



CORETEC VENTURES

Financing Fuel Cell Projects and Businesses

6th International Solid Oxide Fuel Cell Summer School







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Core Technology Ventures Services

Core Tec Ventures H2&FC Industry Activities

	Company		Network			
Network / Company				 Fuel Cell Europe		
Activity	<i>Novel PEM Cathode Developer</i>	<i>Carbon nano-tubes manufacture</i>	<i>Roads2Hycom €4.5m EU-funded project</i>	<i>European Fuel Cell Industry Association</i>	<i>Set up by UK Govt in response to the threat of climate change</i>	<i>Set up by the UK Govt to promote UK Business, Innovation and Skills</i>
Core Tec	<i>Supply chain evaluation; Formal introductions to Core Tec industry contacts</i>	<i>Assessment of potential location in supply chain, Formal introductions to Core Tec industry contacts</i>	<i>Finance partner in this consortium, (29 Partners), which is charged with describing & analysing the EU H2&FC industry</i>	<i>Founding Board Member (2001)</i>	<i>Contracted to support UK companies and universities with their H2&FC activities</i>	<i>Steering committee member of the Knowledge Transfer Network</i> <i>Assessor for the March '09 H2&FC Technologies Competition for Funding</i>



Core Tec Ventures: Finance Market-Activities

	Private Finance		Stock Market Listings		
Company					
Activity	<i>Novel PEM Cathode Developer</i>	<i>Contract Research Organisation</i>	<i>SOFC System developer</i>	<i>Novel PEM Membranes</i>	<i>PEMFC System Developer</i>
Core Tec Role	<i>Advice with a £1.6m capital raising</i>	<i>Advice with a £10m capital raising</i>	<i>Advice and project management of technical due diligence for stock market listing</i>	<i>Co-author with investment bank of stock market research prior to company listing on London's AIM</i>	<i>Advisor on Management Buy-out, project management of technical due diligence leading floatation on London's AIM, Identification of key non-executive director</i>



1: Introduction to Basic Financial Terminology

Source of Funds

Debt, Equity, Subsidies and budgets

Financial Instruments



Outline

1. Introduction to Financial Terminology:

- a) Debt, Equity, Subsidies and budgets, 'Sources of Finance and Financial Instruments
- b) Financing Fuel Cell Businesses: Type of Firm & Financing Instruments
- c) Financing Fuel Cell Projects & Finance Instruments

2. The Financial System in the Context of the wider Economy

- a) The Economy & the Supply of Investment Funds
- b) The Role of the Financial Markets
- c) Financial Flows and the Role of Intermediaries
- d) Financial Flows & Markets

3. The Financial Chain and the Evolution of Companies

- a) The Types & Roles of Financial Investors in Emerging Companies
- b) Company Evolution: from Applied R&D to Establishing a Business
- c) Matching investors with Developers:
 - a) Start-ups with Friends & Family
 - b) Early-stage, with angels & VCs
 - c) Established business with professional investors

4. The Expectations of Finance Providers

- a) Investor Requirements of the Management
- b) Investor Requirements of the Business Model
- c) Cautionary Tales: Management Fundraising & Strategy
- d) New Companies often Fail to appreciate ...
- e) Total Equity Raised by Independent Developers: EU Vs North America

