Facilitating Transfer of Technology in order to build Deep Tech Businesses:

Difficulties in turning intellectual property developed by universities into commercial application is one of the greatest bottlenecks to the creation of world changing businesses, and ultimately growth and prosperity. It is critical that we all work towards facilitating transfer of technology

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The topic of Facilitating Transfer of Technology is a big one, and this article touches upon a number of other big topics that are linked to it: The "valley of death" in the financing of a startup, the challenges faced by angels in scaling up their own investments, the challenges faced by universities in promoting tech transfer, the focus of VCs on unicorns at the expense of early-stage investments, the misalignment of interest between early-stage investors/founders and VCs, and the challenges inherent in turning academic inventors into entrepreneurs.

But the purpose of this article is not to address all of them. Instead, this article looks at one of the many options available: the creation of spinoffs and the argument that one avenue is to build a bridge between universities and venture building groups with the means and experience to build deep tech businesses. Monte Carlo Capital has been focusing on that segment. Let me start by setting some context and explain what we do.

1. Monte Carlo Capital (MCC)

Funding big ideas that make the world a better place.

I founded MCC in 2009 initially to invest my own capital, with a main focus on early-stage businesses. Today, MCC is a group of high net worth individuals and family offices who are based in several European and Asian countries and invest in Europe and the US.

We target two types of businesses:

- Most of our investments are in deep tech businesses, typically backed by leading scientists, based on technology solving big problems. We invest in anything from medical devices to artificial intelligence, robotics, big data and internet of things.

- We also seek highly disruptive businesses that are smarter/better/cheaper than anyone else. This could be in pretty much any traditional tech industry (e.g. fin tech, e-commerce, etc).

We only invest in businesses with the potential to reach exit valuations superior to $100 million; therefore, we look for big global ideas. We start investing as angel investors at the seed stage.

Let's focus on deep tech businesses. Those businesses are often shunned by business angels. Deep tech businesses can be intimidating to the non-specialists, and businesses of this nature typically require more cash and a longer time horizon to exit than cash-light and easily scalable businesses such as software.

However, over time I've found that tech is usually not what goes wrong. If you invest in businesses backed by leading scientists and you can get assurance that the tech works (and you have a good IP strategy), it's typically not the point of failure. If chosen carefully, deep tech is less prone to competition than software because the barriers to entry are lower for the latter.

As an investor, once you make sure that the tech works (or is likely to work), the main risks remain similar to any business: execution (i.e. people) and financing (those are very broad categories, and any experienced investor knows that risks can come from a very wide range of factors).

Over the years, I have looked to mitigate tech, execution and financing risks. This article shows, through its different sections, how we try to do this.

Core to MCC strategy is our ability to invest at the "valley of death" stage. Also core to our strategy is to bring together the best features of angels and venture capital - in other words, having the size and scale of a venture fund, whilst being private investors (i.e. we remain angel investors).

1a. The "Valley of Death"

One major risk is financing, particularly at the "valley of death" stage:

As per the European Business Angels Network (EBAN) 2018 Statistics Compendium[i], the average investment of a business angel in Europe in 2017 was EUR 25,400, whilst the average investment per Business Angel Network (a business angel investment club) was EUR 182,000. In the US, the numbers are not very different. The 2017 HALO report points that that the median angel network investment was USD 200,000[ii].

On the other hand, VCs that can back a big deep tech idea will usually not invest less than a few million euros to make their time worthwhile.

Now, let's assume startup XYZ needs to raise EUR 1 million because it has either:

a. gone through the first EUR 100,000 to 300,000 angel round or
b. created a big deep tech project, and needs to raise EUR 1 million

Startup XYZ has two options to get funding: find 40 individual business angels (whose average ticket size in Europe is EUR 25,000) or find a VC (which is likely to tell them to come back when they need a few millions).

That gap between financing from angels and venture capital is the "valley of death" in the funding cycle. Many businesses with great potential fail because they can't raise 1 to 2 million (there are some super angels and angel groups that can invest a couple of million euros. But there are few of them). It's just the structure of the investment market that makes it difficult to raise 1 million.

If you can invest 1 million, you have an edge. At MCC, our first ticket is, as a group, anywhere between EUR 500,000 and EUR 1.5 million and we usually take an entire seed round. By focusing on the "valley of death", we can attract great businesses from Europe and the US that are struggling to raise get financing.

