

DEEP
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The Lab-to-Market Journey - a Blueprint

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DEEP TECH LEADERS



Deep Tech Leaders recruits leaders and boards for some of the world's most innovative Deep Tech start-ups. We are one of the leading UK & European Deep Tech executive search firms, and the only one to exclusively support Deep Tech companies on the Lab-to-Market journey. Headquartered in London, we work with Deep Tech start-ups, spin-outs, and investors from across the Advanced Computing, Industrial and Medical domains.

Chris Reichhelm is the founder and CEO of Deep Tech Leaders. He has been advising and recruiting for advanced technology and engineering companies for more than 25-years. Over the past 12-years, he has worked with more than 120 Deep Tech start-ups across the Advanced Computing, Industrial and Medical Device domains, helping them through their Lab-to-Market journeys. He works extensively with leading investors, and regularly advises universities and institutions on leadership challenges within Deep Tech businesses.

Deep Tech companies can address many of humanity's greatest problems. But building a Deep Tech company is hard, with technical, commercial, and financial risk at every stage of the journey.

Not surprisingly, most Deep Tech companies fail.

If more Deep Tech companies are to succeed, they need a better understanding of the Lab-to-Market journey.

What is the Lab-to-Market Journey?



Simply, the process that every advanced science and engineering company must go through to deliver their innovation from the lab to the market.

Lab-to-Market Journey: 3-Phases

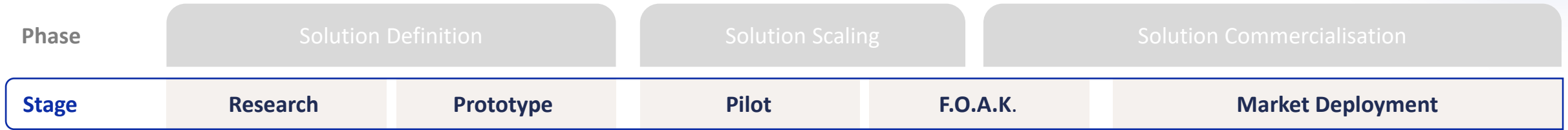
Phase

Solution Definition

Solution Scaling

Solution Commercialisation

Lab-to-Market Journey: 5-Stages



Commercial Readiness Levels ('CRL')

Phase	Solution Definition		Solution Scaling		Solution Commercialisation	
Stage	Research	Prototype	Pilot	F.O.A.K.	Market Deployment	
CRL Milestone	<ol style="list-style-type: none"> 1. "What problem are we solving?". 2. Primary & secondary research. 3. Early applications identified. 	<ol style="list-style-type: none"> 4. Strategic relationship development, scouting for pilot, early sampling. 5. Early value proposition, business model, pricing, costs and margins defined. 	<ol style="list-style-type: none"> 6. Partnerships formed across value chain; and certification and regulatory requirements underway. 7. Financial model/commercial viability validated. 	<ol style="list-style-type: none"> 8. First commercial system built; market assumptions updated. 	<ol style="list-style-type: none"> 9. Full commercialization of solution. 	

Technology Readiness Levels ('TRL')

Phase	Solution Definition		Solution Scaling		Solution Commercialisation	
Stage	Research	Prototype	Pilot	F.O.A.K.	Market Deployment	
TRL Milestone	<ol style="list-style-type: none"> 1. Basic technology principles observed & reported. 2. Technology concept and/or application formulated. 3. Repeatable experiments that demonstrate basic function. 	<ol style="list-style-type: none"> 4. Performing small-scale prototype in a lab environment. 5. Performing prototype in an intended environment. Technical validation achieved. 	<ol style="list-style-type: none"> 6. Full-system demonstrated in intended environment. 7. Demonstration system operating near commercial scale. Integration w/ processes, systems and components is key challenge. 	<ol style="list-style-type: none"> 8. First-of-a-Kind commercial system is complete and qualified with final integration completed. 	<ol style="list-style-type: none"> 9. System is fully deployable, integrated, compliant and regulated. 	