5. Closing Remarks

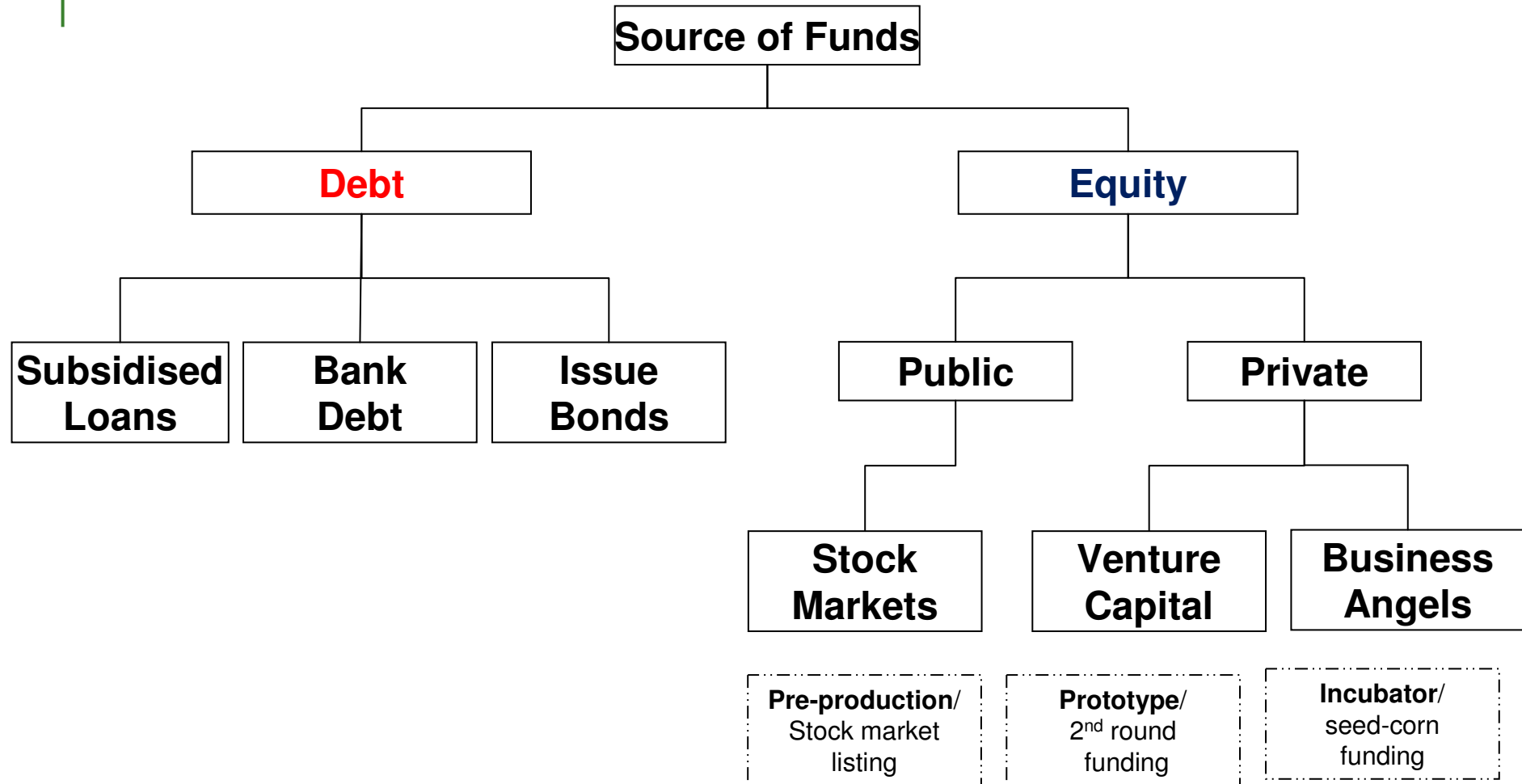


Introduction to Basic Financial Terminology

- ❖ **Debt:** Money raised on a debt market (bonds) or obtained from a bank (loans). This requires the borrower to prove he or she has the resources to pay the debt back at the agreed time AND the ability to make interest payments. It is available to corporate entities (bonds or loans) or private individuals (loans, mortgages). Potentially available to Joint Technology Initiatives depending on legal structure. Not suitable for university R&D projects or independent developers who have little or no revenues. Corporations and public bodies can raise debt to be provided to demonstration projects. *In the event a company goes bust, debt providers are paid back after preferential creditors, e.g. employees' wages, but before equity providers.*
- ❖ **Equity:** Or risk capital or permanent capital, is money raised on a bourse or private market from professional investors (insurance companies, pension funds, etc) venture capitalists or private individuals, and which is not returned to the providers. Available to established corporations (bourse: secondary issue of shares, or initial public offering) and is possible though difficult for start-up companies from VCs and private individuals. The provider of equity becomes an owner of the company with corresponding rights. Requires assets (physical & intellectual) that can be owned. Highly unlikely to be available source of finance to demonstration projects and extremely difficult for seed companies. *Equity providers are the last people to be paid in the event the company goes bust, assuming there is any cash left. Hence the term Risk Capital.*
- ❖ **Subsidies 1:** Tax breaks and capital grants are made available to corporations and are only of use where the corporation has taxable revenues it can use to claim the tax break and the capital resources to match the capital grant which normally a percentage of the specified capital cost incurred by the corporation. Only indirectly useful for demonstration projects in as far as corporate participants may have access to tax breaks and grants against which the project could be used. Will be different across the EU depending on local tax regimes.
- ❖ **Subsidies 2:** R&D grants e.g. EU Framework grants are available to academe and corporations with the capital reserves available to cover that part of the project's cost not paid for by the grant. Whether such subsidies will be directly available to demonstration projects needs clarification. They are indirectly available to participating companies and as such are similar to the subsidies outlined above.
- ❖ **Budgets:** Cash that is made available to a department of a company or public body for specific purposes over a specified period of time.



Sources of Finance



Newly established companies are essentially limited to seed & early-stage financing

