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# ***Assessing the Market Potential of Technology***

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## *What / who is the Innovation Advisory Service?*

- **Part of the CERN external TT network**
  - Mission to promote benefit to UK from CERN technology
- **Supported by:**
  - Britain's Office of Science and Innovation (OSI)
  - Particle Physics and Astronomy Research Council (PPARC)
  - CERN
- **UKTTC is a group of three people:**
  - Alex Efimov – Technology mining and brokering
  - Nathan Hill – Industry partnerships and entrepreneurship
  - David Rafe – Research support



## *Objectives*

- Increased understanding of the issues involved in technology and business partnerships
- Increased participation in partnerships and commercialisation
- **Detailed, practical examination of issues**



### *Agenda*

1. Assessing the market potential of a technology
2. Partnering with industry
3. Developing a spinout company



## ***Assessing the market potential of a technology***

- Concepts
  - Four streams of development
  - Costs and risks of development cycle
  - Models for managing development risk
  - How to value a technology opportunity
  - Factors influencing valuation
  - Business models
- Case studies

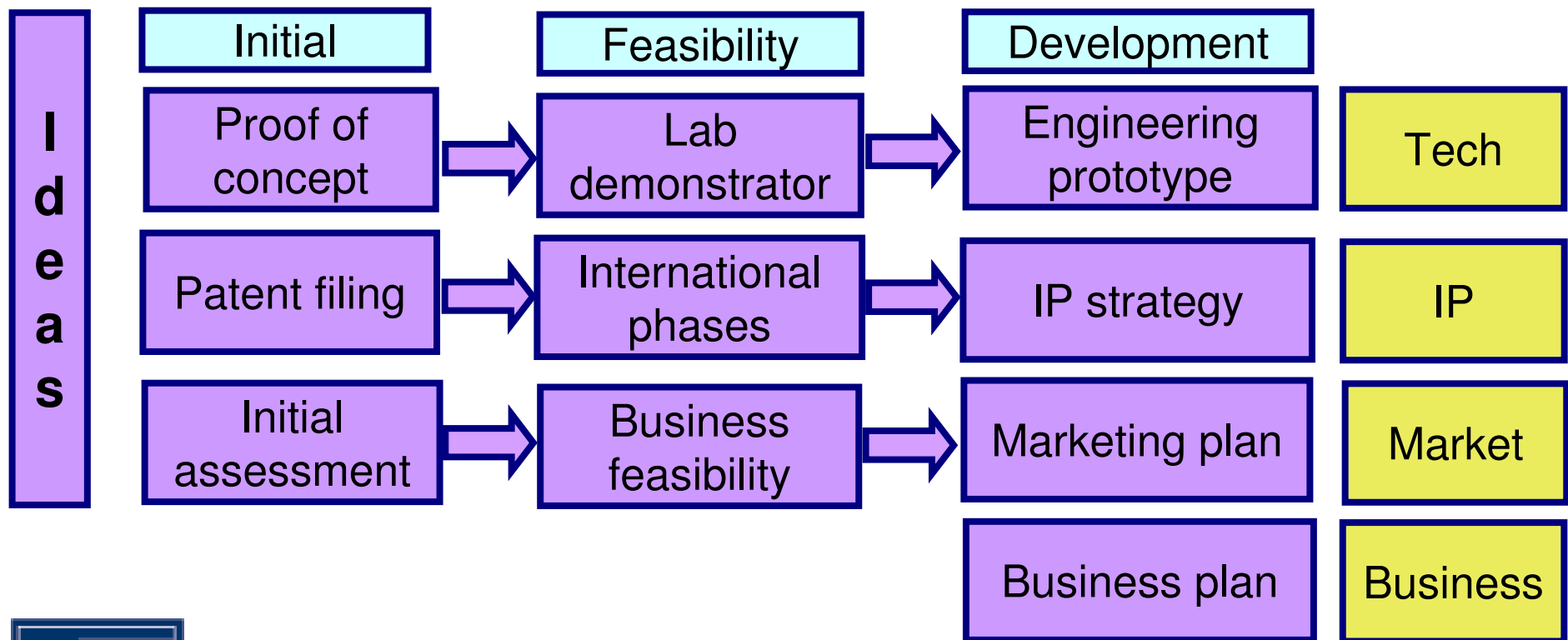


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## Four streams of development

