

Startups & Scaleups in Photonics

Swiss Photonics Lunch Meeting, 08.04.2025

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How to Measure Success for a Tech Startup/Scaleup?

Let's keep things simple:

1. The technology should work (feasibility, proof-of-concept),
2. there should be an accessible market for it (product-market fit, customer value),
3. the company should be able to manufacture it (production or fabless),
4. the company should be able to scale up manufacturing and sales (growth) and,
5. the company should have a clear path to profitability and ROI (profit).

Structured 9-level scale from 1 to 9:

Technology Readiness Level (TRL)

Business Readiness Level (BRL)

Manufacturing Readiness Level (MRL)

Scalability Readiness Level (SRL)

Profitability Readiness Level (PRL)

Technology Readiness Level (TRL) & Minimum Viable Product (MVP)

TRL Defined

The TRL system was introduced by the NASA in the 1970s to assess the **maturity of technologies** before integrating them into **space missions**.

The TRL is a structured **9-level scale** ranging from **basic research (TRL 1)** to **fully operational technology (TRL 9)** ready for the moon.

MVP Creation

The startups could turn their idea into a so-called MVP, a **Minimum Viable Product (TRL5)**.

An **MVP** is the **simplest version of a product** that delivers **core functionality** to early users.

The MVP allows **testing the market, validate ideas, and gather real user feedback** before scaling up.

TRL

(Technology Readiness Level)

- 9 **Qualified product** proven and in the operational environment.
- 8 Product **complete** and **qualified** with in operational environment
- 7 **Prototype** in use in relevant environment. Product development.
- 6 Technology/solution **demonstrated** in relevant environment.
- 5 Test set-up & technology **validated in operational environment**.
- 4 Technology or solution **validated** in the **laboratory**/in the field.
- 3 Experimental **proof of concept**.
- 2 **Concept** for technology and/or application formulated.
- 1 **Basic principle** of a technology, a function or an application.

Tech: Research → Startup → Scaleup

Startup

TRL > 3: The product is often in **development or pilot phases**, with early testing but not yet widely deployed or commercialized.

Business Focus: Startups are focused on **proof of concept, securing initial funding, and early customer validation**.

Challenges: High uncertainty, frequent pivots, proving market fit, ensuring IP and Freedom-to-Operate (FtO), and securing initial funding (Seed).

Scaleup

TRL > 6: The technology has been **validated in operational environments**.

The product is **refined, stable, and adopted by a growing customer base**.

Business Focus: Scaleups shift towards **scaling operations, market expansion, and revenue growth**.

Challenges: Managing **growth**, organizational **scaling**, and **process optimization**.

TRL (Technology Readiness Level)

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Business Readiness Level (BRL), Product Market Fit (PMF) & Blue/Red Ocean Markets

BRL Defined

The BRL framework **assesses the maturity of a business idea** from concept to **full market deployment**.

BRL 6 is related to **first customers, first revenue**.

BRL 7 is achieved if the **product-market fit (PMF)** has been demonstrated.

End Markets

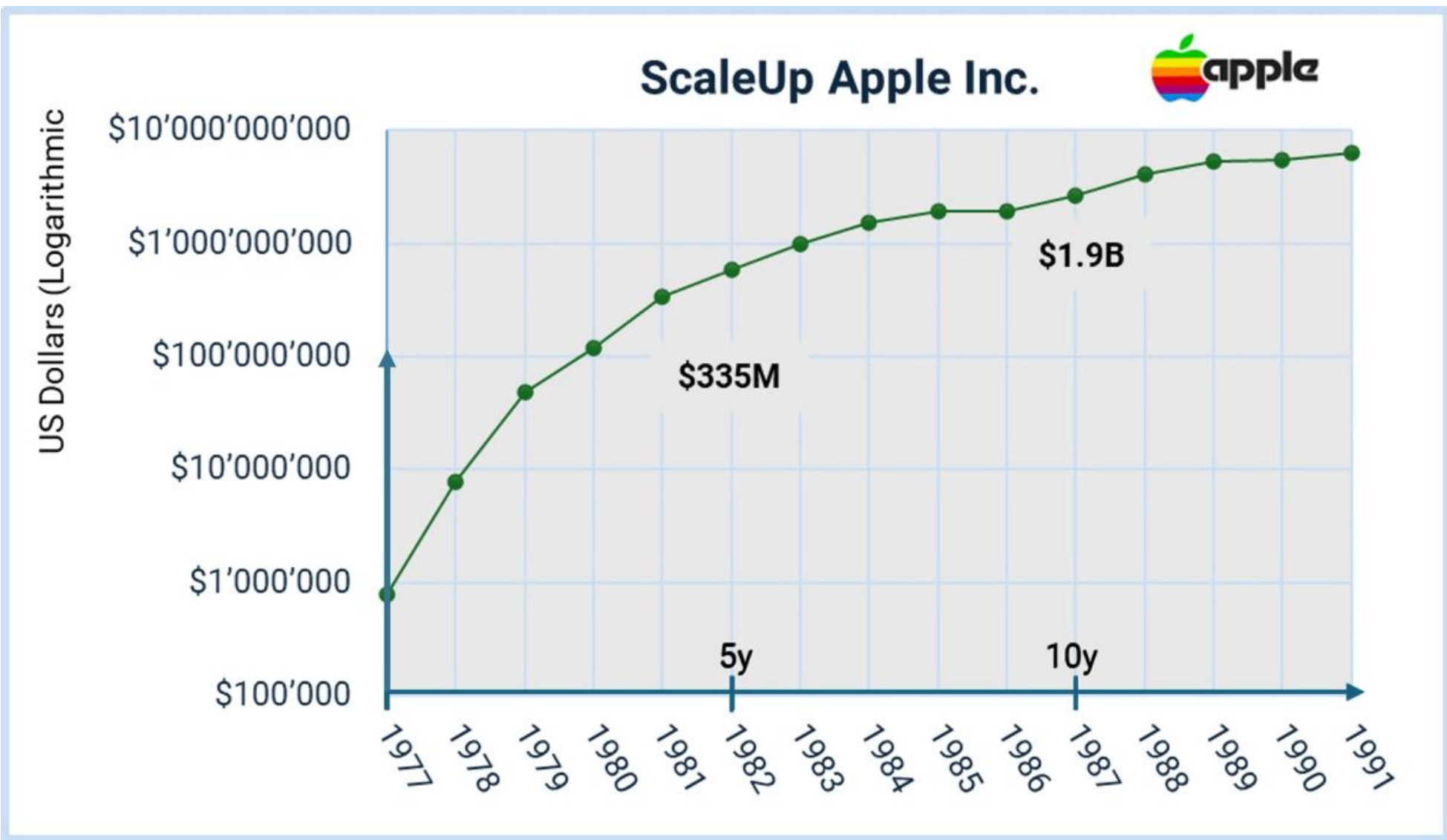
Best is to serve a "**Blue Ocean**" market, with little or no competition, where **demand is created** rather than fought over.