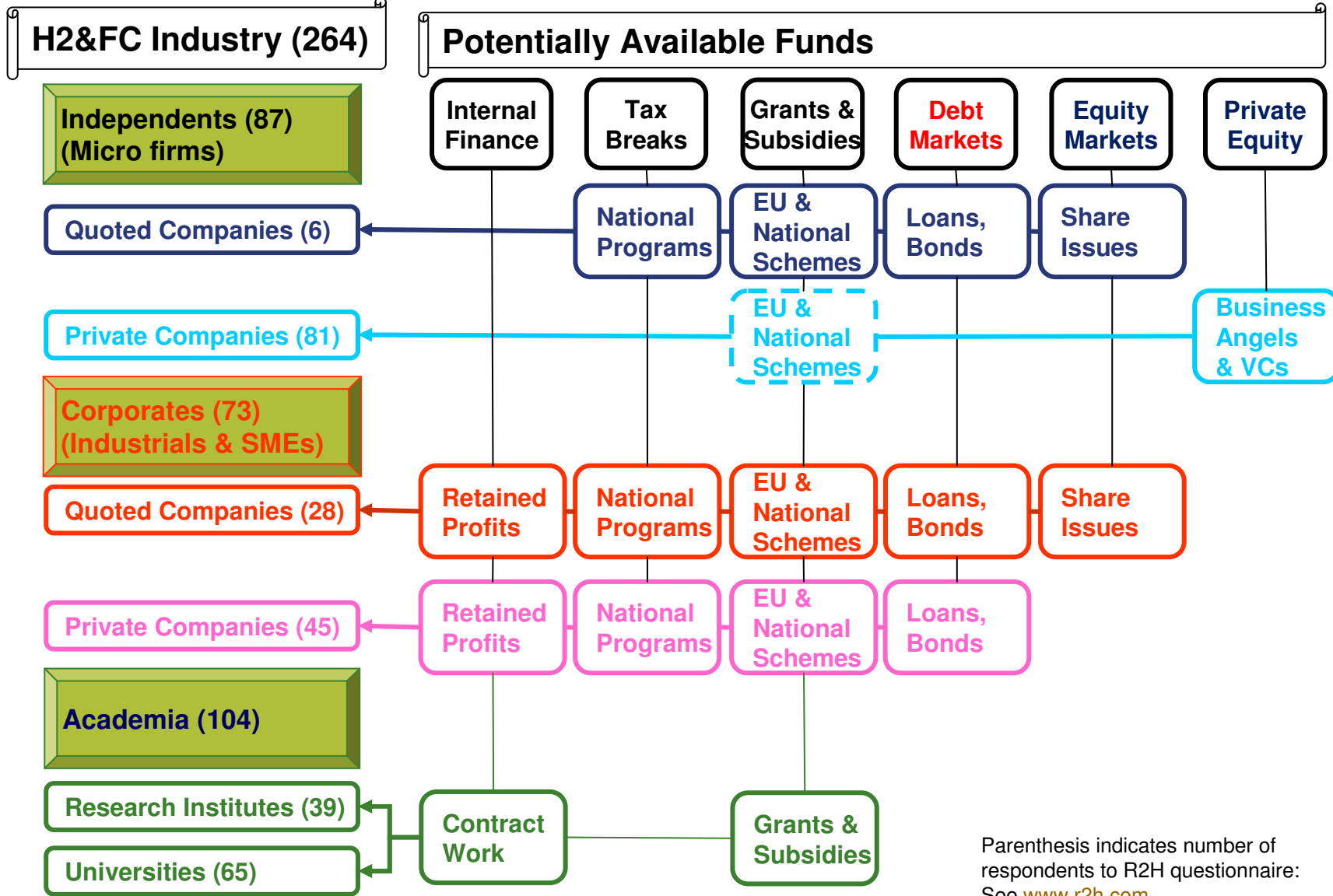


Financial Instruments Matrix

Type of Instrument	<u>Debt</u>		<u>Equity</u>		<u>Subsidies</u>	
	Bonds	Mortgages	Publicly traded shares	Privately traded shares	R&D Grants: e.g. EU Framework Grants	Tax Credits: e.g. accelerated depreciation
Examples of users	Institutional Investors, Financial companies	Companies, Home owners	Institutional investors, Private Individuals	Business angels, Venture capitalists, Corporate Venturers	Companies Universities Research Institutes	Companies
Typical Issuers	Companies, Governments	Retail banks Building societies	Quoted Companies	Private Companies	National & local governments, European Union	National & local governments
Constraints	Ability to pay interest & principal	Ability to pay interest & principal	Capacity to generate profits and pay dividends	Ability to show superior technology & management	For companies, proven capacity to match the subsidy	Ability to make profits to benefit from tax credit
Purpose of issue	<p>Debt allows companies to pursue their own interests by leveraging profits with little or no impact on control. Unlike equity, debt can attract tax breaks with interest payments treated as a cost. Typically companies choose a mixture of debt and equity that suits their aims and the current state of the economy. E.g. as interest rates fall companies may seek to finance increased investment by debt rather than issuing new equity to shareholders.</p>		<p>Equity gives companies the freedom to pursue their own best interests in the manner they regard as most appropriate, as well affording them the ability to make use of various government subsidies, such as EU Framework grants. However, subsidies related to income tax relief require a company to generate taxable profits.</p>		<p>Subsidies can allow both governments & companies to pursue social welfare & profit simultaneously by promoting economic growth (jobs). In the case of R&D, subsidies encourage firms to pursue socially beneficial projects that otherwise may be lost to society. The drawback for newly emerging companies is that they often do not have the capital required to match grants nor the profits to benefit from tax breaks.</p>	



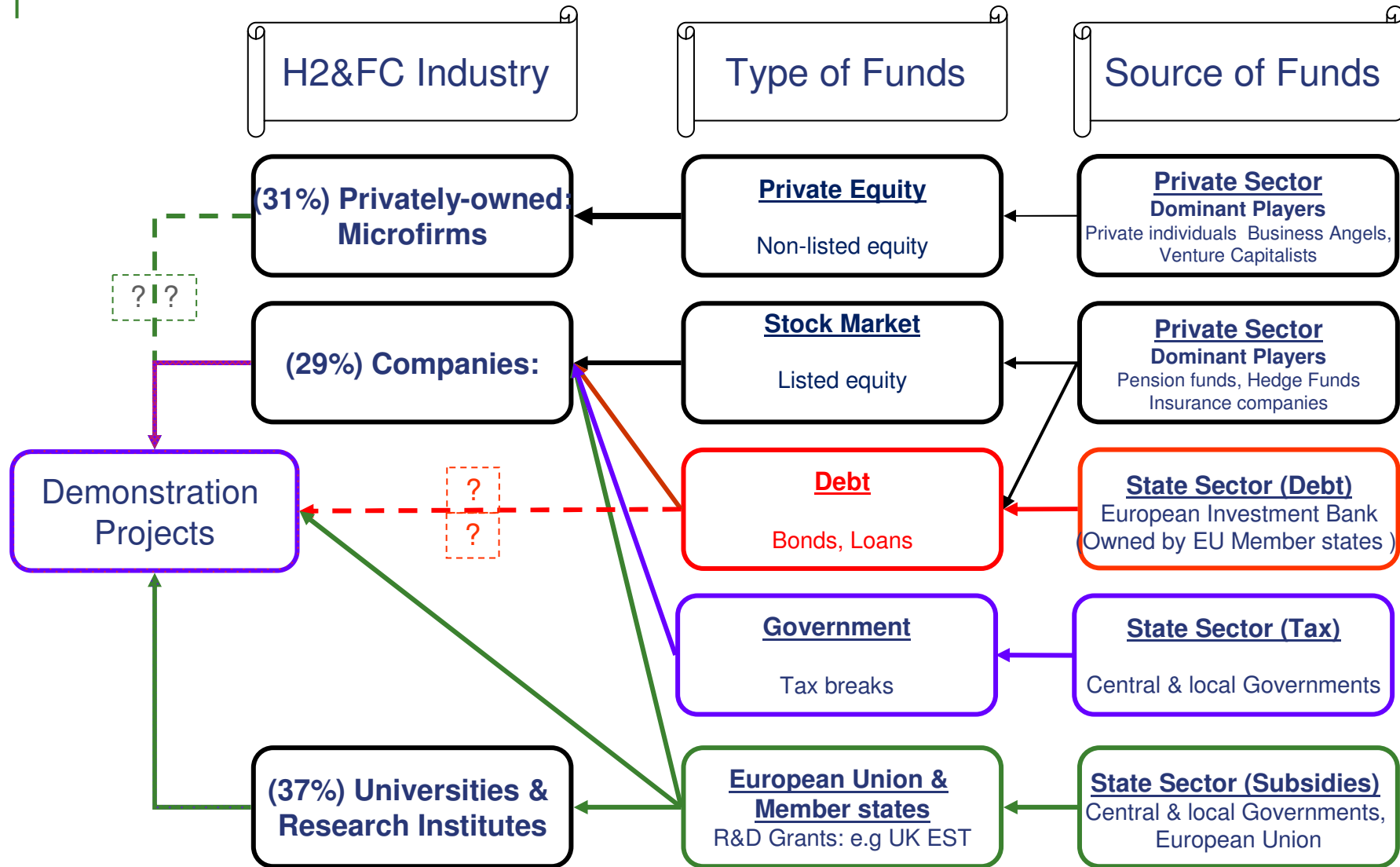
Financing Fuel Cell Businesses: Type of Firm & Financing Instruments



