Beyond Technical Readiness Levels: how do we assess readiness for scale impact?

Summary

The European Union has been investing heavily in research addressing critical challenges, often with great success in enabling new solutions. But there is frustration that proven innovations struggle to deliver the envisaged impact, not because they prove to be bad ideas but because the barriers to widespread adoption go beyond proving that something works.

For many years Technical Readiness Levels have been used to assess progress from an idea towards a proven solution. But innovations achieving TRL9 – actual system proven in an operational environment – are still a long way from being buyable solutions for even the most forward-looking users. There is an intermediate stage where adoption has very high inter-dependencies.

This is not a new thought. Various organisations have looked at this from different perspectives: societal readiness (society focus), market readiness (customer focus), and commercial readiness (investor focus) all have their champions. And this list is not complete, with regulatory readiness being an obvious gap.

Recent research and innovation calls for proposals are recognising this issue without calling it out explicitly: more of the focus is on assessing impact and on the exploitation plan. But in the absence of a common assessment methodology for readiness for scale it is difficult to compare different proposals in this regard without being over-influenced by the honeyed words of the proposal writer.

The Boostlog project has demonstrated the need to create systematic ways of bridging this gap. The Entrance project is seeking to bridge this gap for a number of specific innovations, bringing together interested buyers with proven solutions and jointly identifying and addressing the interdependencies.

This paper envisages the creation and widespread adoption of a standard Scale Readiness Level.

To do this requires answers to two different questions:

1. If such a tool existed, who would lead its widespread adoption?
2. What needs to be done to create it?

Working alongside Boostlog and Entrance projects, ALICE is proposing to co-ordinate work to address these two questions.

Why are Technical Readiness Levels not enough?

TRLs assess the progress of a solution idea towards a state of being proven in an operational environment. The creator of TRLs was NASA, for whom the readiness of a solution to be used in their space programme was the only concern. They had no need to create a market or to find investors for each idea; their arena was beyond the scope of most regulators. Whether it worked was the only important measure. TRLs were

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then taken up by the UK Nuclear Decommissioning Authority, who again had no need to create a customer-base. And now TRLs are widely used by a variety of technical research programmes.

TRLs were never designed to assess the readiness of a fragmented potential user base to buy and use the solution. The designers had one user in mind – themselves. But for the challenges of decarbonisation, and other challenges, the user-base is highly fragmented, and their adoption of the new solution is dependent on a series of different concerns that go beyond technical readiness.

1. Is the societal framework in place that sees solving the problem in the way the solution envisages as desirable? Are the necessary changes in ways of life accepted and valued?
2. Is the regulatory framework in place that minimises risk to customer, investor and wider society?
3. Is there a pipeline of potential users, each understanding the potential value, what needs to be in place and at what price-point they will buy?
4. Is there an investable proposition, whereby the roadmap to critical mass can at least be hypothesised? (Critical mass for this purpose is defined as the point where both the revenue stream exceeds the cost of provision, and where the risks associated with dependencies on external factors are acceptable).

Social Readiness Levels

A scale of Social Readiness has been created and adopted by a number of organisations such as the Danish Innovation Fund. Its concepts have clear links to Market Readiness (potential customers) and Regulatory readiness, and through these to Commercial readiness (potential investors).

Examples of this would be society's willingness to accept bigger trucks in return for fewer of them even if the highways could accommodate them, or of willingness not to use the local planning system to block onshore windfarms near them. On a smaller scale the willingness to adopt different behaviours, such as sorting waste into different bins, actually reusing reusable bags, or bringing back packaging to claim a small deposit refund.

Regulatory Readiness Levels

Regulatory readiness has a close relationship with societal readiness but is more easily measured. Is the use of the innovation legal? Are the necessary frameworks in place so that compliance can be established.

Examples of this would be self-driving vehicles on public roads and their associated insurance requirements, or the use of drones for delivering goods.

Market Readiness Levels

For many innovations this is the critical hurdle, as the change often does not demand social or regulatory change.