Crowded marketplaces or "**Red Ocean**" markets with (big) **end-market champions** who defend their **cash cows** are very difficult to access.

BRL (Business Readiness Level)

- 9** **Business model** is **final**, scaling with profitable and sustainable **results**.
- 8** Sales and metrics show business model holds, is scalable and expandable.
- 7** Product/market fit and customers payment willingness **demonstrated**.
- 6** Full **business model** incl. pricing verified on customers by test sales.
- 5** First version of **revenue model** incl. pricing hypotheses, USP & competition.
- 4** First version of **full business model** in canvas show viability and potential.
- 3** Draft of **business models**, market potential and competitive overview.
- 2** Valid **business concepts** described. Markets and competitors identified.
- 1** **Business ideas** and first concepts developed.

The Big Hero of Tech Startups: Apple

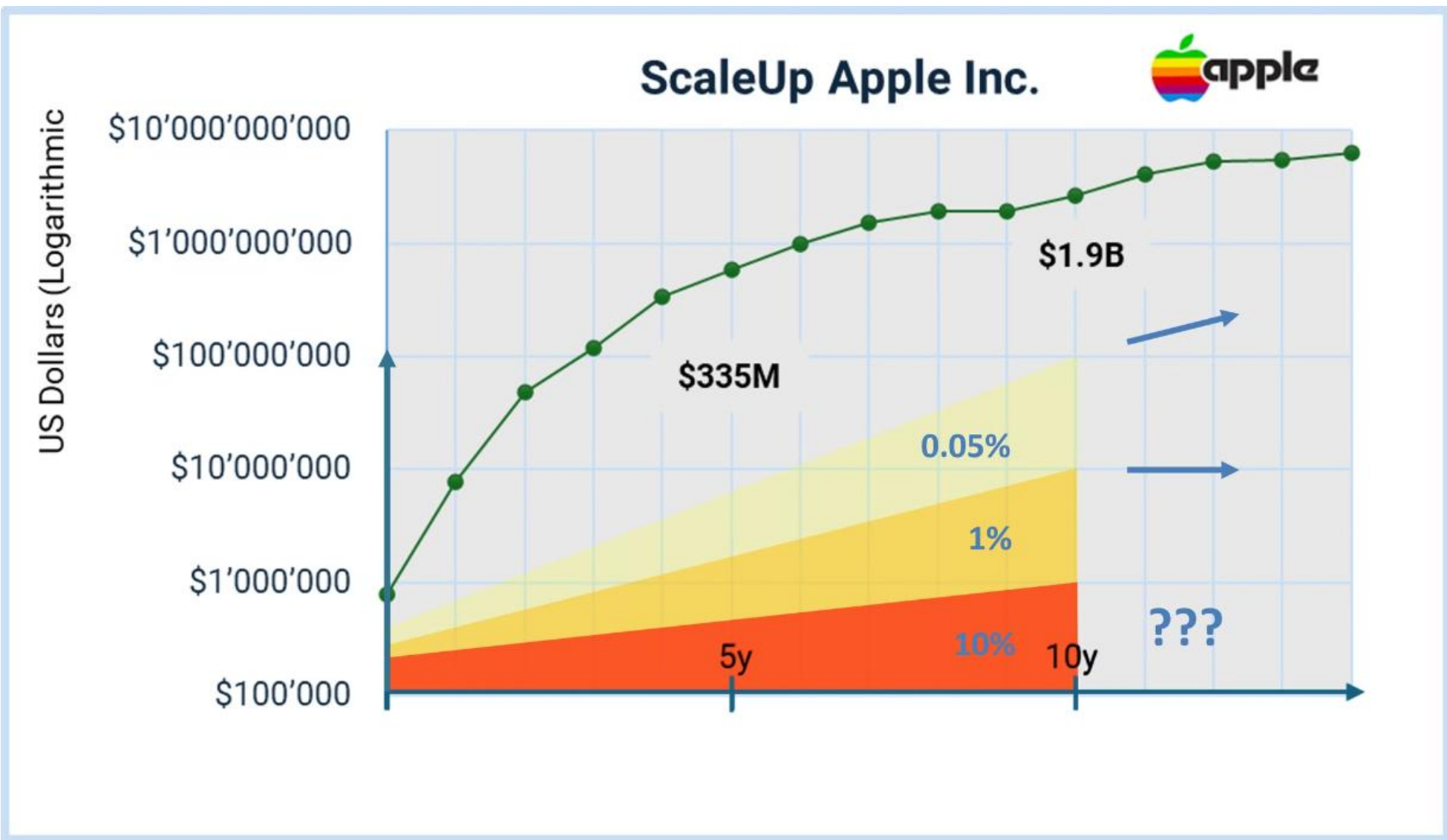


Blue Ocean

Apple revolutionized **personal computing** by making technology **accessible, user-friendly, and visually engaging**, shaping the future of the industry.

Apple transformed **computers from niche tools for engineers into must-have devices** for homes and offices, setting the stage for the digital revolution.

The Bitter Truth: Survival & Revenue of Scaleups



Red Ocean

Scaleups entering a **crowded (red ocean) market** face intense **competition from established end-market champions**.

Success depends on offering a **unique value proposition (USP)**, **superior technology**, **disruptive business model** and the ability (funding) to **ramp-up fast** to conquer market share.

Business Plan

Implementation Plan, Go-To-Market

- Best is to serve a "**Blue Ocean**" market, with little or no competition, where **demand is created** rather than fought over.
- **Crowded marketplaces** or "**Red Ocean**" markets with (big) **end-market champions** who defend their **cash cows** are very difficult to access. You need a really good plan!

Founders' Goal: Build & Keep or Build & Sell?

BRL (Business Readiness Level)

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Founder's Goal: Build & Keep or Build & Sell?

- **Build & Keep** focuses on long-term growth, profitability, and maintaining control, often through bootstrapping or sustainable scaling, without planning for an exit.
- **Build & Sell** prioritizes rapid scaling, high valuation, and an eventual exit through acquisition or IPO, often relying on PE or VC funding.

The **choice** depends on **founder goals**, **market dynamics**, and **funding strategies**.

The earlier the founders and the investors agree on the overall goal, the better!

Manufacturing Readiness Level (MRL)

Production or fabless

The **product is ready**, **first customers** want to get it, now the startup needs to **establish production**.