Parenthesis indicates number of respondents to R2H questionnaire:
See www.r2h.com



Financing Fuel Cell Projects & Finance Instruments



Percentages refer to Roads2HyCom database:

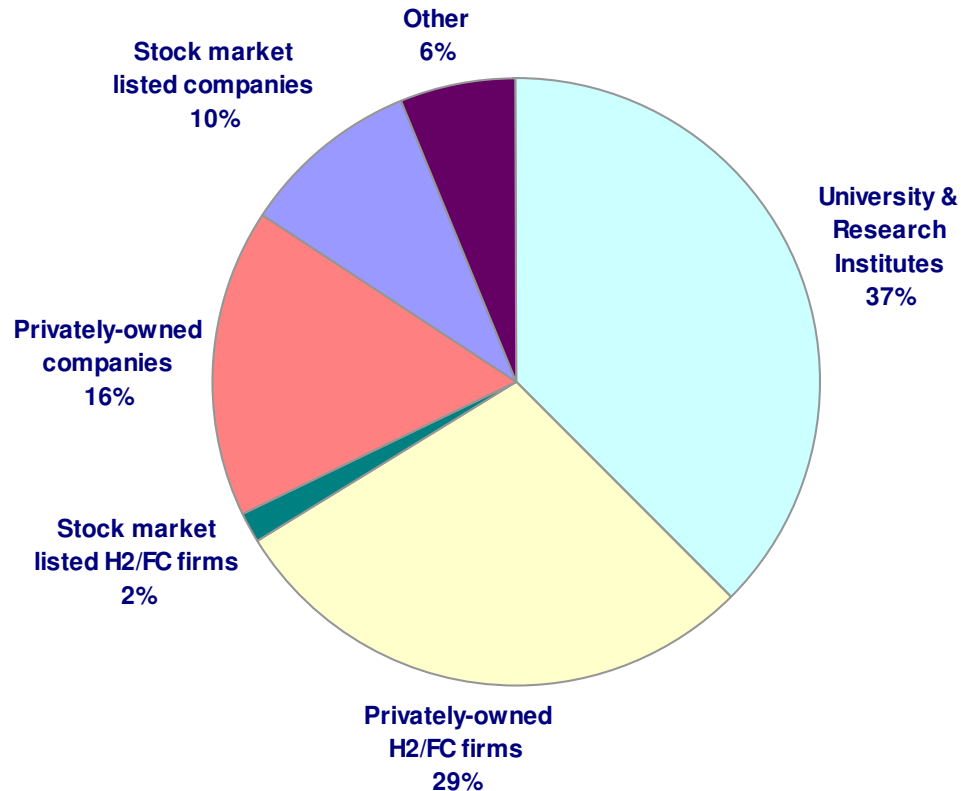


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Structure of the European H2&FC Industry:

Dominated by innovative Independent and Academic organisations

Provisional Data from Roads2HyCom Project*



Nomenclature

- ❖ **“University & Research Institutes”**
Institutions developing H2&FC technologies, e.g. Fraunhofer, ECN
- ❖ **“H2&FC Firms”**
‘Micro-firms’, predominantly focused on the development of H2&FC technologies, e.g. CFCL, Nedstack, P21
- ❖ **“Companies”**
Well-capitalised, economically successful corporates, whose existence is not dependent on the success of H2&FC e.g. Daimler, SGL Carbon, Schunk
- ❖ **“Other”**
Service companies e.g. consultants