Manufacturing Readiness Levels ('MRL')

Phase	Solution Definition		Solution Scaling		Solution Commercialisation
Stage	Research	Prototype	Pilot	F.O.A.K.	Market Deployment
MRL Milestone	<ol style="list-style-type: none"> 1. Basic manufacturing implications identified. 2. Manufacturing concepts identified. 3. Manufacturing proof-of-concept developed. 	<ol style="list-style-type: none"> 4. Capability to produce technology in a laboratory environment. 5. Capability to produce prototype components in a production relevant environment. 6. Capability to produce a prototype system or sub-system in a production relevant environment. 	<ol style="list-style-type: none"> 7. Capability to produce systems, subsystems or components in a production representative environment. 8. Pilot line capability demonstrated. Ready to begin low-rate production. 	<ol style="list-style-type: none"> 9. Low-rate production demonstrated. Capability in place to begin Full-Rate Production. 	<ol style="list-style-type: none"> 10. Full rate production demonstrated and lean production practices in place.

But what really happens
at each stage?



Or rather, what **SHOULD** be
happening?

A Deeper Dive - the Research Stage

COMMERCIAL	PRODUCT MANAGEMENT	TECHNOLOGY	ENGINEERING & OPERATIONS	FINANCE & LEGAL
<p>Exploration / early identification of problem to be solved through meetings with potential partners / customers and supported by market analysis.</p> <p>Seeking early market validation of approach and confirmation of problem / solution.</p>	<p>Exploration of potential use cases / applications.</p>	<p>Applying scientific method to development of technology innovation aligned to market validated problem.</p> <p>Establishing technical feasibility and repeatability.</p> <p>IP filing within relevant patent jurisdictions. Consideration of what to file and what to leave as 'know-how'.</p>	<p>Consideration of engineering and scaling challenges as part of technical development activity, including early engineering design.</p> <p>Early consideration of supply chain, bill of materials and unit economics.</p>	<p>Early seed / grant funding may be secured.</p>

A Deeper Dive – the Prototype Stage

COMMERCIAL	PRODUCT MANAGEMENT	TECHNOLOGY	ENGINEERING & OPERATIONS	FINANCE & LEGAL
<p>Sharpened understanding of problem to be solved through active market engagement & relationship development.</p> <p>Evolved understanding of target market, size of opportunity and value proposition.</p> <p>Scouting for partners where on-site prototype can be based.</p> <p>Active consideration of business & commercial models with different market, financial and technical inputs.</p> <p>Early pricing analysis.</p> <p>Sampling of early solution with potential partners / customers.</p> <p>Research projects may have generated early revenue.</p> <p>By TRL 5, partner candidates for pilot are identified.</p>	<p>Product hypothesis emerging with early validation from potential partners / customers.</p> <p>Deeper understanding of potential applications, use-cases, market dynamics (current v. future) and competitive solutions.</p> <p>Early competitive analysis exists, illustrating advantages of emerging solution.</p> <p>Product features mapped against market requirements.</p> <p>Value chain and target market are outlined.</p> <p>By TRL 5, value proposition is enhanced, providing additional insight on product definition, performance requirements, market requirements, unit economics, pricing.</p>	<p>Guiding novel technology development from bench to a prototype. By end of TRL (4), production at lab scale (i.e. grams, milliwatts).</p> <p>Continued filing of IP and consolidation of know-how.</p> <p>Emerging understanding of technical differentiators.</p> <p>Emerging understanding of quality / performance requirements and challenges w/plan to account for these.</p> <p>Deeper exploration of each system, process, component of emerging solution and the features required to produce key output.</p> <p>Consideration of scale up challenges and close collaboration with engineering team.</p> <p>By the end of TRL stage (5), production at small scale (i.e. kilograms, watts).</p>	<p>Early engineering design work for a small scale-solution.</p> <p>Emerging understanding of supply chain, bill of materials and unit economics.</p> <p>Align early prototypes with specific applications.</p> <p>Consideration of facilities & skills required for further scaling.</p> <p>Consideration of scale-up strategy, including use of third parties and/or co-development partners.</p> <p>Consideration of the minimum production scale required to get through to next stage and convince target market and prospective value chain partners of the seriousness of the intent.</p> <p>By TRL 5, supply chain, certification and regulatory plans start to be considered, and are factored into unit economics.</p>	<p>Initial finance raised, often in the form of equity and/or grants.</p> <p>Potential participation in start-up accelerator programme.</p> <p>Early financial control in place to manage budgets, support business planning.</p> <p>Emerging governance led by small board of directors.</p> <p>Towards end of TRL 5, increasing sophistication in business planning, incorporating production strategies, design trade-offs, supply chain challenges, scale up economics, commercial models, and pricing options.</p> <p>Preparation for significant financing round during or towards the end of TRL 5, in anticipation of scale up towards TRL 6.</p>