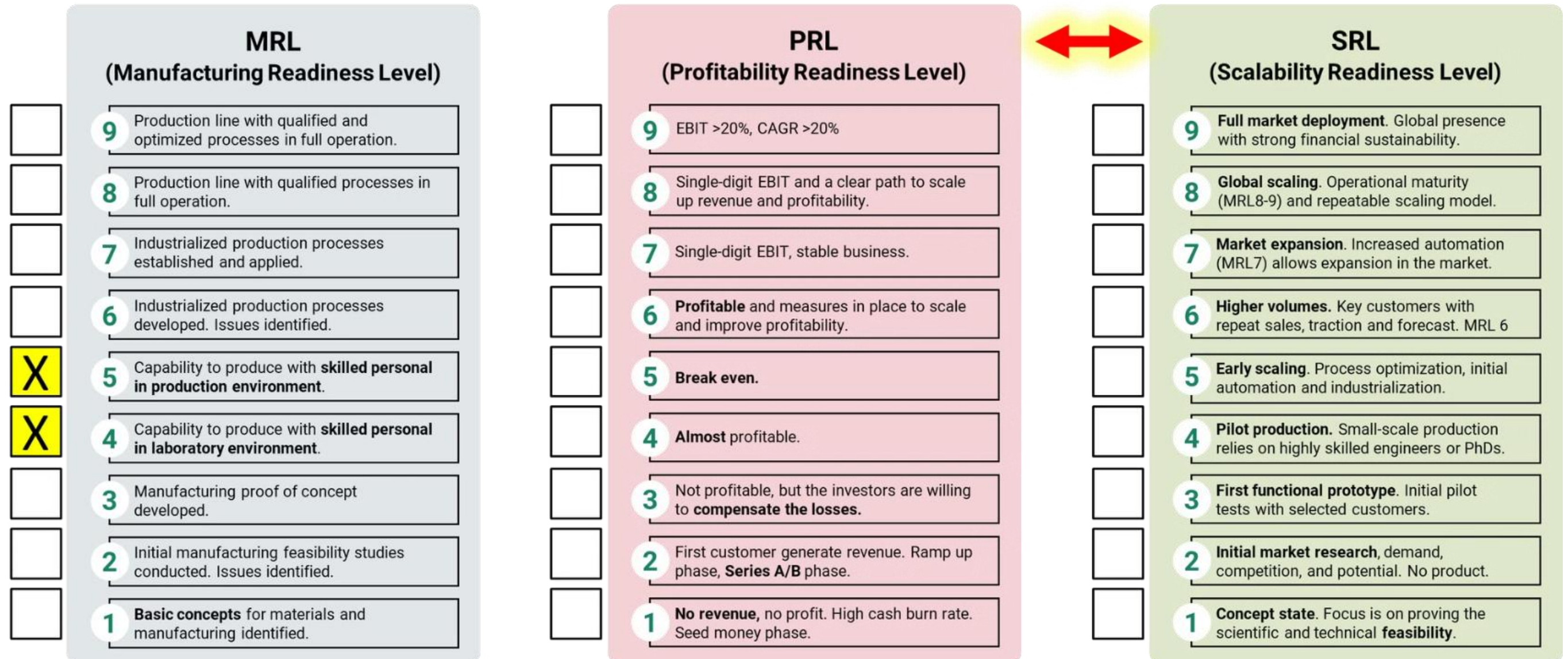
Delivering **qualified products** to customers is the challenge to achieve **revenue** and **profit**.

If fabless is not possible, major **investments** in **infrastructure** and **people** are required.

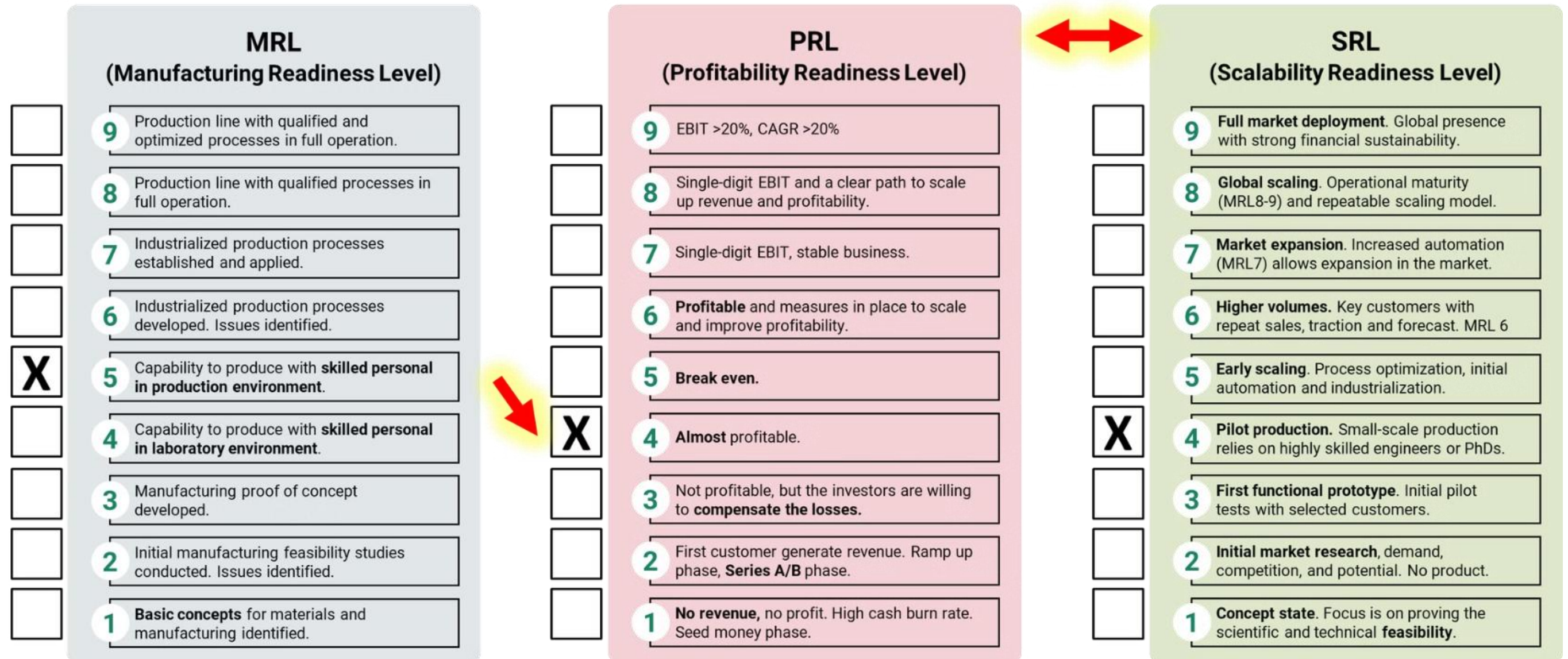
MRL (Manufacturing Readiness Level)

- 9 Production line with qualified and optimized processes in full operation.
- 8 Production line with qualified processes in full operation.
- 7 Industrialized production processes established and applied.
- 6 Industrialized production processes developed. Issues identified.
- 5 Capability to produce with **skilled personal in production environment**.
- 4 Capability to produce with **skilled personal in laboratory environment**.
- 3 Manufacturing proof of concept developed.
- 2 Initial manufacturing feasibility studies conducted. Issues identified.
- 1 **Basic concepts** for materials and manufacturing identified.