1b. Bringing together the best of angel investing and venture capital

Angels bring so much to businesses. Once a business is past the friends and family round, angels bring vital capital and help businesses with advice, introductions, support, mentoring, etc. But angels themselves struggle to scale up their own investing past a certain point. They usually have limited resources past a certain stage (as detailed above). Rare are those full-time angel investors and those with the ability to help a business scale globally. Only a VC can typically do that.

On the other hand, financial venture capital (here, I'm making the distinction between financial VCs and corporate VCs) is facing some backlash. Financial VCs interested are sometimes seen as conflicted with both entrepreneurs and angels, offering punitive terms. Financial VCs can also face a conflict of interest with their portfolio companies (their fiduciary duties are to the fund investors) and some fall short when it comes to adding the value they claim to deliver. Don't get me wrong, VCs are critical to the ecosystem and some do make a significant difference to their portfolio companies, if only by bringing cash. But the issues identified above are increasingly in the backs of the minds of entrepreneurs and angels alike.

To bring more value to our businesses, MCC was built with a view to combine the best of angel investing and venture capital:

- I am a full-time professional investor (and a number of my co-investors are), with investors on two continents, advisors in Europe, US and Asia, a strict investment discipline, a deep due diligence process, and an ability to invest an amount of capital that only venture funds do. I am also often leading follow-on investments, in some instances for three times in a row in the same business, with increasing financing sizes.
- Once we invest, our group helps businesses scale up. We help our portfolio companies with everything from preparing pitch decks, client presentations and financial models, all the way to introducing clients across geographies.

Our ability to take an entire seed round, lead follow-ons and help our businesses scale up allows us to attract great businesses from both Europe and the US. In the end, finding the best businesses to invest in is the essence of early-stage investment. We can also de-risk our investments by both providing real

support to our businesses and by being able to keep financing them up to a certain point, which allows us to choose the larger investors who will take over as businesses grow to need significantly more capital than we can offer.

2. Finding the new-new thing:
Tech Commercialisation.

As an investor, I spend a considerable amount of time on deal flow, looking for businesses that meet our criteria (deep tech backed by a leading scientist, solving a big problem, with big market opportunity and a great team). The fact is, we are all looking for the new-new things.

The thing is, the new-new things are already there. They're sitting somewhere in a file at a university, while they would better serve humanity by being licensed out, transferred to industry, or spun off into a new startup.

Here is some data to provide a sense of scale:

R&D expenditures by US colleges and universities totalled $71.8 billion in 2016, with 94 percent going into science and engineering[iii] .

In Europe, The EUR 70 Bio Horizon 2020 programme was designed by the European Union / European Commission to support and foster research in the European Research Area (ERA), with talks of an increase to EUR 100 Bio for Horizon Europe, the funding program for 2021-2027 and successor of Horizon 2020.

Before going further, we need to define a few terms:

> Technology transfer: the transfer of academic research results to industry in view of their translation into commercial products and services
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> Knowledge Transfer Office (KTO): an innovation intermediary that is created inside an academic organization to facilitate the implementation of transfer activities, namely the support for spinoff creation, patent protection and licensing and the search for demand of research results from the home organization.
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> University Spinoff (also called a spinout): a company created to develop or exploit the Intellectual Property (IP) developed by a university, with a formal contractual relationship for the use of this IP. The spinoff is typically funded by third party capital (e.g., angel investors, VCs, etc.).
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> The transfer of IP from university to business can be done in a number of ways:
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> Research collaboration (also called sponsored research): a research institute makes available its labs to an industrial partner. Research collaboration represents the majority of tech transfer today.

> Licensing: a university licenses out its technology to a commercial partner. If the IP ownership is transferred, it's called an assignment.

So, the math seems simple: $100s of billions granted to universities around the world, financing some of the leading minds and research labs, surely must be the best place to find incredible tech startups that will change the world?

And yet, tech transfer is challenging, and all that money does not produce the impact it should.

