications
- Description
- Dessins
- Résumé

The essential additional information:

- a title
- inventors (individuals)
- an owner (individuals or an institution)
- a geography
- a priority date
- a filing date
- a publication date
- finally (ideally!) a date of issuance

## - The US provisional filing

Not published

Limited to one year

Not examined

A written description

No drawing, no claim necessary

When?

- when time is short

- when strategy (on how) to proceed is unclear

- when short-term budget is limited

## - The 12-month grace period after disclosure or publication

INTERNATIONAL SEARCH REPORT		Intern. Application No. PCT/IB 02/00682
<b>A. CLASSIFICATION OF SUBJECT MATTER</b> IPC 7 G01J3/26 H01S5/183 H01S5/187		
According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b> Minimum documentation searched (classification system followed by classification symbols) IPC 7 G01J H01S		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practical, search terms used) EPO-Internal, WPI Data, PAJ		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 99 34484 A (CORETEK INC) 8 July 1999 (1999-07-08) page 10, line 1 - page 17, paragraph 2 page 34, paragraph 1 - page 40, paragraph 1 figures 1,3F,4G,6-8 ---	1,8
A	US 5 739 945 A (TAYEBATI PARVIZ) 14 April 1998 (1998-04-14) cited in the application column 7, line 19 - line 32 figure 7 ---	1,8
A	US 5 142 414 A (KOEHLER DALE R) 25 August 1992 (1992-08-25) column 4, line 27 - line 50 figure 3 --- -/-	1,8
<input checked="" type="checkbox"/> Further documents are listed in the continuation of box C. <input checked="" type="checkbox"/> Patent family members are listed in annex.		
* Special categories of cited documents: *A* document defining the general state of the art which is not considered to be of particular relevance *E* earlier document but published on or after the international filing date *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) *O* document referring to an oral disclosure, use, exhibition or other means *P* document published prior to the international filing date but later than the priority date claimed *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention *X* document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone *Y* document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art *Z* document member of the same patent family		
Date of the actual completion of the international search 11 July 2002		Date of mailing of the international search report 22/07/2002
Name and mailing address of the ISA European Patent Office, P.O. Box 5818 Patentplan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016		Authorized officer Jacquin, J

Form PCT/ISA/210 (second sheet) (July 1992)

page 1 of 2

Inventors then examiners must check **state of the art** through **prior art search**

The search is similar to a publication bibliography and includes the web, the technical journals as well as patent databases.

**SRI** is supporting search through visits to IPI (Swiss Federal Institute of Intellectual Property) in Bern ([www.ipi.ch](http://www.ipi.ch))

**Tools** are also available on the **web**

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<b>Application number:</b>	<input type="text" value="DE19971031696"/>
<b>Priority number:</b>	<input type="text" value="WO1995US15925"/>
<b>Publication date:</b>	<input type="text" value="yyyyymmdd"/>
<b>Applicant:</b>	<input type="text" value="Institut Pasteur"/>
<b>Inventor:</b>	<input type="text" value="Smith"/>
<b>European Classification (ECLA):</b>	<input type="text" value="F03G7/10"/>
<b>International Patent Classification (IPC):</b>	<input type="text" value="H03M1/12"/>

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**Inventor:** (e.g. SMITH A\* OR JONES D\*) ⓘ