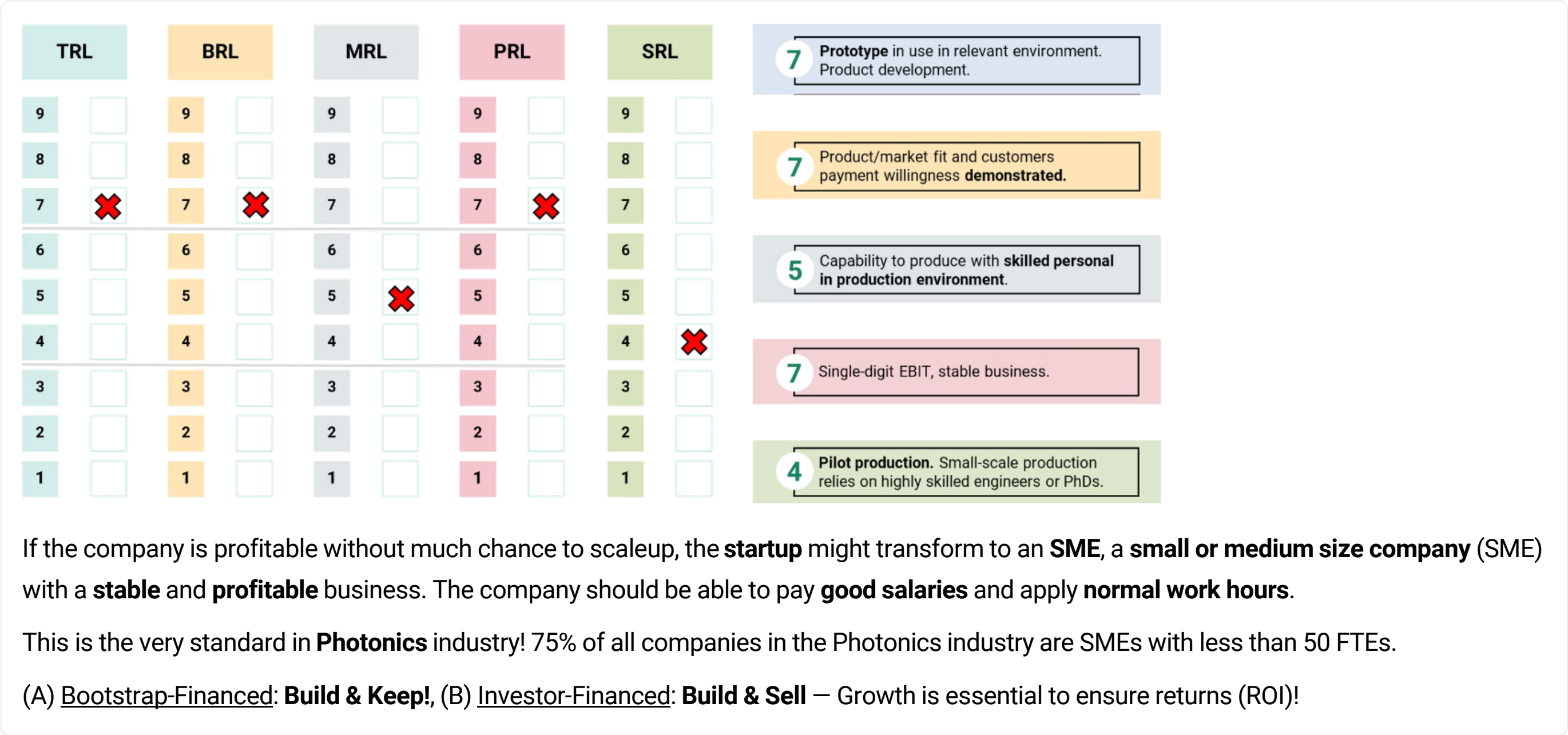
Profitability (PRL) & Scalability (SRL)



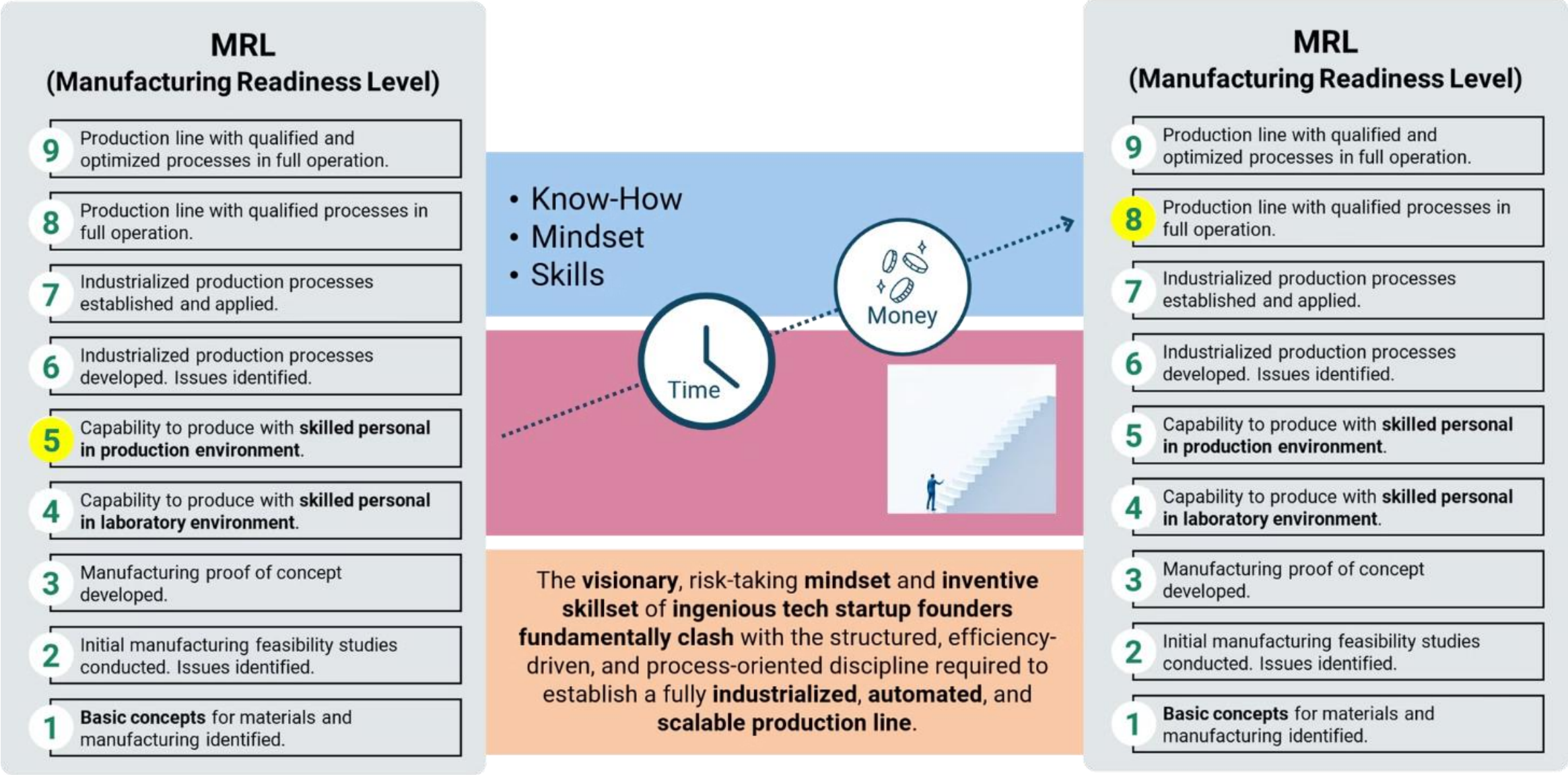
Rule of Thumbs: $PRL \leq MRL$, $MRL \leq SRL$