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The key to this is looking at the solution from the buyer's perspectives. What are the criteria that different potential buyers use to establish whether the innovation is both a clear solution to a recognised problem and is ready to buy and use.

And the literature is full of both examples of technically successful innovations that don't sell, and of the theories around them. The simplest summary is to split the potential market into five groups, each of which have different motivations and requirements:

Segment	Volume Share	Motivation	Requirement
Innovators	1% max	Technical exploration	Newness & excitement
Early Adopters	5% max	Benefit Visionaries	Fundamentals work; workarounds for the rest
Early Majority	44%	Practical value	Holistic practicality
Late Majority	30%	Low risk following	Market standard
Laggards	20%	Retention of capability	Obsolescence of traditional

The volume share numbers are highly indicative, varying enormously from one innovation to another. But the key point is that the innovators, who often band together to create something that works, are a tiny proportion of the user base and are not representative of the rest. The early adopters listen to the innovators, and are then sufficiently excited by the possibilities that they are willing to overlook the rough edges of the solution so long as the fundamentals are in place; in fact they often see those rough edges as the opportunity to shape the complete solution. Without innovators and early adopters the solution never gets to the early majority, which is the key to scale. But the early majority require a holistic solution: they're driven by practicality and expect the innovation to be both easy to buy and easy to use.

In many cases the late majority and the laggards convert inevitably over time: the late majority adopt what is no longer an innovation because everybody else is doing it; and the laggards adopt because their previous solution is no longer available. In most markets the late adopters & laggards represent 50% of the market, so any focus on scale impact cannot ignore them.

There is often a chasm between the early adopters and the early majority into which innovations regularly fall and perish. Crossing the chasm – the title of the classic book by Geoffrey Moore – is fundamentally about addressing the different needs of the early majority while the investors think that the product development process has moved from fundamental change to continuous improvement. Addressing this chasm is the difference between take-up rates for the same innovation in similar but different markets: for example why over 50% of new car registrations in Norway are electric relative to less than 10% in Sweden, Denmark & Finland (2020 data). Clearly a close link with societal and regulatory readiness levels, as the different take-up in Norway is largely driven by the tax treatment in combination with the investment in recharging points.

Commercial Readiness Levels

Most banks and investment organisations have firmly established criteria for assessing the investability of a particular enterprise. One limitation will be that these will tend to evaluate investment risk of a company

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rather than of an idea; and many such assessments are focused at particular points in the development of an enterprise – from seedcorn funding, through angel investments t venture capital, or lending money to established businesses.

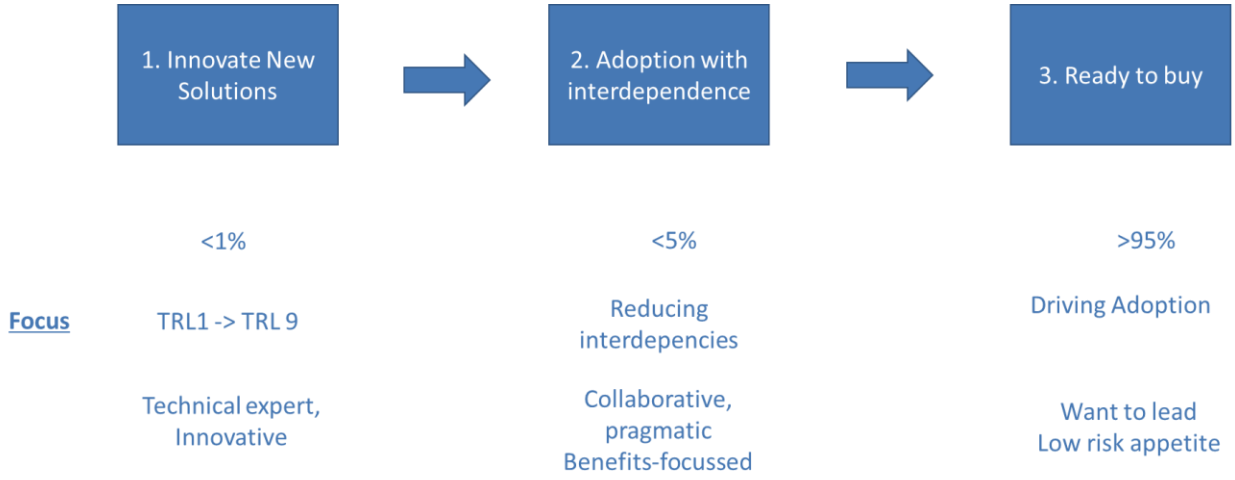
These criteria, particularly those of angel investors focused on taking an equity share in start-ups, may give a rounded approach as to the credibility of the innovation, the market, the competition, the intellectual property, the organising team, their business plan and associated assumptions and timelines.