The 2018 state of Europe Tech report[iv] highlights that some work remains to be done:

> "The European tech ecosystem is built on top of a large pool of researcher talent that it has largely untapped"; And yet, the report also notes that "Looking beyond just computer science, Europe is home to 31 of the world's top 100 universities in engineering and technology. These 31 universities are distributed across 11 different countries and 29 different cities and reflect the fact that European STEM talent is inherently spread across the region driven by the strong academic institutions that exist in all corners of the region. There are, in short, clusters of world-class talent potential in every corner of Europe."

In reality, some universities are much better than others at tech transfer. The UN (2013), Intellectual Property Commercialization: Policy Options and Practical Instruments, reports that a concentration of tech transfer is in the hands of a few universities in Europe, with the top 10 percent of universities accounting for over 80 percent of all university licensing income and 40 percent of spinoffs. One interesting finding of the report is that "Older knowledge transfer offices produce fewer invention disclosures, patent applications and grants than younger offices. However, older offices produce larger licensing revenues, in part because they are more successful in finding licensees for their patents. Thus, it seems that as knowledge transfer offices gain in experience, they get better at weeding out research results with poor commercial potential and focusing their patenting activities on fewer but more commercially promising results."

The report also compares European and US tech transfer and highlights some of the challenges faced when transferring tech:

> "According to a Green Paper by the European Commission, one of the main reasons why Europe trails the United States in the commercialization of university research is that research activities and the supporting legal and policy frameworks are excessively fragmented, making cross-border collaboration difficult and preventing the EU from reaching critical mass and fulfilling its innovation potential.
>
> Researchers still see career opportunities curtailed by legal and practical barriers hampering their mobility across institutions, sectors and countries.
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> Businesses often find it difficult to cooperate and enter into partnerships with research institutions in Europe, particularly across countries.

> National and regional research funding (programs, infrastructures, core funding of research institutions) remains largely uncoordinated. This leads to dispersion of resources, excessive duplication, unrealized benefits from potential spillovers, and failure to play the global role that Europe's R&D capability would otherwise allow, notably in addressing major global challenges.
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> Reforms undertaken at national level often lack a true European perspective and transnational coherence to overcome these problems, the European Union is pursuing the creation of a European Research Area, in which researchers will be able to move with ease within the EU, cross-border research and development cooperation will be strengthened, and national and regional research programs will be opened up and developed in coordination. Current intellectual property rights regimes are considered a major obstacle to the full realization of the European Research Area. This pertains to inconsistent national rules regarding the management of intellectual property, particularly when it results from public funding, as well as to the high costs of obtaining and enforcing national patents in a Europe of 27 Member States."

The ASTP Proton Survey Report on Knowledge Transfer Activities in Europe[v] for the financial year 2016 further highlights the fact that tech transfer is in the hands of a few universities:

> "Responding KTOs reported the creation of 635 spinoffs in FY2016. However, this type of output is not widely spread, as out of 397 responding KTOs, half of them reported no spinoff creation."

The survey finds that the bulk of the spinoffs are concentrated in a few institutions. Ten KTOs reported more than 10 spinoffs, while 19 KTOs reported between 6 and 10 in 2016.

In essence, hundreds of billions are spent every year globally to fund university R&D. Outside of a few universities, the IP created remains underutilised by the industry, not yielding the benefits to humanity it is meant to bring in the first place.

3. What are investors doing about this?

Let's focus on the spinoff part of the tech transfer equation.

Business angels sit at the early-stage of the investment spectrum. But as we discussed earlier, an individual angel invests an average of EUR 25,400, and a network EUR 182,000. In addition, most angels shy away from deep tech. The money required to "de-risk" a tech can reach millions and take longer than most angels are prepared to wait.

On the other hand, VCs are beating records in terms of fundraising. So, we might assume that VCs would be pouring money into this significant source of intellectual property just waiting to be turned into businesses, but those techs are not businesses yet. VCs want to see a business.

Besides, the stats behind VCs' big funds don't tell the whole story:
An increasingly large share of VC money goes into chasing unicorns. The KPMG venture pulse Q4 2018[vi] noted:

> "Over the past year, many VC firms acted more like PE with respect to their investments, focusing on fewer but bigger deals. This has created somewhat of a vacuum at early-stage deal levels, with many jurisdictions seeing a big decline in early-stage deals volume… the sharp decline in early-stage deals globally could cause pipeline issues later down the road."