Organisational Form

Stock market listed (Corporate) company

Privately owned (Corporate) company

Stock market listed (Micro) firm

Privately owned (Micro) firm

University, Research Institute

Potentially Available Financial Instruments

Debt, **Equity**, Grants & Subsidies, Tax breaks, Retained Profits

Debt, Grants, Subsidies, Tax breaks, Retained Profits

Debt, **Equity**, Grants & Subsidies, Tax breaks

Venture Capital, Private Sources

R&D Grants, Industry sponsorship

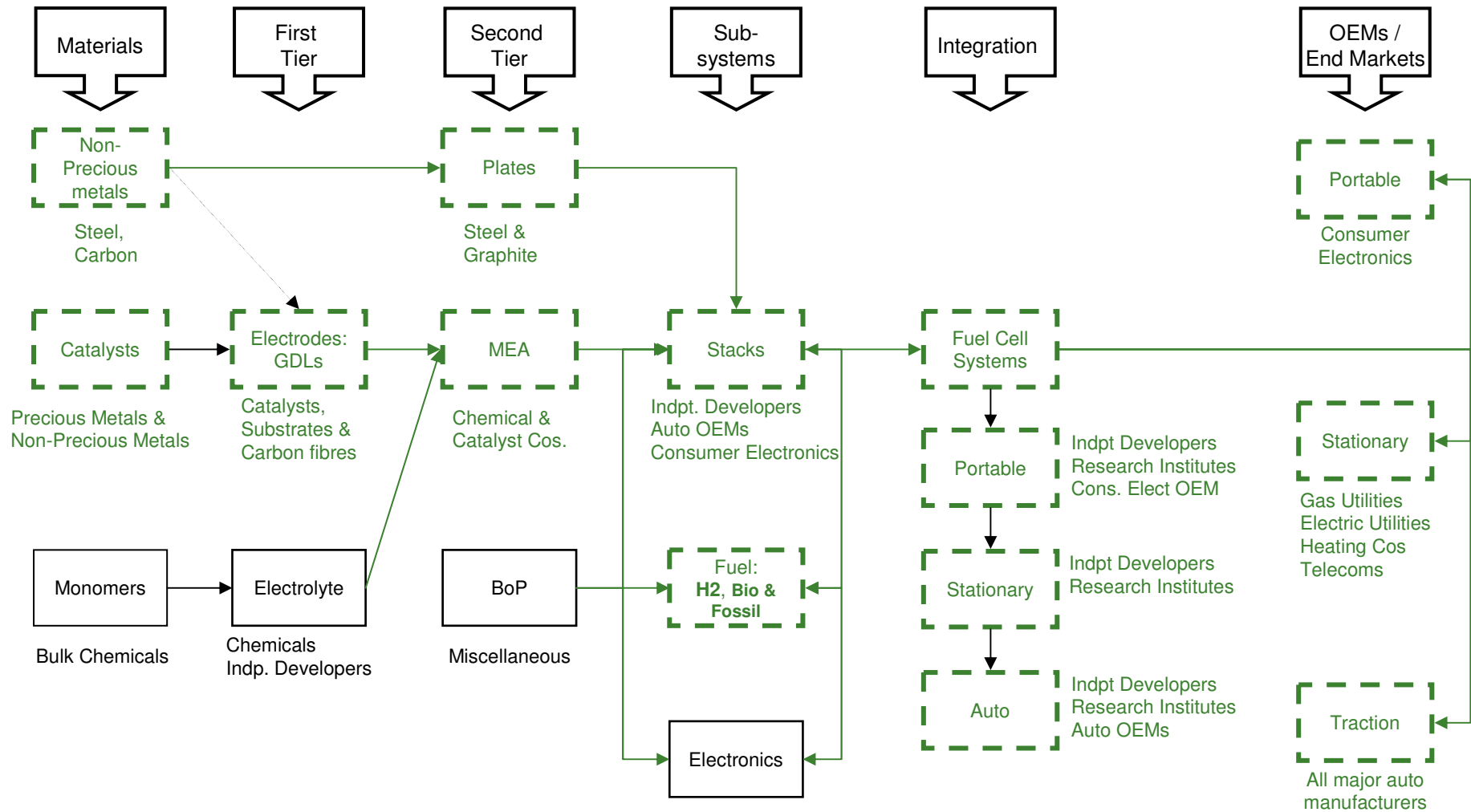
281 respondents gave details of “organisational form”



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•Roads2HyCom is an EU supported consortium charged with describing & analysing the European H2&FC industry

Identify Location in the Supply Chain



2: The Financial System in the Context of the Economy:

The Economy & the Supply of Investment Funds

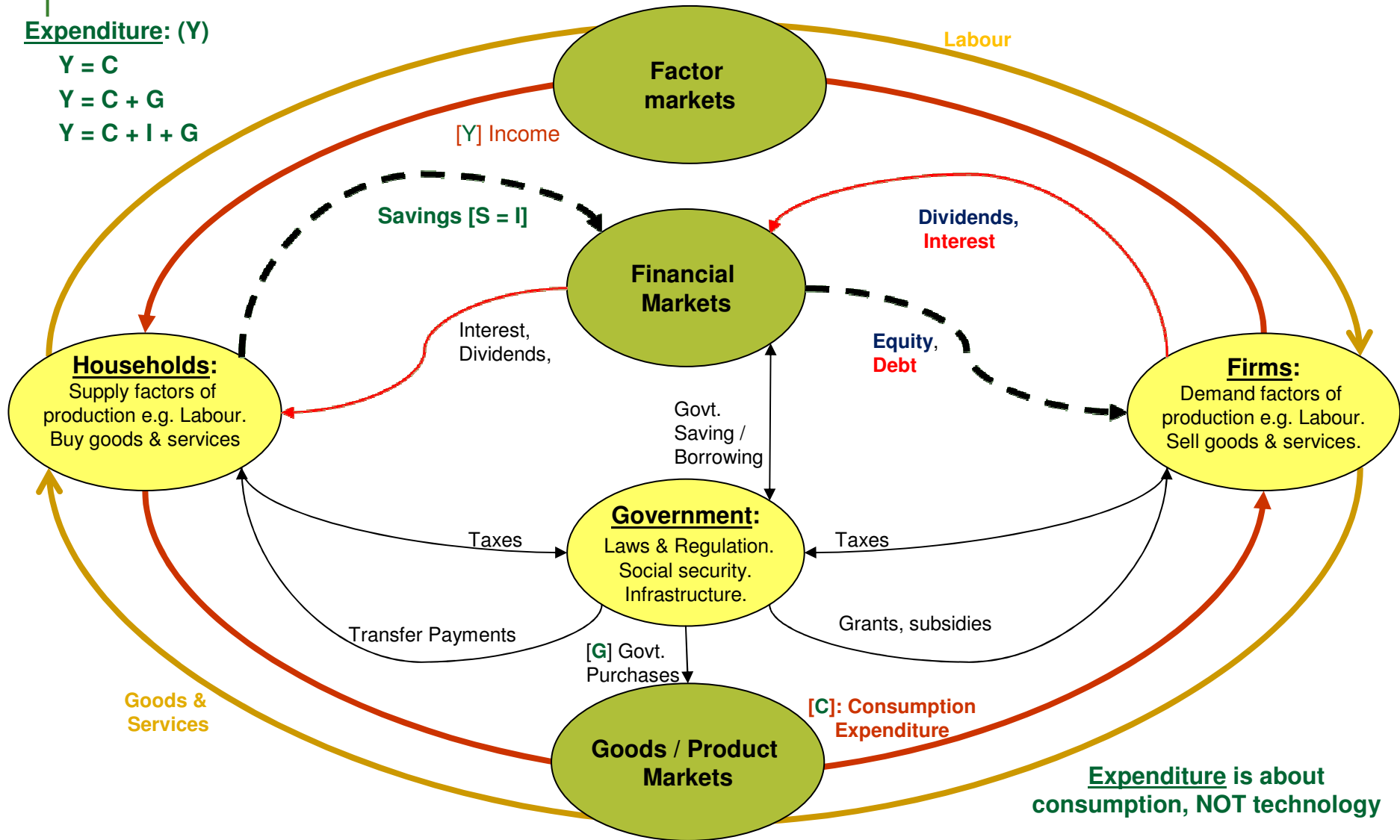
The Role of the Financial Markets

Financial Flows and the Role of Intermediaries

Financial Flows & Markets



The Economy & the Supply of Investment Funds: ($S \equiv I$)



The Role of the Financial Markets

- ❖ What do the financial markets facilitate?
 - ❖ The efficient allocation of capital (vs central planning)
 - ❖ From those wishing to save to those wishing to borrow for investment or consumption
 - ❖ The provision of choice in the timing of consumption
 - ❖ Saving for retirement
 - ❖ The provision of information
 - ❖ How well / badly assets are being managed, what crops to grow
 - ❖ The management of risk over time
 - ❖ Selling next year's crops today



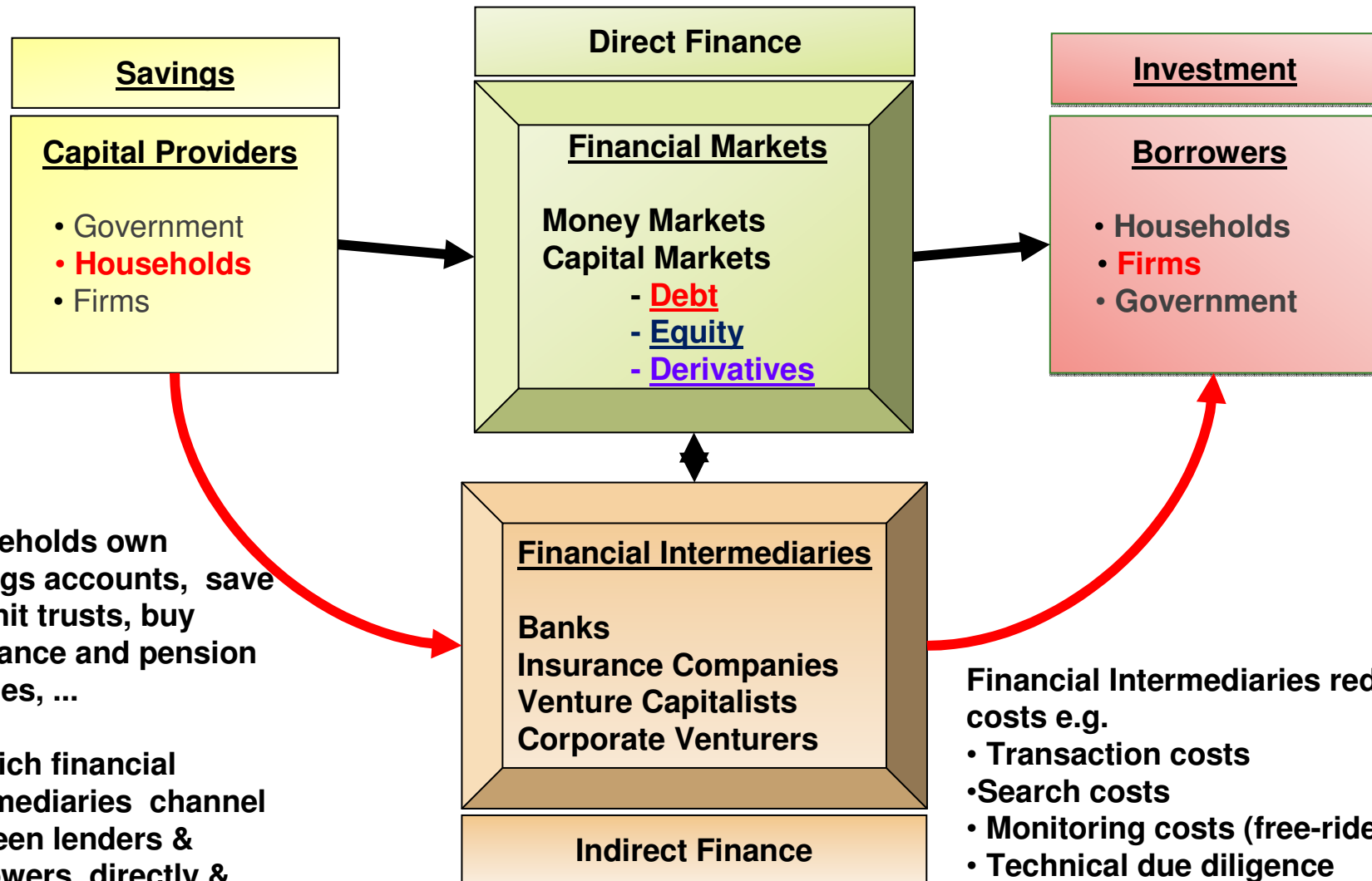
Financial Flows and the Role of Intermediaries

Households		Financial Intermediaries: E.g. Banks & insurance Companies			Corporations: E.g. Industrial Companies
Source of Funds		Liabilities	Assets		Funding
Savings accounts	}	Savings deposits	Corporate bonds	}	Debt
Fund units		Mutual Funds	Equity		Equity

- Households seek to save with low risk and high liquidity, i.e. short-term
- Financial intermediaries create liquid instruments, (e.g. savings deposits, mutual funds) attracting household savings, which can be quickly realised
- Firms borrow long-term to finance their activities & create long-term liabilities (e.g. debt & equity)
- Financial intermediaries use household savings to buy & sell corporate debt & equity
- On the one hand, households withdraw funds on demand, and on the other, the liabilities of the corporations are traded on financial markets allowing people with different views of the world to buy and sell these



Financial Flows & Markets



Households own savings accounts, save via unit trusts, buy insurance and pension policies, ...