A Deeper Dive – the Pilot Stage

COMMERCIAL	PRODUCT MANAGEMENT	TECHNOLOGY	ENGINEERING & OPERATIONS	FINANCE & LEGAL
<p>Partnership secured for build-out of pilot-scale unit. Emerging plan to convert partner to paying customer.</p> <p>Active creation of opportunities for further pilots, product / process sampling & qualification, and other commercial engagement with the aim of identifying and securing product-market-fit.</p> <p>Further identification and qualification of target customers / partners, extending trusted relationships across value chain.</p> <p>Business plan and commercial model evolving and increasing in depth and sophistication.</p>	<p>Initial application area(s) is/are clear.</p> <p>Frequent partner / market engagement to understand feature prioritisation.</p> <p>Frequent engagement with pilot / demonstration partner, capturing data from pilot and refining value proposition.</p> <p>Early Key Opinion Leaders may be on board.</p> <p>Value proposition sharpens, with appreciation of understanding of competitive landscape and how solution competes with existing competitive solutions.</p> <p>Early product roadmap providing insight into future direction, design trade-offs, scheduling of new features, etc.</p> <p>Emerging appreciation of what it takes for solution to be selected by customers/partners.</p> <p>Drive towards product-market-fit w/constant refinement, testing, and validation.</p> <p>Lead generation activity commences.</p>	<p>R&D activity split between support and development of current solution(s), and development of next generation solutions.</p> <p>Industrialisation of solution, including systems, components and processes.</p> <p>Technology roadmap developed.</p> <p>Frequent engagement with demonstration partner(s), as well as prospective partners and customers to sharpen understanding of problem being solved and further technical challenges.</p> <p>Developing understanding & improvement of technology at ever-larger scale and integrated into other systems.</p> <p>Tight collaboration with engineering, identifying and addressing problematic areas.</p> <p>Continued IP filing, along with documentation of know-how.</p>	<p>Development and build out of pilot plant either directly or with partners.</p> <p>Build out of engineering capability in-line with that of an emerging commercial-scale system.</p> <p>Supply chain activity commences, with sharpening views on likely partners, bill of materials, and unit economics.</p> <p>Heavy presence on-site with partner to learn and improve solution performance.</p> <p>Consideration of location, site requirements, access to raw materials, permits, certification required, etc.</p> <p>Maturing production strategies and understanding of key metrics required to make business model work.</p> <p>Programme management is in place to oversee execution and delivery of key projects.</p> <p>QHES policies are mostly defined and implemented.</p> <p>Certification / regulation plans are being developed.</p> <p>By the end of TRL stage (7), production at pilot scale (i.e. tonnes / kilowatts).</p>	<p>Consideration of significantly larger financing rounds with wider set of capital options and providers.</p> <p>Value proposition, business plan and commercial models are evolving, including projections, cost/benefit analysis, unit economics and pricing.</p> <p>Increasing level of financial management in place, with regular accounts being produced and considered at board.</p> <p>Ongoing negotiation with potential strategic partners and customers, ensuring IP protection, sound contracts, and generally good governance.</p> <p>Ongoing communication with board, key investors & shareholders, and the preparation for ever-larger financings from increasingly diverse set of investors.</p>