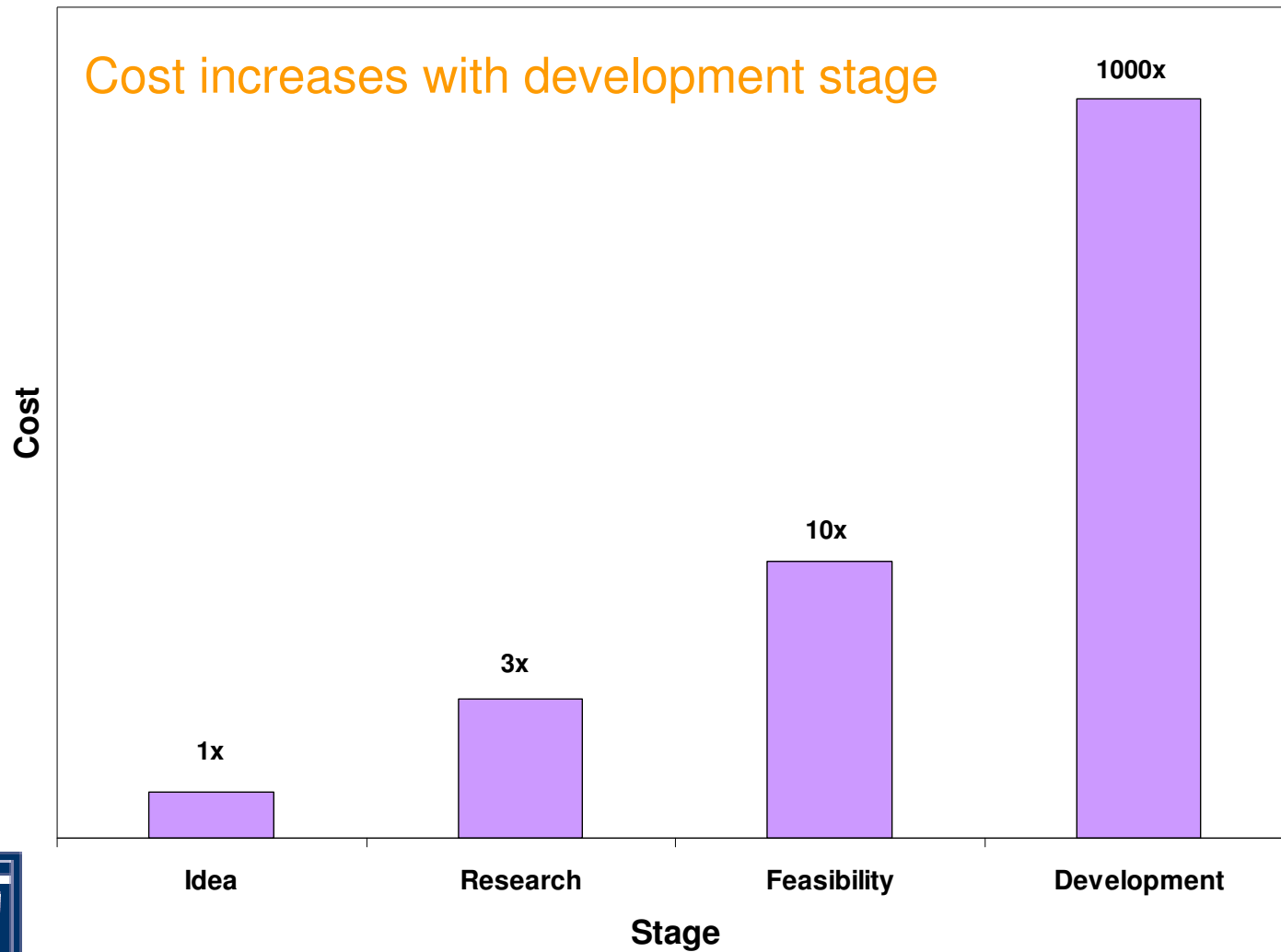


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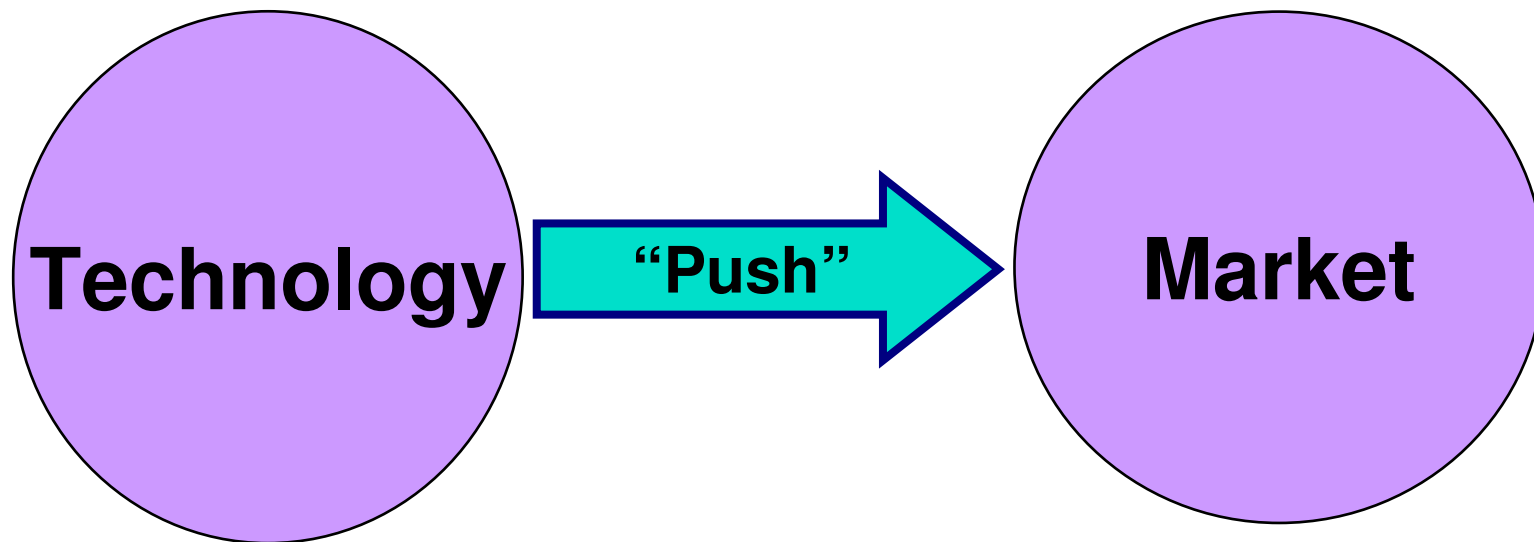