... which financial intermediaries channel between lenders & borrowers, directly & indirectly

Financial Intermediaries reduce costs e.g.

- Transaction costs
- Search costs
- Monitoring costs (free-riders)
- Technical due diligence
- Legal & other professional costs



3: The Financial Chain and the Evolution of Companies

The Types & Roles of Financial Investors in Emerging Companies
Company Evolution: from Applied R&D to Establishing a Business

Matching investors with Developers:

- Start-ups with Friends & Family
- Early-stage, with angels & VCs
- Established business with professional investors



The Types & Roles of Financial Investors in Emerging Companies

❖ Family and Friends

- ❖ Provide the initial finance on the basis of personal relationships & trust
- ❖ They often provide little further input to the development of the technology

❖ Business Angels

- ❖ Provide their own money to finance seed and early-stage developers
- ❖ They often also provide their own business experience and expertise to develop the company

❖ Venture Capitalists

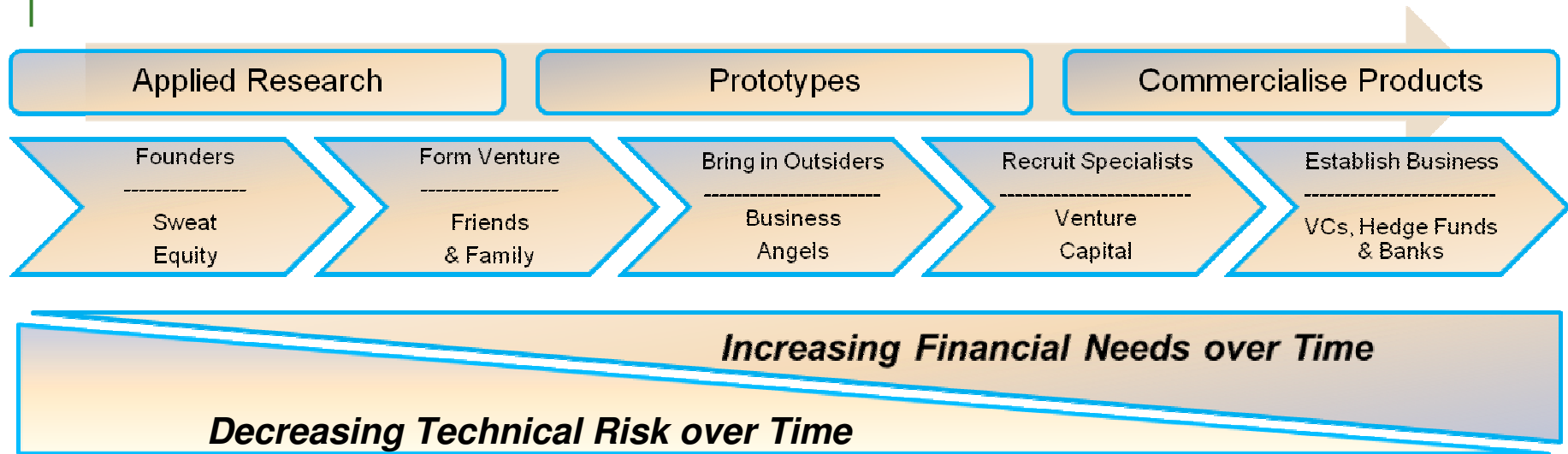
- ❖ Channel capital raised from their clients to high risk innovative companies & ideally
 - ❖ Provide financial & strategic expertise as well as expert knowledge of the wider industry
 - ❖ Open their network of contacts with potential commercial & research partners, potential customers and introduces qualified managers as the company expands

❖ Hedge Funds

- ❖ Provide the final financing to companies with little technical risk that are on the verge of listing on a stock market or prior to a trade sale



Company Evolution: from applied R&D to establishing a business



Start-up companies tend not to have a management team or the necessary skills to manage the challenges newly established companies encounter. These issues may include:

- The continual raising of finance
- Hiring appropriate staff at the appropriate time
- Establishing financial controls and operational standards
- Validating the product opportunity
- Building distribution channels
- Marketing
- Acquiring new customers,
- Protecting and managing and monetising intellectual property
- Managing growth



Matching Investors with Developers: Start-ups with Family & Friends



I. Start-Up / Seed Capital (*Typically raising less than €300,000*)

a. Company Characteristics:

'technology' is a scientific concept with a potential future use which has yet to be practically demonstrated. Risk of failure and thus loss of capital for the investor at its highest.

b. Use of Capital:

to cover the cost of 'proof of concept, to pay salaries, develop the business plan & fund additional technical and market research. Unlikely to meet banks requirements for lending and very few venture capital funds will invest at such an early stage

c. Sources of funds

friends & family, maybe business angles



Matching Investors with Developers: Early-stage, with angles & VCs



II. **Early Stage:** (Typically raising less than €3m)

a. **Company Characteristics:**

business concept technically proven, outline business plan in place, probably based on rudimentary market forecasts. Few, if any, non-scientific members of staff may exist.

b. **Use of Capital:**

develop technology from 'proof of concept' to prototype. Some patents may be filed &/or granted. Specialist members of staff, including experienced start-up business executives hired to enable transition from technology to product developer.