In its 2018 report on European venture,[vii] Deal Room reported that growth in venture has been mainly led by larger rounds between 2013 and 2018. In 2013, Deal Room reports that EUR 100 million+ deals represented a total of EUR 1.2 billion in investments, growing to a total of EUR 6.8 billion in 2018. Whilst less than EUR 10 million financings totalled EUR 3.4 billion in 2013, growing a lot less, to EUR 6.5 billion in 2018. The same trend is observed in the United States.

Whilst the VCs are chasing the latest multibillion USD food delivery, car sharing or music sharing app, universities, funded with hundreds of billions of public money, are struggling to bring the IP they produce to market.

And yet, it is important to remember how venture capital firms started and what their earlier successes were.

In 1946, Georges Doriot, a business professor at Harvard and founder of INSEAD, partnered with MIT president Karl Comton to found American Research and Development Corporation. ARDC is often called the first venture capital firm. Its biggest hit came in 1957 when ARDC decided to invest $70,000 with MIT engineers Kenneth Olson and Harlan Anderson to start Digital Equipment Corporation (DEC). At the time of DEC IPO in 1968, the value of ARDC's stake had grown to $355 million.

At its origin, venture capital was looking to identify promising technology, often coming out of universities. Those technologies were designed by some of the world's leading scientists who needed the capital and expertise of venture capitalists to take those technologies to the world.

Fast forward a few decades, and venture capital has moved away from its roots. In a world where companies are remaining private a lot longer, venture capital preference has moved away from financing the early deep tech university businesses to car sharing - chasing unicorns. Although those investments are reported as venture, it's hard to argue that investing in an Uber or a Lyft with a valuation of tens of billions is still venture capital.

4. How to foster tech transfer
and the challenges of the inventor entrepreneur

A number of challenges and ways to meet them have been identified in a number of reports such as the Entente Report on Knowledge Transfer in Health[viii] and the Research into issues around the commercialisation of university IP February 2018 from RSM[ix].

It is beyond the scope of this article to develop all those points. But I would like to zoom in on one of the key challenges, which is turning a brilliant inventor into a successful entrepreneur.

Earlier, I argued that the key risks in deep tech were the tech itself, people and financing.

Let's look at people.

The widely chosen route to create a spinoff is to turn an inventor (i.e., the person or a team at the origin of the tech) into an entrepreneur. An entire ecosystem is built around this, such as providing business education to scientists, creating incubators inside universities surrounded by an ecosystem of mentors and support, etc.

However, there are challenges to that route:

- A PhD in physics, a great tech idea and some training on entrepreneurship is no guarantee to turn a 25-year-old into the next Bill Gates.
- A lot of the IP is produced not by 25-year-olds, but by experienced researchers with long tenure who have no interest in becoming tech entrepreneurs.

Building a great business needs a great tech, a great team that can execute and money.

One of the challenges of successful tech transfer comes from the challenges of identifying tech entrepreneurs who are capable of building a successful tech business. This is, in my view, one of the main risks of investing in university spinoffs.

One solution is tech venture building. This is where MCC comes in.

5. Venture Building

To solve the conundrum of finding great tech, great teams and funding, I have teamed up with US-based Ikove Capital to seek world changing IP and turn them into businesses.

In essence:

We have a team of 22 people in a "Startup Nursery™" based in the US whose job is sourcing IP and building businesses:

- Liaison with tech transfer offices and researchers
- Tech team scouting through hundreds of IP and looking to determine if:
    - The tech actually works (or is very likely to work).
    - It's solving a big problem better than anything out there.
    - The market is big enough that we can build a $100M+ business within six years with a reasonable amount of money ($10-15Max).
    - We can build a team.

- Full time lawyer who can deal with all legal aspects, from IP licensing to company set up.
- Entrepreneurs in residence who can support businesses across different verticals, from SaaS to manufacturing.
- Business development that seeks to support businesses in their growth.
- As each business grows, key people are hired and more businesses are added to the group, vital synergies between businesses and people and geographies are leveraged.

Once a tech has been identified, a license is secured from the university. The typical deal involves both the university and the investor securing some equity in the spinoff. At that point, outside investors are brought in, and I have been the lead investor in eight of the 10 businesses coming from the group. The businesses are in artificial intelligence, medical devices, IoT and robotics.