kapon

**Patent Number:** (e.g. EP797246 OR U85723945-A) ⓘ

**International Patent Classification:** (e.g. G06F-001/16 OR B23k\*) ⓘ

**Derwent Class Code:** (e.g. T04 OR V05) ⓘ

**Derwent Manual Code:** (e.g. T01-L02) ⓘ

**Derwent Primary Accession Number:** (e.g. 1998-123456) ⓘ

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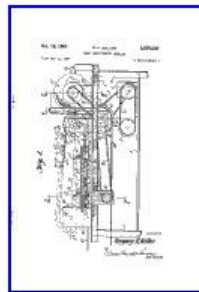
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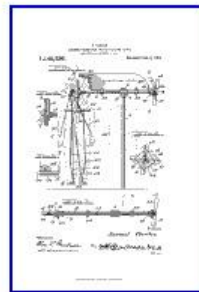
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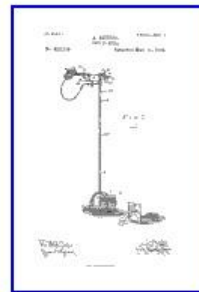
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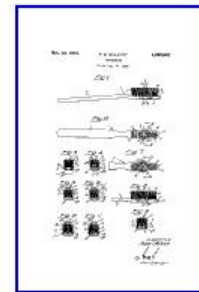
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Many inventions and patent application belong to universities (or other institutions)

Therefore a negotiation to obtain a license is usual

The philosophy of licensing is as follows:

- EPFL deserves some reward for the IP use
- It is based on an upfront payment and royalties
- In the case of start-ups the upfront payment can be replaced with equity
- The licensee maintains the IP protection from the date of the license.

Never forget it is a dynamic process with iterations

IP is intangible so its value is difficult (impossible?) to assess

On top of its value, there are other important features

- duration
- payments
- geography, jurisdiction
- fields of use
- conditions (“milestones”, “termination”)
- confidentiality, responsibility.....

- Confidentiality
- Duration
- Well-defined work schedule
- Reporting obligations
- Liability
- Payment schedule
- Nature of the intellectual property
- Option term on license
- Scope of license
- Lump sum/Royalties
- Patent costs
- Ownership of intellectual property
- Ownership of improvements
- Infringements (who takes action)
- Termination
- Laws of the country

Again... IP is intangible so its value is difficult (impossible?) to assess

There are valuation techniques (just as for start-up valuation)

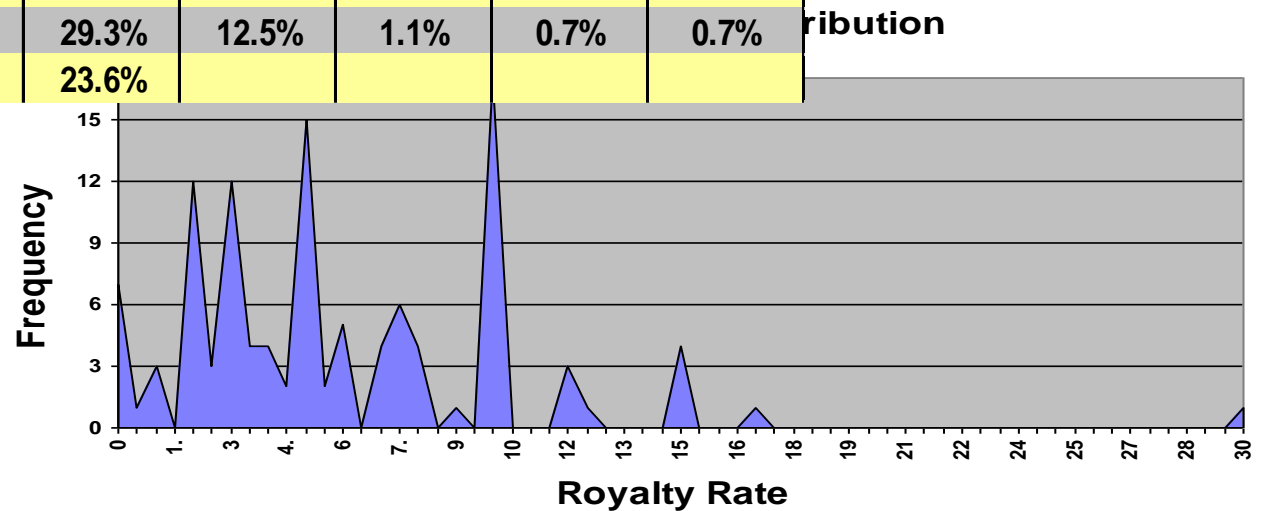
- 25% rule
- Past investments
- Industry standards

But the value is negotiated and the price is fixed between a buyer and a seller; it is the law of offer and demand.