Other

There may be other dimensions we have not yet considered. The concept of economies of scale will need to be covered somewhere. We will be engaging with a diverse group specifically to address the "what else?" question.

Conclusion

In its essence this is about creating an assessment methodology that recognises the necessary progress from "Stage 1 – Innovate New Solutions" to "Stage 2 – Adoption with interdependence" to "Stage 3 – Ready to Buy". Its at the third stage that the scale & impact can really take place.



As illustrated above the types of critical participants evolve over time. One of the dangers is that the leading edge research & innovation specialists drawn to the technical excitement of Stage 1 are rarely the people to empathise with the potential buyers in Stage 3.

Without an assessment scale it is not surprising that innovations get stuck between Stages 1 and 3, with the participants in Stage 1 preaching to the converted, and the potential customers in Stage 3 frustrated that an exciting-sounding innovation just doesn't qualify as a buyable solution.

Extending the readiness level assessment scale beyond technical readiness is a critical step to converting innovation into impact at scale.

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Action Plan

The action plan is addressed to the two key questions identified at the start:

1. Discussion of the issue with potential sponsors of a new Scale Readiness assessment tool
2. Development of a draft Scale Readiness assessment tool

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We welcome feedback and input to this discussion paper. To that end, please contact Fernando Liesa: fliesa@etp-alice.eu

About ALICE

ALICE, the **Alliance for Logistics Innovation through Collaboration in Europe**[1] is a non-for-profit industry led association based in Brussels with 160+ **members** reaching the full stakeholders' groups within freight transport, logistics and supply chain. ALICE is the Alliance of European leading companies and experts in implementing logistics and supply chain innovation.

ALICE's vision is to achieve an affordable **transition towards net zero emissions logistics**. To that end, logistics, from global to urban, need to evolve. Assets and resources, including transportation means, need to be better utilized. By creating seamlessly interconnected logistics networks through the **Physical Internet (PI)** better conditions for affordability of zero emissions solutions will be created through improved asset sharing and efficiency, contributing also to improved agility and resilience of supply chains. This efficiency gains will reduce the burden to transition of assets and energies needed for zero emissions transportation and logistics.

This transition requires scalable innovation and that european freight transport and logistics R&I ecosystem perform optimally boosting impact generation out of R&I investment and accelerating R&I take up.

ALICE supports, assists, and advises the European Commission[2] in the definition and implementation of the EU Program for research: Horizon 2020 and Horizon Europe in Logistics.

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Disclaimer

This discussion pper aims to bring together the views of a wide range of ALICE members regarding this subject. The views expressed in this report are based on the author consolidation work and of the stakeholders and experts consulted through different activities such as workshops, surveys, direct contacts, etc. The individual organizations as part of the ALICE membership may not necessarily fully support all the views expressed in the document. All the stakeholders involved do share a common interest however: Accelerate the transition towards climate neutrality in an affordable way and the need of innovation development and accelerated take up to realize it.

[1] Transparency Register number 006901422654-34

[2] Recognized by the European Commission as a European Technology Platform (ETP) in 2013. SWD (2013)272/F1 COMMISSION STAFF WORKING DOCUMENT STRATEGY FOR EUROPEAN TECHNOLOGY PLATFORMS: ETP 2020

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