Stricter financial controls will need to be put in place.

c. **Sources of funds:**

specialist early-stage VCs &/or corporate ventures with a strategic interest are active at this stage. Although the broad energy sector is starting to attract the venture capital community, few funds as yet exist with the expertise needed to invest in H2&FC companies at this stage.



Matching Investors with Developers: Established business with professional investors



III. **Development Capital/ Expansion Capital:** (Typically raising in excess of €3m)

a. **Company Characteristics:**

prototype demonstrated. Collaborations established to access additional technology, engineering, routes to market. Most still loss-making, limiting ability to raise debt from lending institutions

b. **Use of Capital:**

to participate in the funding of collaborations & expand workforce e.g. marketing and finance. The company may also need to move to more spacious or more convenient premises. The business may also be looking to acquire specialist teams or to acquire businesses to accelerate its growth beyond what is possible organically. Once companies have established the market viability of their product, they often require additional capital to expand and bolster their infrastructure, to accelerate market penetration or to expand into new geographic markets.

c. **Source of funds:**

Venture capital, Corporate venturing, Hedge funds



4: The Expectations of Finance Providers

Investor Requirements of the Management

Investor Requirements of the Business Model

Cautionary Tales: Management, Fundraising & Strategy

New Companies often Fail to appreciate ...

Total Equity Raised by Independent Developers: EU Vs North America

“Large increases in costs with questionable increase in performance can be tolerated only for race horses and fancy spouses”

Lord Kelvin



Investor Requirements of the Management

- ❖ High level of personal commitment (often evidenced by earlier financial commitment)
- ❖ Understand the technology and its potential commercial applications
- ❖ Focussed on product not technology (Sales = Products)
- ❖ Realise that commercial means that the residual of Sales less Costs is positive (Profits)
- ❖ Willingness to engage and delegate responsibilities to appropriately qualified staff
- ❖ Willingness to share profits
- ❖ Willingness to relinquish control



Investor Requirements of the Business Model

- ❖ Protected technology (preferably utilised in application-specific development) and/or technological lead over competitors
- ❖ Transparent 'unique selling point' – what problem is solved
- ❖ Technology addresses large and/ or strongly growing markets
- ❖ Above average growth potential
- ❖ Scalable business plan (i.e. The ability to grow revenues faster than costs – falling average fixed costs)
- ❖ Realistic manufacturing strategy
- ❖ Supported by well-defined development and financial milestones
- ❖ Transparent exit strategy for investors, through either stock market listing or trade sale



Cautionary Tales

❖ Management

- Poor investor relations management
- Inexperience at dealing with corporate partners
- Poor customer expectation management
- Founders' reluctance to introduce professional managers
- Inactive non-executive (supervisory) board
- Inappropriately large management teams

❖ Fundraising

- Inadequate corporate structure
- Poor or little investor documentation: business plan, presentations, Company summary
- Unclear ownership of intellectual property
- Poor and/or misleading investor communications raises the long-term cost capital
- The highest price is rarely the best price

❖ Strategy

- No technical or commercial milestones
- Poor or ill defined product focus
- Reluctance or inability to adapt to changing markets
- No exit strategy



New Companies often fail to appreciate ...

- ❖ The Fact that H2&FC Companies are not Ordinary Equity Investments
 - ❖ Investment outcome is potentially binary i.e. many H2&FC businesses face huge success or catastrophic failure
- ❖ The Need to provide evidence of real 3rd party risk sharing such as
 - ❖ Partnerships in R&D, marketing and product development
- ❖ An Appreciation of the Risk Concerns of the Investor, including:
 - ❖ Regulatory risk (e.g. Policy shifts)
 - ❖ Technical risk and crucially
 - ❖ Management
- ❖ The Fact that investors interests are limited by relatively short time periods
 - ❖ Governments are driven by long term economic growth (Welfare / Employment)
 - ❖ Corporations are driven by long-term survival
 - ❖ Financial investors are driven by short to medium term cash flows
- ❖ That the Returns on early stage investments on Average Result in:
 - ❖ 34% total loss
 - ❖ 13% partial loss or breakeven
 - ❖ 17% returns greater than 25%
 - ❖ 13% returns between 25 – 49%
 - ❖ 23% returns greater than 50%

(Source C. Mason; R. Harrison)



Total Equity Raised by Independent Developers: EU Vs North America

Independent Quoted H2&FC Companies	R&D Spend to Latest FY \$m (% of total)	Employees FY Latest (% of total)	Equity Raised to end last FY US\$ m (% of total)	Number of Companies
North America	\$176.107 (91%)	2,132 (91.9%)	\$3,360.679 (92.6%)	16
Europe	\$9.525 (4.9%)	89 (3.8%)	\$131.414 (3.6%)	6
Australia	\$7.904 (4.1%)	100 (4.3%)	\$136.303 (3.8%)	1
Total	\$193.535	2,321	\$3,628.396	23



5: Concluding Remarks



Concluding Remarks

- ✓ **Finance is fundamental to the development and commercialisation process**
 - ✓ Finance is no guarantee of success, but its absence will guarantee failure
 - ✓ Households savings are a major source of investment finance
 - ✓ Individuals with savings accounts, pension & insurance policies contribute to the flow of investment capital

- ✓ **The road to commercialisation begins with savings**
 - ✓ For economically successful companies this is a mixture of retained profits, debt, equity & government subsidies
 - ✓ For start-up companies equity is the only practicable option

- ✓ **Financial markets and financial products are highly diverse**
 - ✓ Identify where your level of development relative to the appropriate financial provider
 - ✓ Remember, non-government investors are motivated by practical products, not the elegance of your technology

- ✓ **European start-up companies often lack the necessary skills to develop commercial product**
 - ✓ The average European start-up at best fails to understand the importance of finance in the commercialisation process and at worst is hostile to financial investors
 - ✓ Taking the time to understand the importance of finance and the motivations of investors will pay dividends



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