To keep building on our success, we have recently partnered and launched a fund (the Startup Nursery fund) which will finance the creation of the next dozen businesses using the same process.

So, the key is: we don't invest in deep tech startups. We don't invest in an inventor turned entrepreneur. We build the businesses ourselves with significant dedicated resources that look to systematise and de-risk the whole process, from startup all the way to exit.

Monte Carlo Capital will be able to lead seed and follow-on rounds of the best businesses coming out of the Startup Nursery. The Startup Nursery is just one (important) source of deal flows for Monte Carlo Capital, but the venture building process represents significant benefits for all involved parties.

5a. For the investors:

1. Tech risk:

We can pick great tech by having a significant IP deal flow and a deep tech focused due diligence team

2. People / execution risk:

- A lot of the wobbliness of a startup comes from people, their interactions, and the sheer quantity of tasks an entrepreneur has to deal with, which are all risks (founders' relationship, experience, staying power, personal family circumstances, ability to recruit and motivate a team, ability to have the appropriate IP strategy, deal with financing and investors, accounting and finance, etc).
- A 22 strong team focused on the initial IP identification, due diligence, and providing support to each business, de-risking substantially the people/execution risk that kills most businesses.
- This team is just dedicated to the venture building process. Once spun-off, each business hires its own staff. However, the Startup Nursery team keeps supporting each business, providing economies of scale in terms of costs and staff.

3. Financing risk:

Given MCC's investment strategy, investing at the "valley of death" stage and leading follow-ons, the funding question is addressed (as long as the company keeps performing).

5b. For the university:

- The underlying process ensures a significantly higher success rate than a spin-off that requires grooming an inventor.
- It can show some success turning those millions in funding into great businesses, increase its visibility, etc

5c. For the "inventor":

- The inventor does not need to become an entrepreneur and can keep focusing on an academic career, whilst keeping the upside via an equity participation in the company. Most of our scientists are 50-year-old+ world leaders in their academic field and have little interest leaving a successful academic career to become entrepreneurs.
- Their chance of success is higher than by looking to be the entrepreneur themselves.

6. Conclusion:

With hundreds of billions every year financing university R&D globally, it is critical to improve tech transfer at large. Spin-offs need to be encouraged, but challenges remain.

One way to create successful spin-offs is by bringing professional venture builders and universities closer. The benefits are significant for all parties. Monte Carlo Capital has been looking to size this immense opportunity in the US. The opportunities for tech transfer are significant in Europe, too.

Difficulties in turning intellectual property developed by universities into commercial applications is one of the greatest bottlenecks to the creation of world changing businesses and ultimately growth and prosperity. It is critical that we all work towards facilitating transfer of technology.

About the Author:

Ian Sosso is the founder and managing partner of Monte Carlo Capital, a group of business angels, UHNWI and family offices investing in Europe and the US in early-stage deep tech and highly disruptive businesses.

Ian is also a managing partner of the Startup Nursery fund, a fund dedicated to funding deep tech US university spin-offs.

Ian started his career in 1993 and previously worked in Paris, London, Tokyo, Singapore and Hong Kong with HSBC, UBS and JPMorgan, holding investment banking positions in trading, sales and financial engineering.

Before founding Monte Carlo Capital, Ian was, until 2009, the regional managing director and head of investment banking in Asia for Commerzbank where he was managing all capital markets activities in the region, including equity derivatives, credit, precious metals, foreign exchange, debt capital markets, as well as the treasuries of HK, Singapore and Shanghai.

Over the years, Ian has been a keynote speaker in numerous conferences in Monaco, throughout Europe, the US, Dubai, Russia, China, HK, Singapore, Taiwan, Korea and Malaysia.

Ian currently lectures venture capital and entrepreneurial finance to MBA and finance MSc students at the International University of Monaco. Ian joined the European Business Angels Network (EBAN) in 2016 and in 2017 won the best performing new member award. Ian was elected to the board of EBAN in June 2018. He is also a board member of the Monaco Venture Capital Association.

Ian is a citizen of Monaco and holds a MSc in Finance from the London School of Economics (LSE).

Endnotes:

i http://www.eban.org/2017-annual-eban-statistics-compendium

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