A Deeper Dive – the F.O.A.K. Stage

COMMERCIAL	PRODUCT MANAGEMENT	TECHNOLOGY	ENGINEERING & OPERATIONS	FINANCE & LEGAL
<p>Business plan and commercial model are validated.</p> <p>GTM plan emerges.</p> <p>Gen-1 solution may now be sold with first customer(s) acquired.</p> <p>Customer qualification criteria in place with active targeting of prospects and buildout of customer pipeline.</p> <p>Partnerships with key participants in value chain are being developed, leading to prospective commercial engagements.</p> <p>Negotiations are ongoing with key prospects from target market.</p> <p>Product / process sampling is very active.</p>	<p>Value proposition is clearly defined and validated.</p> <p>Granular level of understanding of what it takes for solution to be selected by customers / partners.</p> <p>Emerging path to Product-Market-Fit w/hypotheses in place to test strength of fit.</p> <p>Relationships with industrial sponsors / key opinion leaders in place.</p> <p>Product roadmap in place.</p> <p>Marketing communication plans with relevant product literature being circulated and company profile being actively developed across the right channels.</p> <p>Lead generation activity increased.</p>	<p>Commercial-grade system is nearly complete and qualified, while integration challenges are ongoing.</p> <p>Increased specialisation on team.</p> <p>Continued IP filing and documentation of know how.</p> <p>Technology development team is in place and focused on preparations to serve the market, optimising existing systems, working through potential integration issues.</p> <p>Speed, performance and customer service are increasing in importance.</p> <p>Technology roadmap is defined, documented and signed off, detailing timings of new features & capabilities.</p> <p>Deep collaboration with engineering teams and partners.</p> <p>Innovation and next generation solutions are in development.</p> <p>Highly professional approach to increased sampling and product/process qualification.</p>	<p>At least one commercial-grade exemplar unit in place and performing broadly in line with expectations.</p> <p>Demonstrator unit (at company office) for client / partner visits is in place.</p> <p>Production strategy, scale-up plan and programme management are in place.</p> <p>Advanced consideration for widespread deployment is in place, with plans nearing completion.</p> <p>Ongoing definition of next-gen units ('Nth-of-a-Kind') that improve performance and value.</p> <p>Relationships with supply-chain and delivery partners are in place, with new partners being qualified.</p> <p>QHES systems and procedures are clearly in place.</p> <p>Certification and regulatory approval process are well underway or complete.</p> <p>System is producing at or near commercial scale (i.e.kilotonnes / kilowatts).</p>	<p>Ongoing consideration of significantly larger financing rounds with wider set of capital options (i.e. equity, debt, private, public) and providers for widespread deployment.</p> <p>Ongoing communication with key investors, shareholders and stakeholders.</p> <p>Fundamental financial models and key assumptions are in place and validated, with updates as needed.</p> <p>Additional changes may be added to model(s) that accurately reflect costs for widespread deployment.</p> <p>Professional financial management practices in place.</p> <p>Ongoing support of contract negotiation and IP filing, enhancing the company's technology leadership position.</p>

A Deeper Dive – the Market Deployment Stage

COMMERCIAL	PRODUCT MANAGEMENT	TECHNOLOGY	ENGINEERING & OPERATIONS	FINANCE & LEGAL
<p>Customer acquisition becomes major focus.</p> <p>Active pursuit of revenue, deals, and market share.</p> <p>GTM plan is fully developed and being followed.</p> <p>Lead generation and sales operation capability now in place.</p> <p>Profile building and lead generation activity to support efforts to capture market share.</p> <p>Customer Success is now in place, with identification and management of customer technical issues, ensuring successful handling.</p> <p>Insight from customers is regularly factored into product and commercial thinking.</p>	<p>Product-market-fit has been achieved or has nearly been achieved.</p> <p>Product roadmap is in place, with schedule for new features signed off and scheduled.</p> <p>Balance of upstream and downstream product management activity, validating new feature ideas, and next-generation solutions, with marketing and communication of currently available solutions.</p> <p>Key Opinion Leaders are actively supporting the company.</p>	<p>System is fully industrialised with integration completed.</p> <p>Technology roadmap is signed off and being delivered.</p> <p>Technology development team is scaled and in place, weighted towards development / optimisation, with new research focused on supporting technology roadmap.</p> <p>Continued development of IP, enhancing the size and quality of the company's technology moat.</p>	<p>Production strategy for widespread deployment is in place and being realised.</p> <p>Scale-up / engineering team / capability in place.</p> <p>Supply chain secure and in place.</p> <p>Procurement capability in place.</p> <p>Company-wide adoption of QHES procedures.</p> <p>Fully certified, regulated and compliant.</p> <p>System is producing at commercial scale (i.e. kilotonnes / kilowatts).</p>	<p>Consideration of broader financing options to fuel expansion.</p> <p>Key financial / commercial models are in place, with all key assumptions validated, though these will evolve with market.</p> <p>Ongoing communication with key investors, shareholders and stakeholders.</p> <p>Separate legal and IP team in place.</p> <p>Highly professional finance and accounts systems in place to support the growing needs of the business.</p>

Deep Tech start-ups
have a better chance
of achieving their
next milestone if
they have...



A better understanding of their likely
Lab-to-Market Journey.



Anticipated and defined their own Lab-
to-Market milestones.



Planned and onboarded the right skills
at the right time.

DEEP TECH LEADERS



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