## *Models for managing development risk*

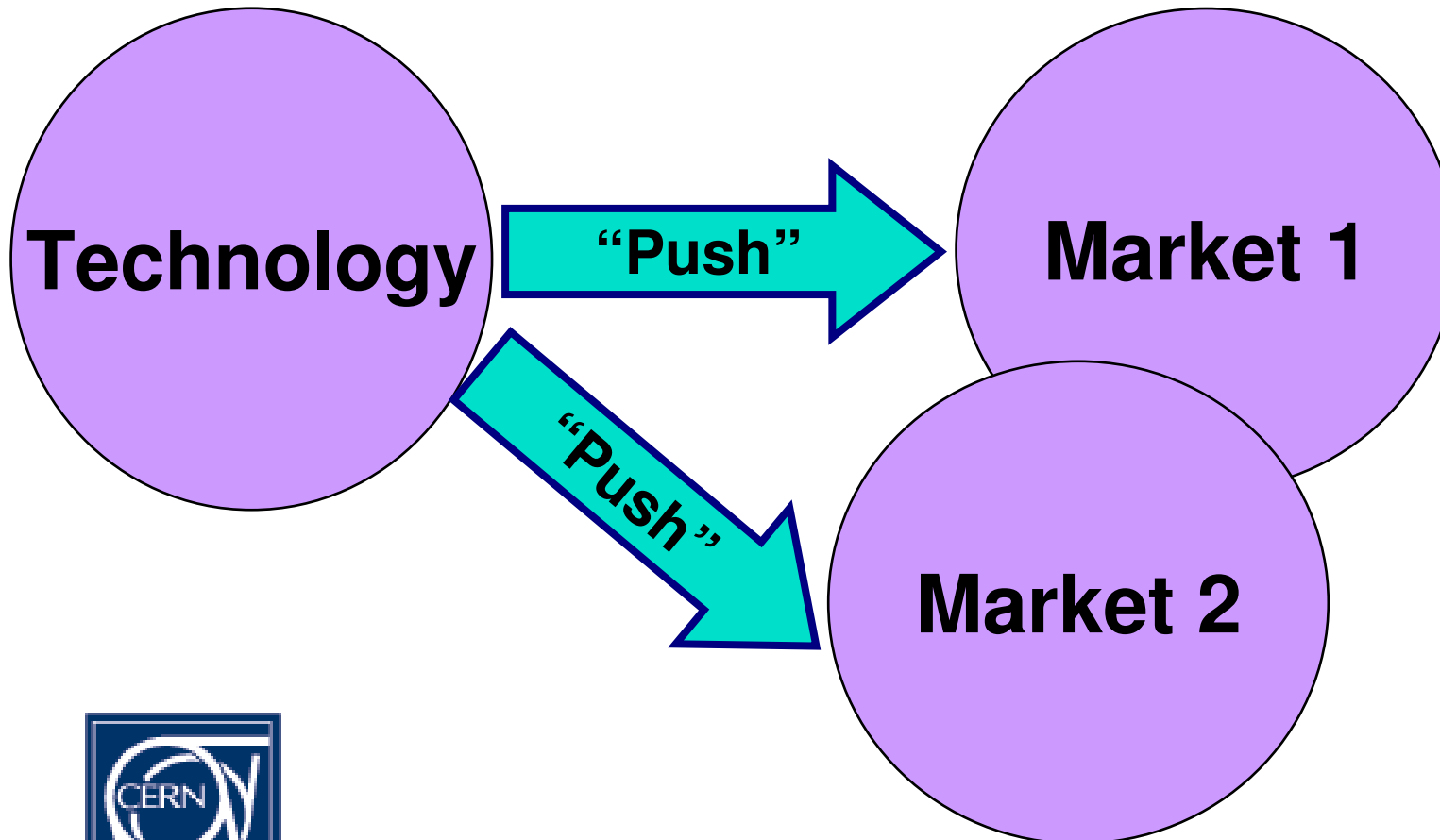
- Technology push
- Market pull
- Stage-gates
- Modified stage-gates e.g. “Skunkworks”