Case (A): The Tech Scaleup transforms to a stable SME!



MRL: The Greatest Challenge, the Abyss, the Ultimate Test for Tech Scaleups



MRL: Let me Repeat the Key Messages:

The visionary, risk-taking MINDSET and the inventive SKILLSET of ingenious founders

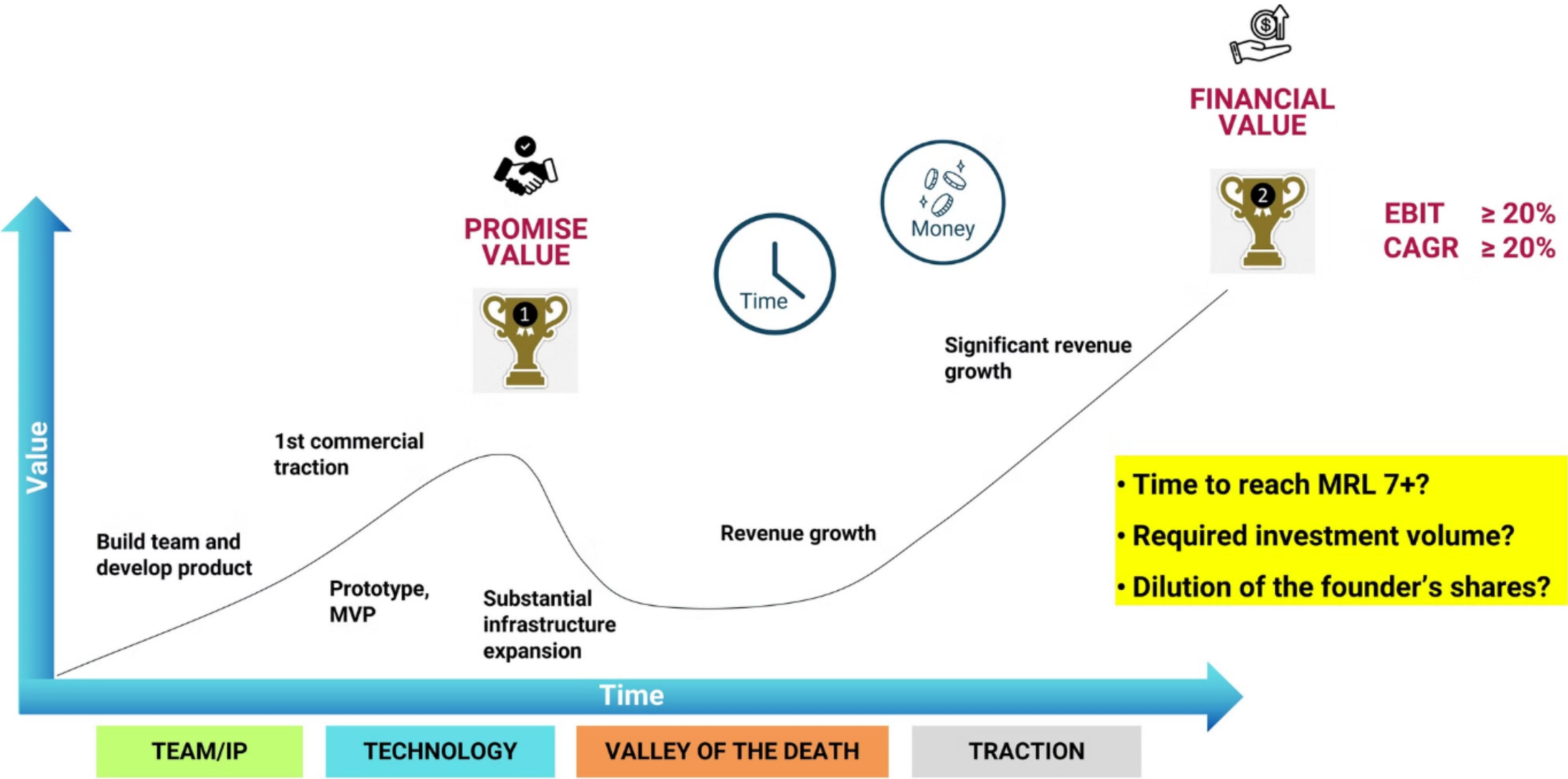
fundamentally clash with

the structured, efficiency-driven, and process-oriented DISCIPLINE required to establish a fully industrialized, automated, and scalable production line (MRL 8).

The transition from MRL 4/5 to MRL 8 is **significantly longer**, more **costly**, and **far riskier** than **first-time CEOs** or **first-time founders** typically anticipate.