# Example of royalty rates

**Royalty Rates for In-Licensing by Industry**

Industry	0-2%	2-5%	5-10%	10-15%	15-20%	20-25%	>25%
Aerospace	50.0%	50.0%					
Automotive	52.5%	45.0%	2.5%				
Chemical	16.5%	58.1%	24.3%	0.8%	0.4%		
Computer	62.5%	31.3%	6.3%				
Electronics		50.0%	25.0%	25.0%			
Energy		66.7%					
Food/Consumer		100.0%					
General Mfg.	45.0%	28.6%	12.1%	14.3%			
Government/University	25.0%	25.0%	50.0%				
Health Care	3.3%	51.7%	45.0%				
Pharmaceuticals	23.6%	32.1%	29.3%	12.5%	1.1%	0.7%	0.7%
Telecommunications	40.0%	37.3%	23.6%				



## Example of royalty rates

Technology / Industry	Earned Royalty	Up-Front Payments	Minimum Payments
Reagents/Process	1-3%	Patent Costs	\$2-10K
Reagents/Kit	2-10	Patent Costs	\$2-10K
Diagnostics In Vitro	2-6	\$5-20K	\$2-60K
Diagnostics In Vivo	3-8	\$5-20K	\$2-60K
Therapeutics	4-12	\$20-150K	\$20-150K
Medical Instrumentation	4-10	\$5-150K	\$5-20K (Yr 1)

Source : G.Gorey & E.Kahn, Genetic Engineering News, July-August 1991

Industry	Average	Median	Max	Min	Count	
Chemicals	4.7%	4.3%	25.0%	0.1%	78	
Internet (incl. software)	11.8%	8.8%	50.0%	0.3%	88	
Telecom (excl Media)	4.9%	4.5%	15.5%	0.4%	73	
Consumer Gds, Rtl & Leis		5.5%	5.0%	28.0%	0.1%	98
Media & Entertainment	9.1%	5.0%	50.0%	2.0%	25	
Food Processing	3.2%	2.8%	10.0%	0.3%	38	
Medical/Health Products	6.1%	5.0%	77.0%	0.1%	376	
Pharma. & Biotech	7.0%	5.0%	50.0%	0.0%	458	
Energy & Environment	5.0%	5.0%	20.0%	1.0%	107	
Machines/Tools	5.2%	4.5%	25.0%	0.5%	90	
Automotive	4.3%	3.5%	15.0%	0.5%	59	
Electrical & Electronics	4.2%	4.0%	15.0%	0.5%	139	
Semiconductors	4.3%	3.0%	30.0%	0.0%	75	
Computers & Office Equip		5.3%	4.0%	25.0%	0.2%	73
Software	11.5%	6.8%	70.0%	0.0%	147	
Industry Summary	6.40%	4.80%			1,924	

# An example of royalty rates

---

A raw idea is worth virtually nothing, due to an astronomical risk factor

A patent pending with a strong business plan may be worth 1 %

An issued patent may be worth 2 %

A patent with a prototype, such as a pharmaceutical with pre-clinical testing may be worth 2-3 %

A pharmaceutical with clinical trials may be worth 3-4 %

A proven drug with FDA approval may be worth 5-7 %

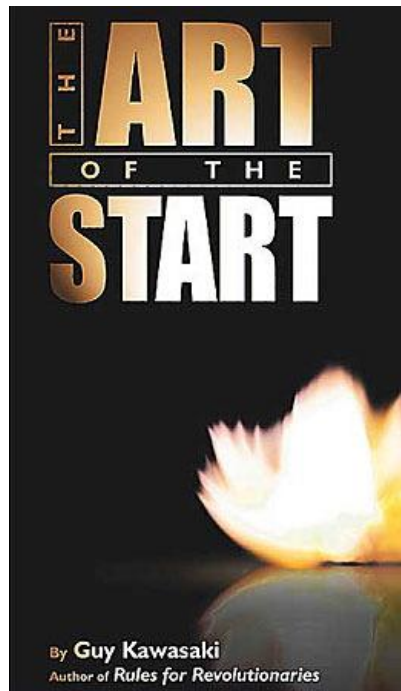
A drug with market share, such as one pharma. distributing through another, may be worth 8-10%