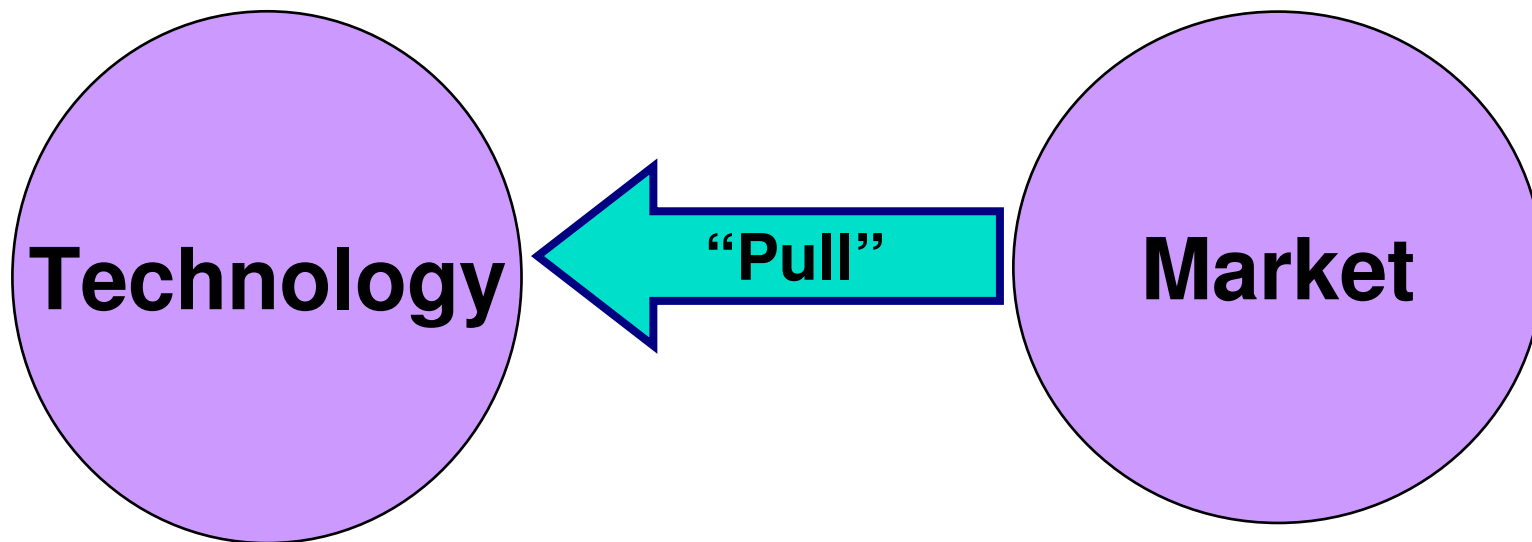
## *Technology push*



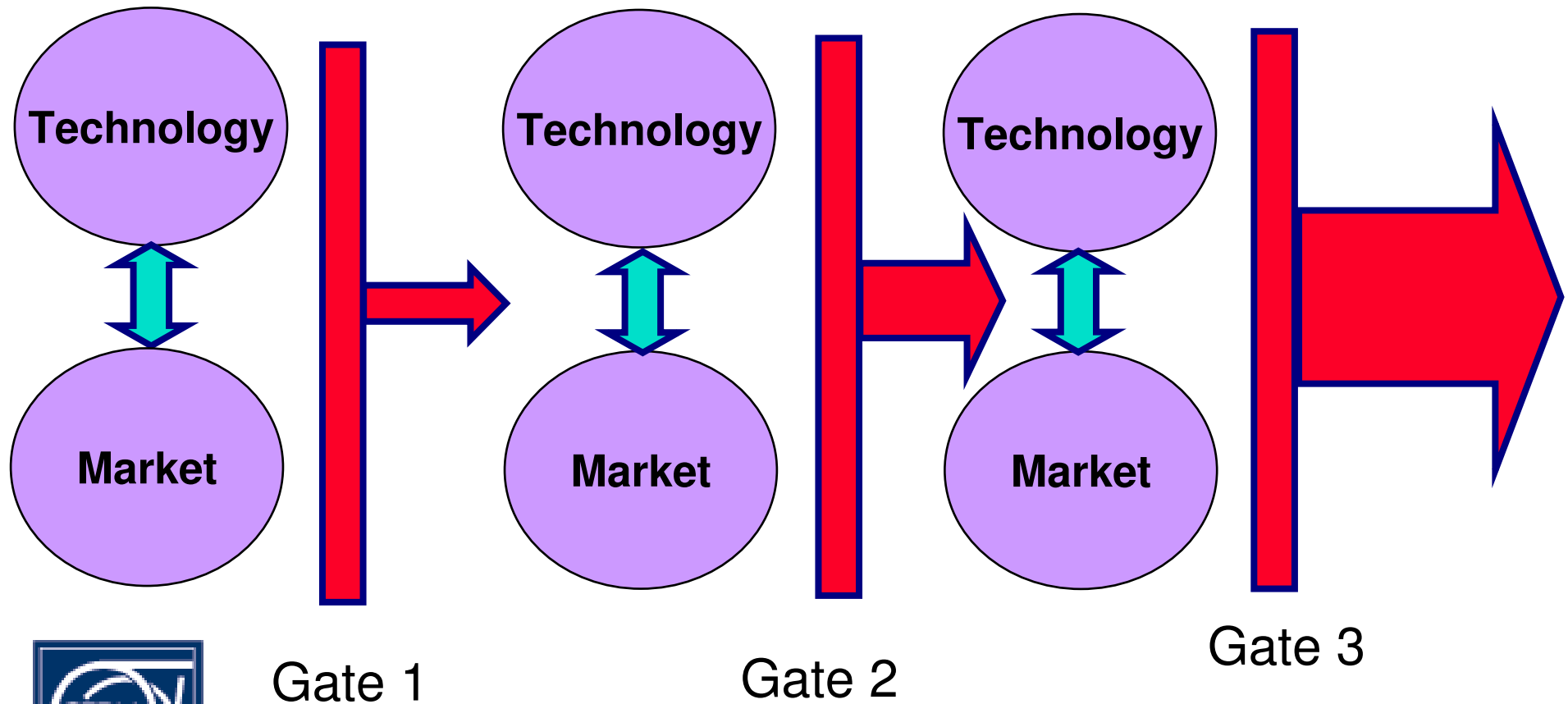
## *Technology push*



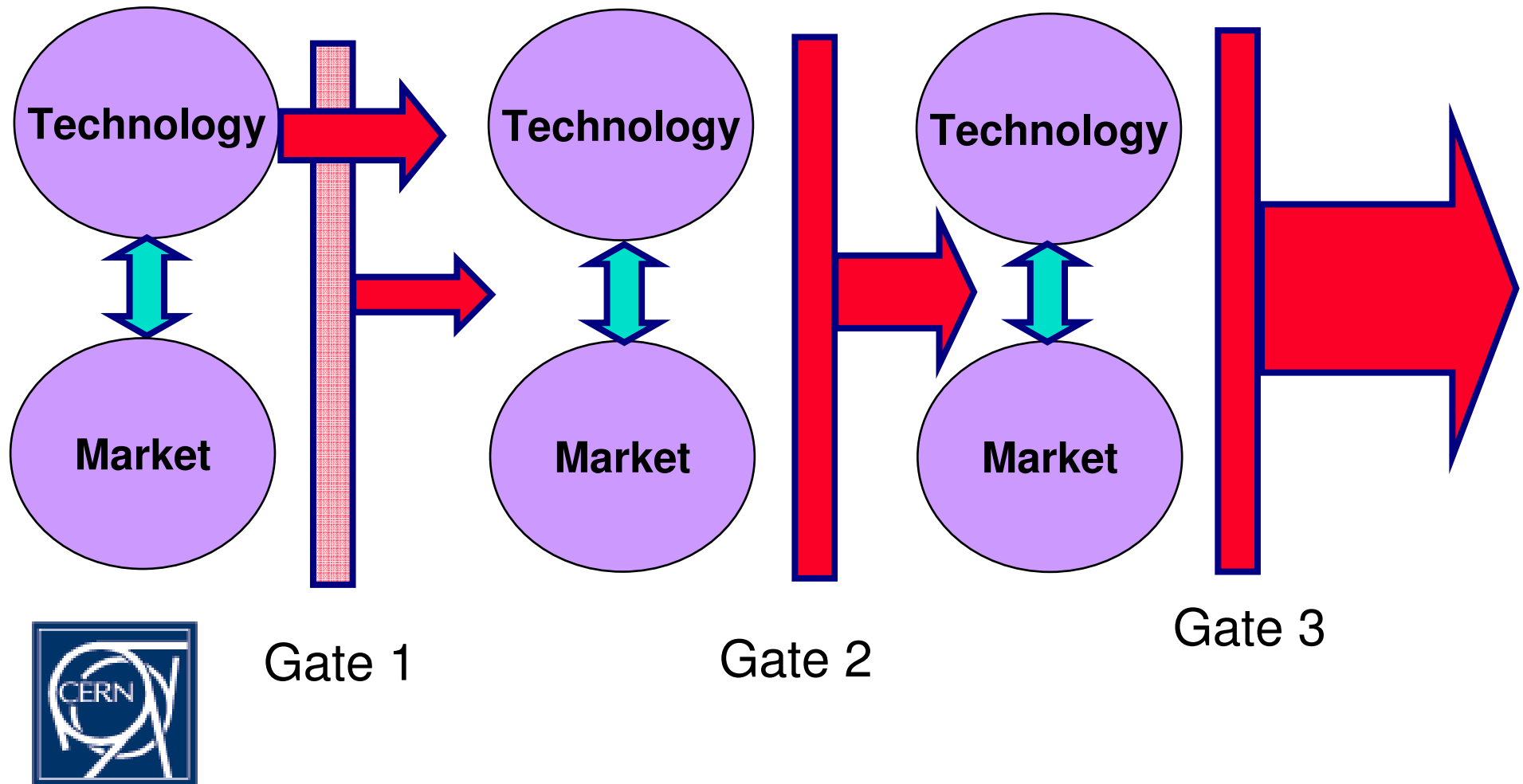
*Market pull*



## Stage Gate



## Modified Stage Gates





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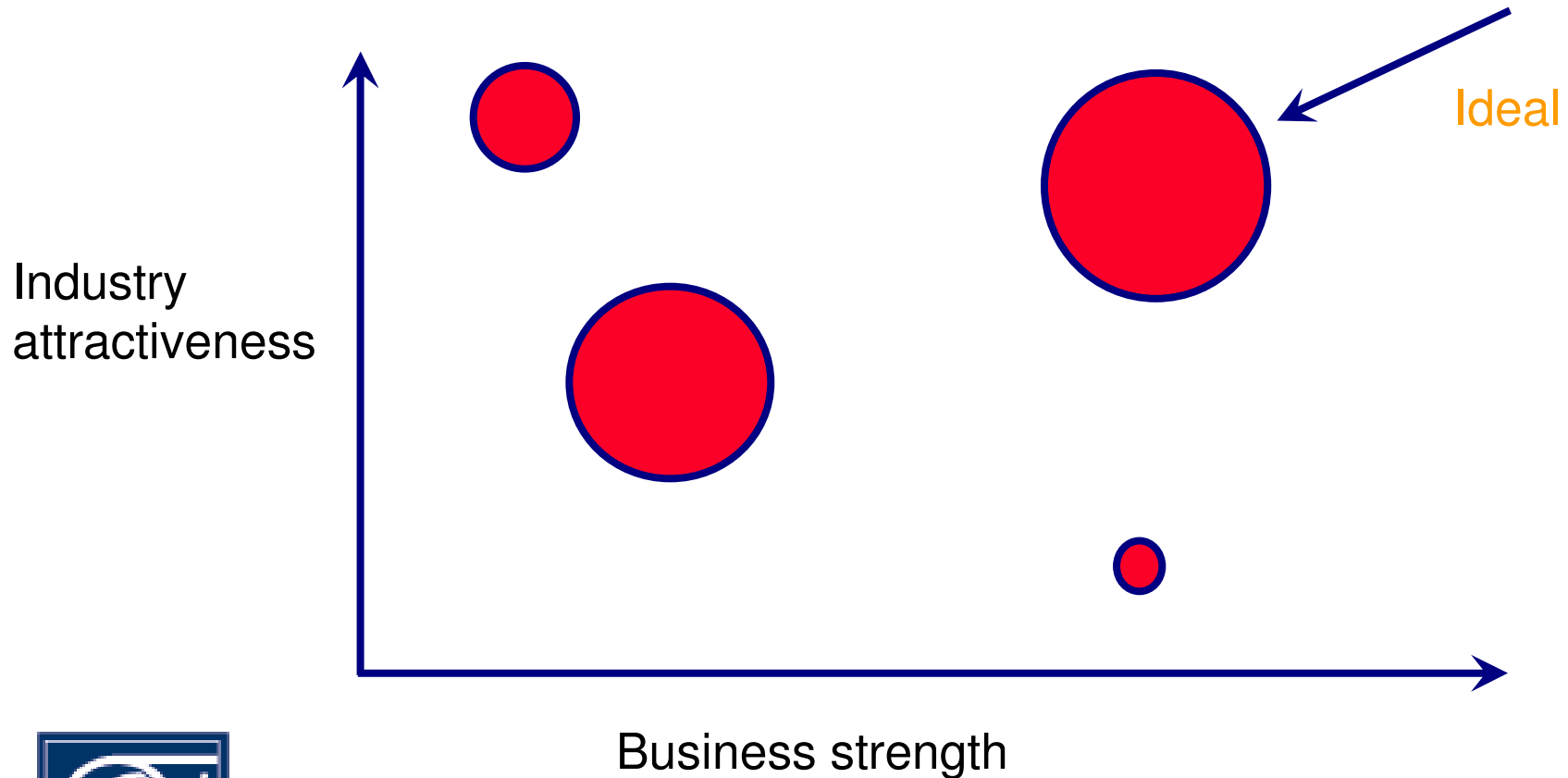


## *How to value a technology opportunity*

- Approaches
  - Net Present Value (NPV) of future cash flows
  - Cost-based valuation
  - Sales-based valuation
  - Profit impact of market share (PIMS)
  - Emotive valuation
- All depend on “strength” of position and “attractiveness” of market



## GE-Shell Matrix



## ***Finding some facts***

- Strength of position
  - Strength of team
  - Nature of Intellectual Property
  - Competition in field (for the market application)
  - Stage of development (be realistic)
  - How much more work is needed to make a saleable product?



## *Finding some facts*

- Attractiveness of opportunity
  - Define the market carefully
  - Limit the number of markets to assess
  - Global size and growth rate of the market