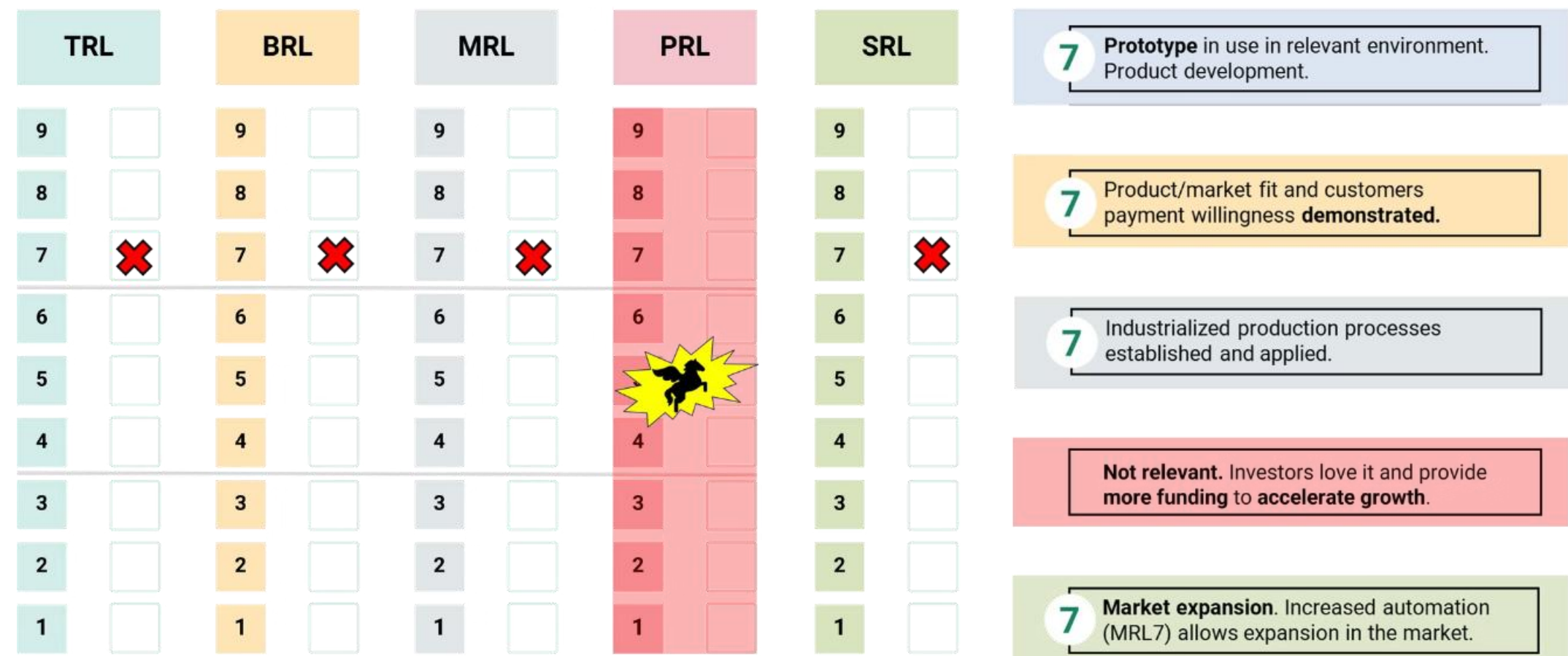
Sell: Exit at Promise or Financial Value Point?

Promise Value Stage - Growth Capital is dangerous



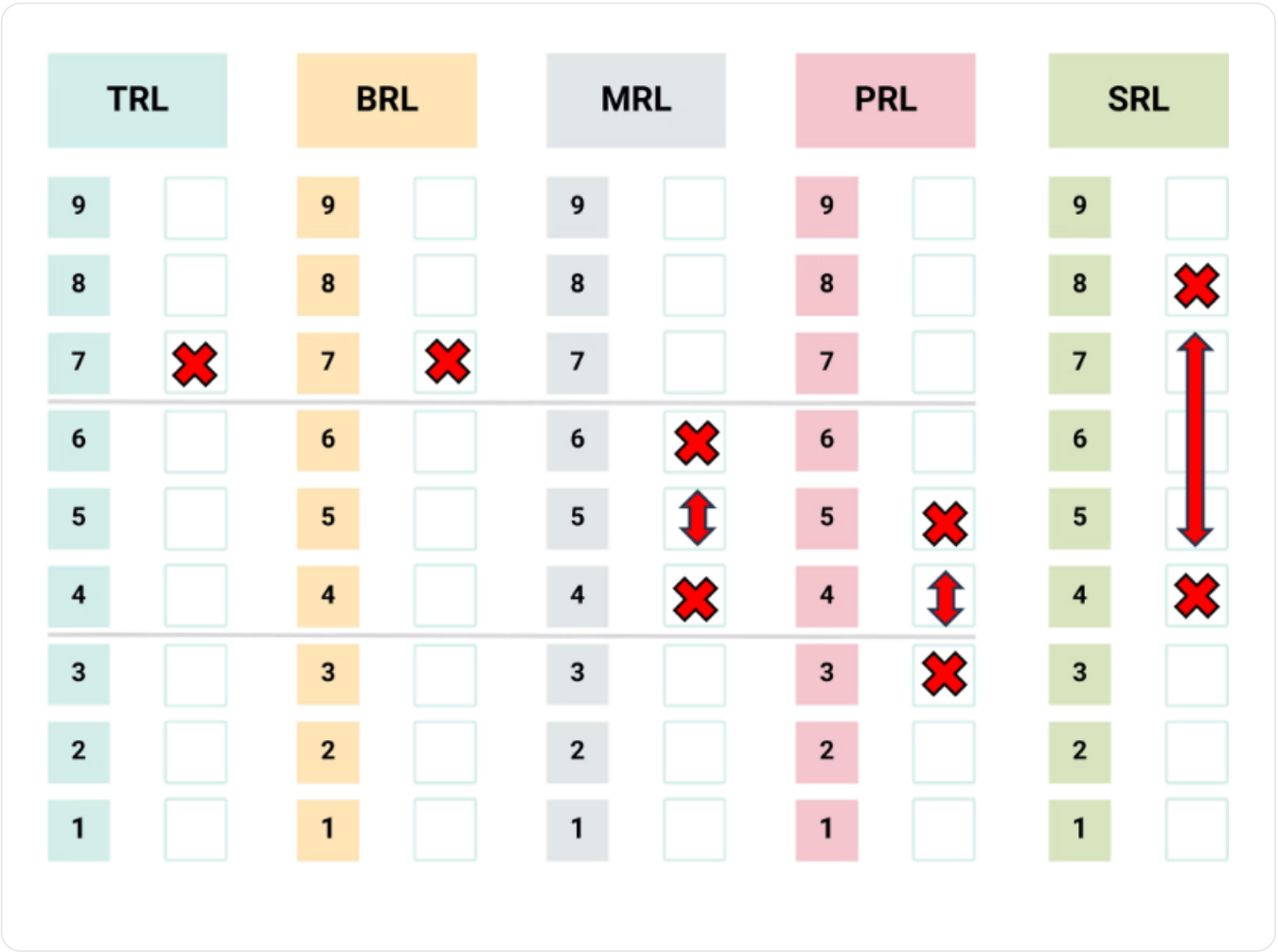
Source: Menalto, Verve Ventures

Case (B): Scale-up Baby, Scale-up!



A clear path to become a **hero**, become a **market champion**. MRL7+ enables a fast and sustainable ramp-up. One of the challenges is to avoid becoming a "**one-time-wonder**", a champion with only one product. A **product pipeline** and **continuous innovation** are key to sustainable success. If this is not possible, an exit at the peak might be the best option.

Case (C): Fallen Heros, Survivors and Zombies Scaleups



Stuck in the death valley

Most likely the production issues (MRL<7) are the bottleneck for sustainable growth.