- Show you thought about an IP strategy
- Disclose your analysis, the strengths and weaknesses
- but...

Never say (or think...) that your IP is a major asset for your business; it is a protection tool but it does not bring that much guarantee.

Mention you have IP and focus on other elements of strength

# IP and VCs (according to Guy Kawasaki)



## The Art of the Start

cause most deals don't pan out. Think of an investor's deal flow as a funnel. Two thousand business plans enter at the top of the funnel. Two hundred are moderately credible. One hundred are interesting enough to read. Forty undergo due diligence. Ten get funded. One makes a bundle of money.

Investors want to weed out the rejects as quickly as possible because they don't want to waste time, and obvious flaws make it easy to throw out a plan, so you must present a clean slate. Here are the areas in which flaws abound:

- **INTELLECTUAL PROPERTY:** Lawsuits, or the risk of lawsuits, by former employers claiming that your technology belongs to them; core technology belonging to a founder, not the company; infringement on someone else's patents.
- **CAPITAL STRUCTURE:** Ownership of the vast majority of the organization by a few founders who are not willing to spread it out; dominant control by an inflexible investor who doesn't want any dilution; substantially overpriced or underpriced previous rounds.
- **MANAGEMENT TEAM:** Married or related co-founders; unqualified friends or roommates in CXO-level positions; lack of relevant industry experience; criminal convictions.
- **STOCK OFFERINGS:** Grants of stock (as opposed to options) to consultants and vendors in lieu of payment; common stock sold to friends and relatives at high valuations; solicitation of investors who are not qualified according to securities laws.
- **REGULATORY COMPLIANCE:** Noncompliance with state or federal laws and regulations; nonpayment of payroll taxes.

### DISCLOSE EVERYTHING

If there's crud that hasn't been—or cannot be—cleaned up immediately, then disclose it to investors. And do it early in the process. The later you reveal it, the harder it will get to do so and the more it will harm your credibility.

## The Art of Raising Capital

For example, Garage once invested in a company that disclosed that a potential investor had a consulting agreement with the company. This deal came to light shortly before the financing was closing. This investor was buying stock, as well as receiving stock and cash for consulting services. No other investor had a similar deal.

When the other investors found out about this arrangement, the deal almost collapsed. Had the company made a full disclosure earlier and explained why it made sense for everyone (which, in fact, it did), things would have gone much more smoothly. Unfortunately, a high-value investor bailed out because of this last-minute issue.

What if you started, or worked for, an organization that failed? There's no use in trying to hide this fact, because investors will uncover it. It's also poor form to blame anyone or anything else: the market, other employees, customers, or, in particular, the investors (no matter what the truth is).

My recommendation is that you do a *mea culpa*. That is, you accept as much blame for the failure as is justified and "confess" your sins. Sophisticated investors find this admirable, and many an investor has made boatloads of money betting on entrepreneurs who failed in earlier efforts. What's important is not that you failed—it's that you learned from your failures and are eager to try again.

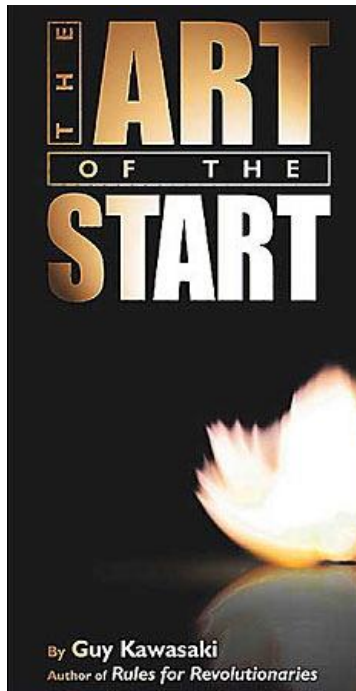
The lesson is this: Clean up your problems or disclose your problems, but never hide your problems.