  - Market characteristics “intensity”
  - Barriers to entry
  - Technology match to market



## ***Finding some facts***

- Sources of information
  - Trade journals and magazines
  - Research individual companies
  - Speak with suppliers (careful!)
  - Speak with potential customers (careful!)
  - Purchased research reports
  - Go to exhibitions in the field



## *Special Issues in IT and Software*

- Protection of IP
- Open Source software (and culture)
- Competitiveness in this environment
- Company structures and business models
  
- Who really makes money out of software?



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## *What do investors seek?*

### **Investor#1: (Business Angel)**

- Strong platform technology/IPR developed by strong scientists
- Platform technology must support a convincing product road map
- Disruptive technology able to change market dynamics
- Globally competitive
- Potential market must be large, global and growing
- Ability to create value through high margins and p/e ratio (industry average)
- Convincing business model

### **Investor#2: (Venture Capitalist)**

- Revenue visibility through customer commitment
- Clear path to profitability
- Management track record
- Valuation methods are harsh and will not return to 2000 levels



## *What do investors seek?*

### **Investor#3: (Investment Bank)**

- Novelty
- Presentability (maturity)
- Existence and size of markets
- Strength of Intellectual Property
- Third party involvement



## ***Factors influencing valuation - summary***

- Global size and growth rate of the market
- Team
- Market characteristics “intensity”
- Strength of Intellectual Property
- Business model



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## *Business Models*

- Partnering – 10.15am (after coffee break)
- Spinout – 11.15am (after Partnering)



## *Summary*

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## *Case study – X-ray detectors for EDXRF*

### Finding the information

- Trade journal – All Report
- Purchased market research
- Bottom-up market model of targeted manufacturers
- Internet-based research
- Talked with users and sales reps