Product-market fit does not work or wrong estimations on obtainable market shares are others.

Often the current **end-market champions** defend their **cash cows** against the innovative "better" product.

Contious funding rounds dilute the shareholder part of equity.
High risk to miss the next funding round.

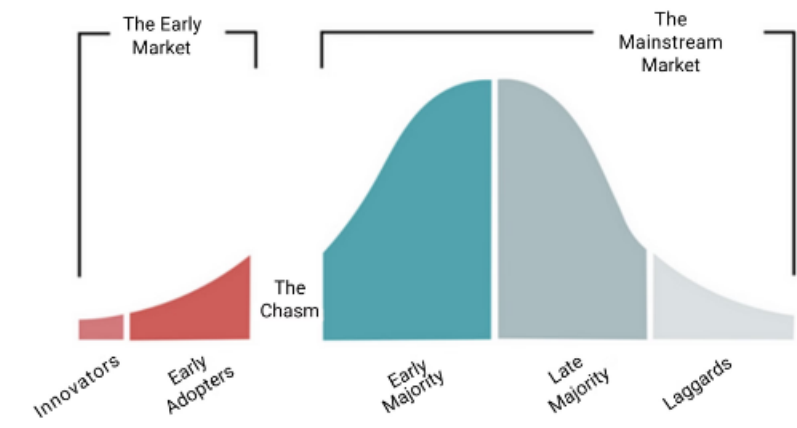
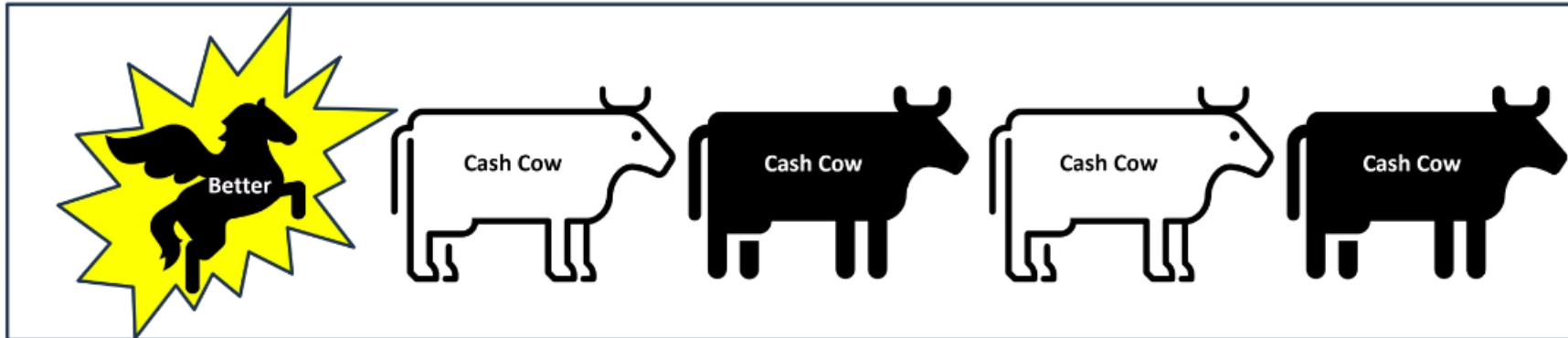
The wheel is still spinning, but the hamster is dead!

End-Market Champions and their Cash-Cows

Crowded Market Place (Red Ocean)

It is very difficult to push an innovative "**better**" or "**cheaper**" product into a **crowded (red ocean) market**. The end-market champions will defend their cash cows by all means. End Market Champions have money, time and access to all customers!

End Market



Crossing the Chasm by Geoffrey A. Moore

If you don't have significant **market share** after **3 years**, the deal is done! **If you can't push your product in the market**, you might need to look for an **end-market champion** to pull you in (M&A).

The Trap: Fake Partnerships

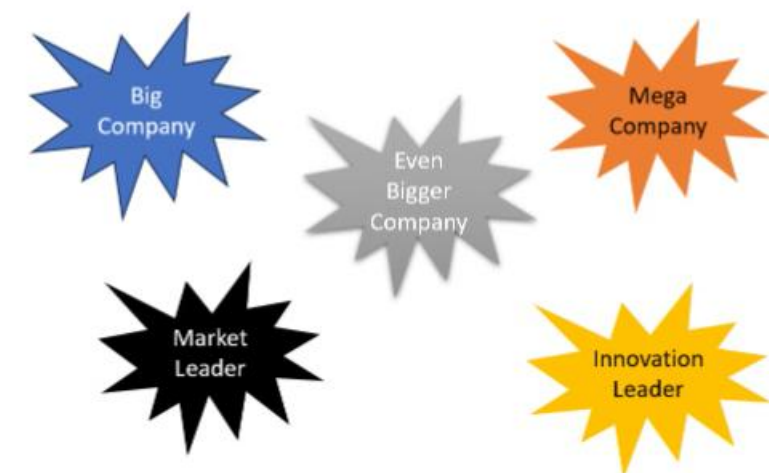
Big players maintain innovation and scouting offices

- These **strategic innovation teams** deploy **scouts** specifically tasked with identifying emerging technologies and startups.
- **Scouts** strategically attend **industry events**, build **relationships** through charm, and deliberately flatter inexperienced founders.
- **Scouts** provide minimal **investment**, purchase **demonstration units**, and maintain regular contact, often creating an illusion of genuine interest.
- **End-Market Champions** often use partnerships as a cover while **blocking real innovation** and to **prevent market entry**.

The scout's job is to keep the kids busy, to protect the less-innovative cash cows.

Our Partners:

We work with all Major Players in the Market!



Self-Sabotage: We know that we have no chance, but we will continue anyhow!