### ACKNOWLEDGE, OR CREATE, AN ENEMY

Many entrepreneurs believe that investors want to hear that the organization has no competition. Unfortunately, sophisticated investors reach one or both of the following conclusions if entrepreneurs make such claims:

- There's no competition because there's no market. If there were a market, there would be others trying to win it.
- The founders are so clueless that they can't even use Google to figure out that ten other companies are doing the same thing.

# IP and VCs (according to Guy Kawasaki)



## The Art of the Start

you are by denigrating such competition. Instead, build the case for these kinds of alternatives:

- partnering with the competition
- flying under its radar
- addressing a niche that it can't or won't address

### Lie #7: "Patents make our business defensible."

Patents do not make a business defensible. They might provide a temporary competitive advantage—particularly in material science, medical devices, and biotech companies—but that's about it.

Garage, for example, has a patent on the process of investors and entrepreneurs using the Internet to catalyze investments. Do I sleep better at night because of this? Has it prevented investment banks, laid-off investment bankers, and consultants from using the Internet to connect buyers and sellers of private placements? Would we try to enforce the patent? The answers are, respectively, no, no, and no.

By all means, file for patents if you can, but don't depend on them for much more than impressing your parents unless you have the time (years) and money (millions) to go to court. If Apple and the U.S. Department of Justice can't beat Microsoft in court, you can't, either.

When talking to investors, the optimal number of times to mention that your technology is patentable is one. Zero is bad because it implies you don't have anything proprietary. More than one mention means that you're inexperienced and think patents make your business defensible.

### Lie #8: "All we have to do is get 1 percent of the market."

This is what venture capitalists call the Chinese Soda Lie. That is, "If just 1 percent of the people in China drink our soda, we will be more successful than any company in the history of mankind." There are four problems with this line of reasoning:

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- It's not that easy to get 1 percent of the people in China to drink your soda.
- Very few entrepreneurs are truly going after a market as large as all the people in China.
- The company that came in before you said something similar about another market. So will the company after you.
- A company that is shooting for only 1 percent market share isn't interesting."

The right thing to do, as I discussed earlier, is to either come up with a believable total addressable market figure or catalyze fantasy so the investor can come up with a number himself. But saying that all you have to do is get 1 percent of a big market labels you a bozo.

### Lie #9: "We have first-mover advantage."

There are at least two problems with this lie. First, it may not actually be true. How can you possibly know that no one else is doing what you're doing? As a rule of thumb, if you're doing something good, five other organizations are doing the same thing. If you're doing something great, ten are. Second, first-mover advantage isn't all that it's cracked up to be. Being a "fast second" might be better—let someone else pioneer the concept, learn from their mistakes, and leapfrog them.

### Lie #10: "We have a world-class, proven team."

The acceptable definition of *world-class* and *proven* in this context is that the founders created enormous wealth for investors in a previous company, or they held positions in highly respected, publicly traded companies. Riding the tornado of a successful company in a minor role, working for McKinsey as a consultant, or putting in a couple of years at Morgan Stanley doesn't count as a proven background.

\*Every venture capitalist secretly wishes to fund a company whose greatest threat is an antitrust lawsuit by the U.S. Department of Justice and the European Union.

# As a conclusion...

*An investment! Not a guarantee!*

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**Intellectual Property  
contributes to create value for a company.**

The company should define its IP strategy in order to optimize the value, with its partners:

- patent attorneys
- investors
- customers
- competitors
- licensees

Start-Up | **Thank You!**

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