## ***Case study – X-ray detectors for EDXRF***

### Applications for X-ray detectors

- Medical - \$2,300m + 6% (3 year CAGR)
- Security - \$1,500m + 11%
- Analytical - \$450m + 8%
- Scientific - \$100m + 5%



## ***Case study – X-ray detectors for EDXRF***

### Analytical applications for X-ray detectors

- Micronalaysis – EDX/WDX \$100m + 3%
- Elemental analysis – EDXRF/WDXRF \$180m + 15%
- Diffraction – XRD \$170m + 3%



## ***Case study – X-ray detectors for EDXRF***

### Growth in elemental analysis

- Driven by industrial and conformance requirements
  - Cheaper, safer X-ray sources
  - Thermoelectrically cooled detectors (TEC)
    - Silicon Drift Diode (SDD)
    - PIN diode (PIN)
- Issues are discrimination, count rate and cost



## *Our device isn't attractive enough*

- But PIN and especially SDD devices are better
- Our detector had poor count rate, high cost but excellent discrimination (resolution)
- Can command a niche of maybe \$1-2m of products (= \$100,000 of detectors)
  - Improve count rate & cost?
  - Niche market for a small company
  - Or terminate development



## *Case study – optics in displays*

Attractiveness of opportunity

- 😊 Huge market, growing above trend
- 😊 Current solutions too expensive
- 😊 Technology matches unfulfilled needs
- 😊 Time to market matches development cycle
- 😞 Very competitive market with huge players
- 😞 Lots of money needed