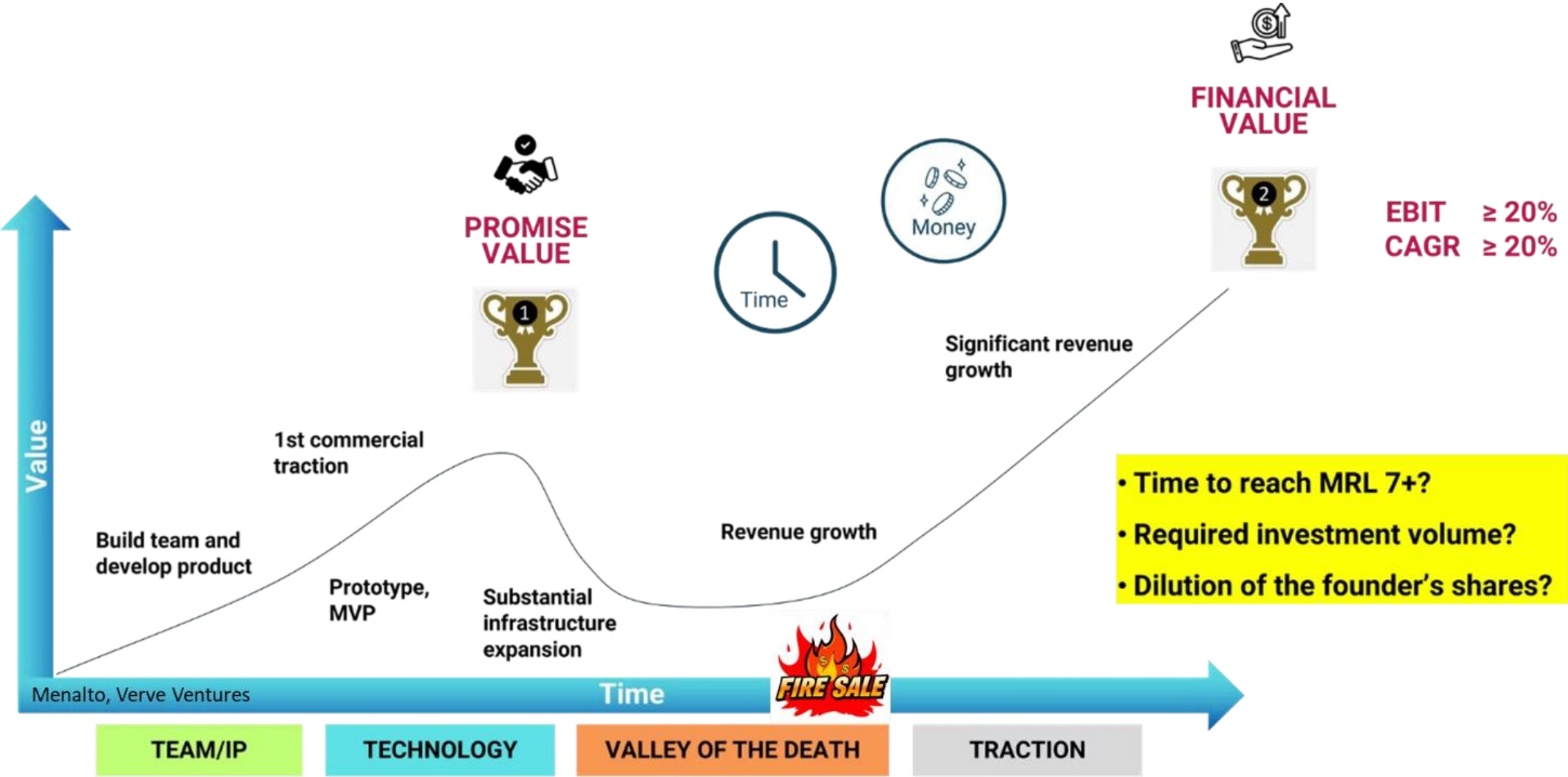
Regarding the probability of success, founding a **tech startup** is **gambling**. Founders should understand the **rules of the game**. Understand when they should **continue** and when it's **time to leave**. For good or for bad!

Daniel Kahneman (Nobel Prize Winner): **Prospect Theory** explains that people **overweight very low probabilities**, making the **thrill of a rare win feel much stronger** than the rational expectation of an almost certain loss.

This is why gamblers are drawn to **lotteries and high-risk bets**, as the excitement of a small chance to win far outweighs the emotional impact of repeatedly losing.

Exit at the Promise Value, Financial Value Point or Fire Sale

Founders work a lot for small salaries. This is their investment. Exit is the most likely form of ROI.



Return on Investment (ROI)

Exit at Promise Value

- An **End-Market-Champion** (strategic investor) acquires a tech scaleup at the **promise value stage**, before they execute major investments into infrastructure.
- **Integrating innovative breakthrough technology** secures a competitive edge by before rivals can, market share gain.
- **Defensive move**, preventing disruptive startups from becoming threats or falling into competitors' hands.
- **Selling** at the **promise value stage** should be guided and executed by experienced **M&A advisors**. Typically, the values (IP, Knowhow, company) are offered to **several end-market-champions** in an **auction**.

Exit at Financial Value

- **Strategic Acquirers, Private Equity (PE) Firms, Venture Capital (VC) or Public Markets (IPO/SPAC)**
- For **highly scalable companies** with **strong financials** and **market demand**. Strong, predictable revenue streams and a clear path to high profitability. **High YoY growth**, strong **customer retention**, and **market scalability**.
- Proprietary technology, defensible IP, or a dominant market position within a niche. Clean cap table, and clear financials.
- Typically a **very complex process** with a deep-diving **due diligence** and sophisticated risk-limiting contracts.

Special: Photonics Tech Scaleups

1. **Capital-Intensive & Slow Scaling** – Unlike software startups, **photonics companies require expensive hardware development, specialized manufacturing, and long testing phases**, making scaling slow and costly.
2. **Complex Sales & Market Adoption** – Photonics products often require **custom integration, long qualification cycles, and deep technical expertise**, making customer acquisition slower and more challenging than in mainstream tech markets.
3. **Limited Investor Appeal** – Photonics is seen as a **niche, deep-tech field** that lacks the hype of software or AI, making it difficult to attract venture capital or private equity funding.
4. **Fragmented Market** – The photonics industry consists mainly of **small and medium-sized companies**, with few dominant players to drive large-scale consolidation or acquisitions.

PRO: Photonics Scaleups that fail to achieve growth, can pivot to become sustainable, profitable SMEs (A).

CON: The probability of surviving multiple funding rounds and emerging as a market leader in the Photonics sector remains considerably low.

Get out of the Death Valley

Founders work hard for small salaries. This is their **investment**. If the company gets **stuck in the death valley** for a **longer period**, the number of options is very limited:

Check List: Where is your Scaleup today, next year and in 3 years?

Transfer to a profitable SME and pay back the investors

Aim for the Financial Value Stage:

- How much additional funding do you need to reach the Financial Value stage?
- What will be your share of the company after dilution?
- What are the risks on this path?

Go back and sell for the Promise Value stage

Wait until the end: Out-of-Business or Fire Fale for low value



The Wheel is spinning, but the Hamster is dead?

Feeling stuck in the Valley of the Death: Talk to Us!

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Startup Event 2025 - Start-ups, Young Companies and the Photonics Industry

13. November 2025, 13:00 – 18:30 in Zurich



- Connecting established companies and start-ups in photonics to exchange experiences and inspire each other – Focus topic for this year's edition: Scale-up Phase
- Program:
 - Key notes from successful former start-up founders
 - Inputs of start-ups presenting their technology, competences and challenges
 - Networking possibilities between startups and established companies in the field of Photonics enabling new collaborations
- Program planning ongoing – startups interested to present themselves are highly welcome to contact Selina Casutt, s.casutt@swissmem.ch
- <https://www.photonicsbooster.ch/event/connecting-startups-young-companies-and-the-photonics-industry/>