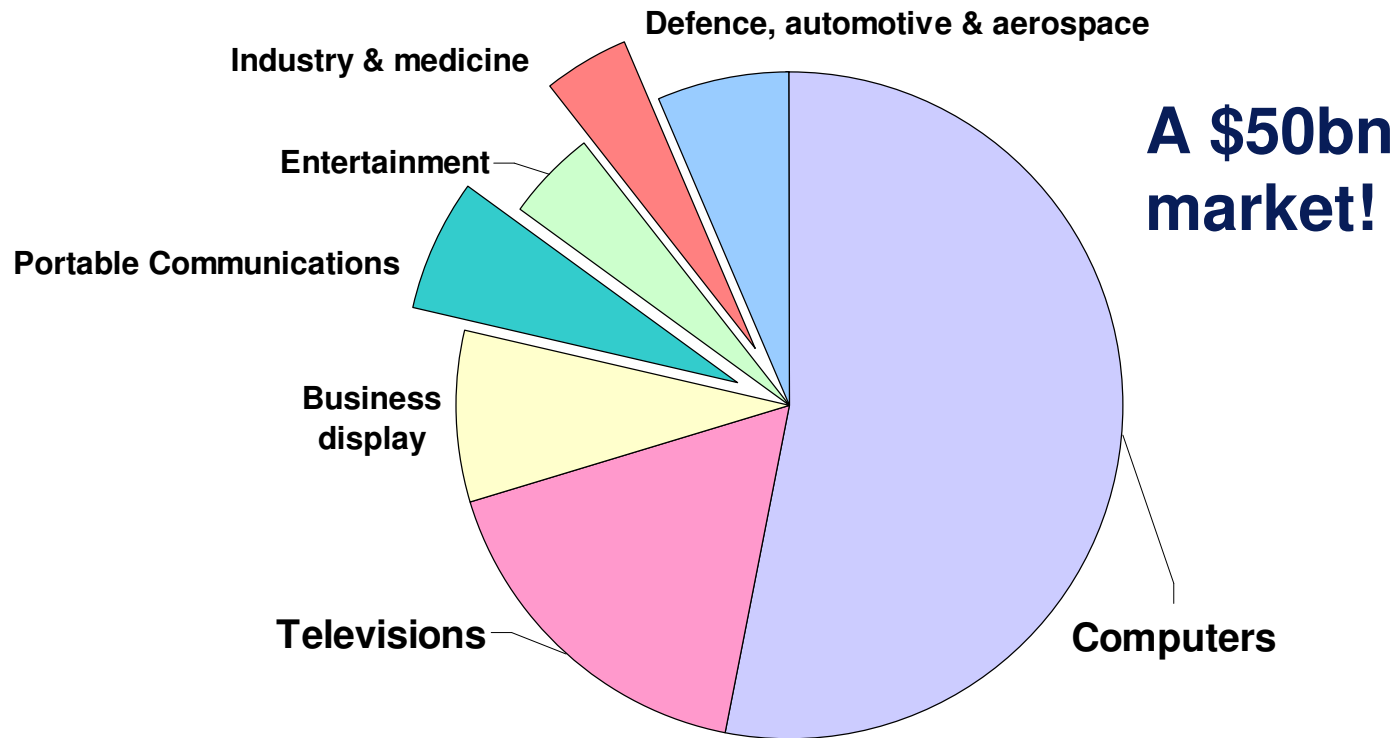
## *Case study – optics in displays*

Strength of position

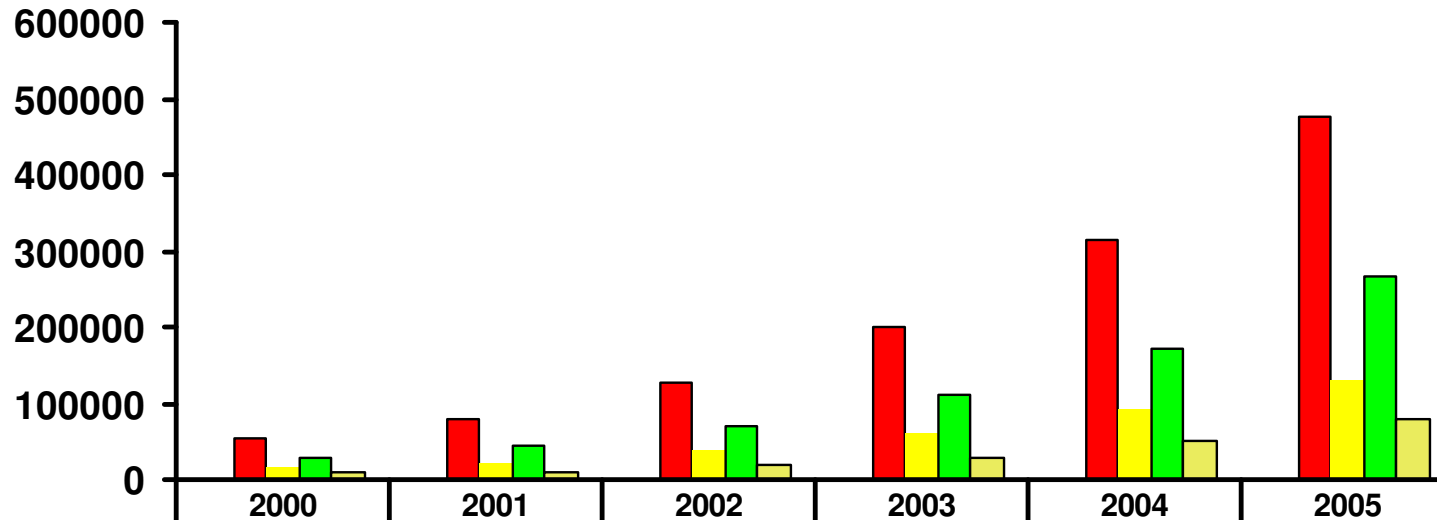
- ☺ Search found only one other IP generator
- ☺ IP is “core”
- ☺ Inventor is well-respected expert
- ☺ Approach is novel and “disruptive”
- ☹ Team is poor (lack of staff and experience)
- ☹ Lots of development required



## Case study – optics in displays



## Case study – optics in displays



	2000	2001	2002	2003	2004	2005
WW Potential						
World	53,600	79,600	126,700	200,000	314,000	476,900
Americas	16,600	23,600	37,700	59,000	92,000	130,900
Europe	29,000	46,000	71,000	111,000	172,000	266,000
AsiaPac	8,000	10,000	18,000	30,000	50,000	80,000



Large area projection TV

Source: DisplaySearch 9/2002



## Market research

Year	Market (\$m)	PDP revenue (\$m)	PDP share (%)	LED revenue (\$m)	LED share (%)
2000		568	28%		
2001	2500	944	37%	425	21%
2007	5500	2270	44%	1500	26%
<b>CAGR</b>	<b>14%</b>				
	<b>Value (\$m)</b>	<b>Share (%)</b>			
<b>USA</b>	859	43%			
<b>Europe</b>	560	28%			
<b>Japan</b>	344	17%			
<b>Far East</b>	131	7%			
<b>RoW</b>	107	5%			



Source: Stanford Resources: Large Screen Displays 2002

## ***Assessing the market***

- Total market for displays \$50bn, 6% growth (2000)
- Flat Panel Displays \$21bn, 15% growth (2000)
- Large area (>80cm) \$8bn, 17% growth (2000)



## *Assessing the market*

Within this \$8bn:

- Applications are:
  - Signage & advertising
  - Business and education projection
  - Large TV
- Technologies are:
  - Plasma
  - LED
  - LCD (>2003)
  - FED, OLED etc



## *Assessing the market*

### Discovery!

- Pixel density, contrast ratio and form factor can allow optical technology to break into and disrupt the home cinema market – Plasma etc won't compete well
- Eureka!



## *Assessing the market*

- Within the \$8bn market, about \$4bn is accessible
- At 30% eventual market share, this is \$1.2bn
- Licence rates will be about 2.5-3.5%
- Market sizes allow \$15-40m p.a. revenues



## *Case study – optics in displays*

### Conclusions

- Business model should be licensing + technology development
- Target partnerships with displays majors
- Develop demonstrators
- Focus on worldwide protection of Intellectual Property



## *Case study – optics in displays*

### Conclusions (cont.)

- Focus markets on home cinema, business projection and signage – 70 times the original target market



## *Funding market assessment*

- Market research is expensive but essential
  - More difficult to fund than technical development
  - Do some initial research yourself
  - Limit the number of markets to assess
  - Develop a stage-gate process
  - Seek funding support and establish a budget
  - But listen carefully to advisors – most are really trying to help





## *Funding market assessment*

- PPARC and CERN support
  - UKTTC
  - Business plan competition
  - Enterprise Fellowships
  - PIPSS
  - Rainbow Seed Fund
  - CERN TT
- DTI awards
- Private finance (ask your grandma)
- ⇒ And many others...



## ***Next seminar – “partnering with industry”***

- Five “golden rules” for establishing successful technology partnerships with industry
- Funding available from PPARC, CERN, UK government and the EU



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*Thank you for listening*

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