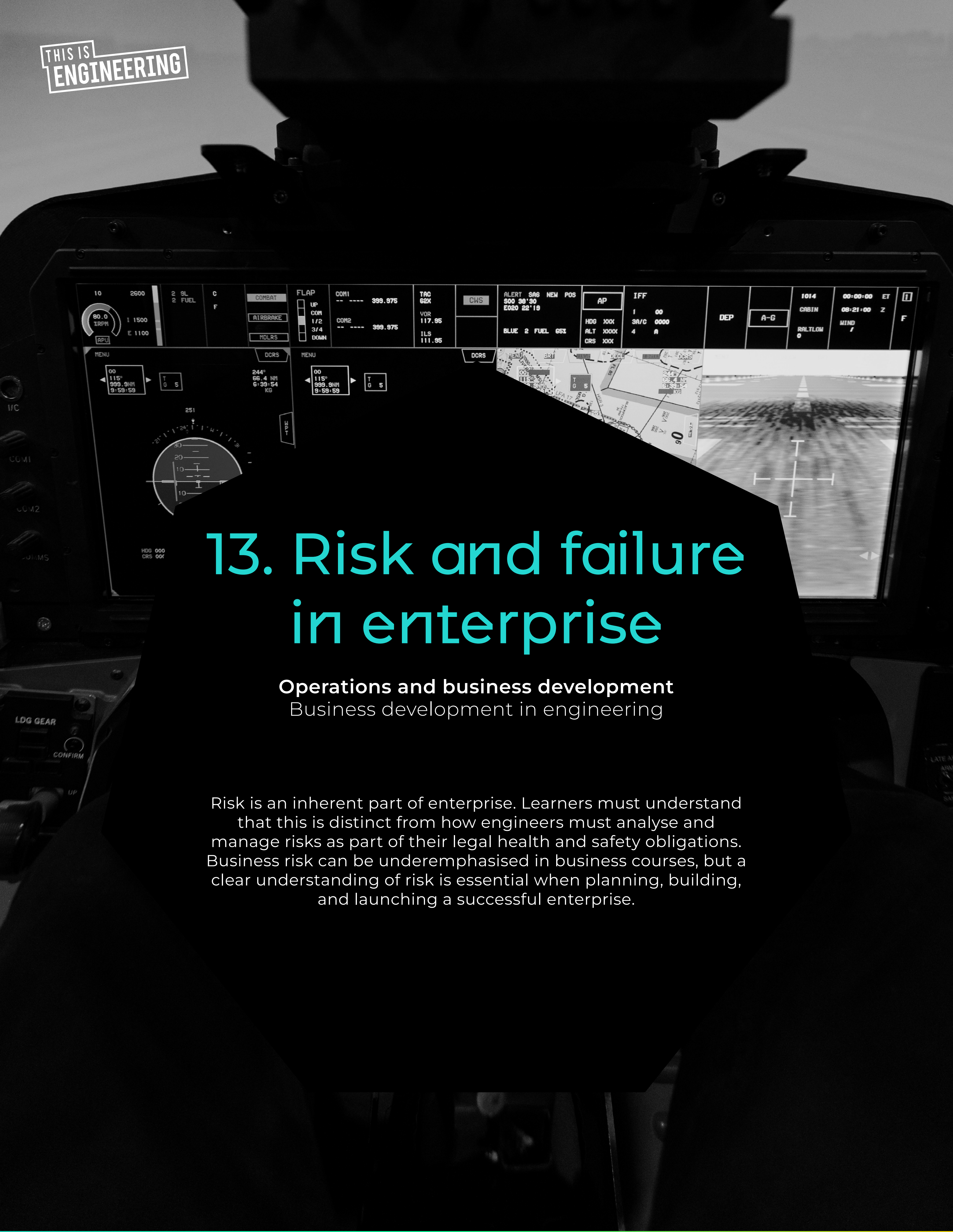
THIS IS ENGINEERING



13. Risk and failure in enterprise

Operations and business development

Business development in engineering

Risk is an inherent part of enterprise. Learners must understand that this is distinct from how engineers must analyse and manage risks as part of their legal health and safety obligations. Business risk can be underemphasised in business courses, but a clear understanding of risk is essential when planning, building, and launching a successful enterprise.

Royal Academy of Engineering

Risk and enterprise

Risk is an essential part of enterprise. **Entrepreneurs are risk-tolerant** and choose to accept some financial risk of failure.

Risks come in different forms: entrepreneurs must identify, understand, and respond to risks in ways that reduce or eliminate them, for example, through:

- market research to test and refine the idea with potential customers
- obtaining market data to ensure there are enough potential customers
- detailed analysis and planning of development, production, and operating costs
- research into barriers to entry (factors that limit sales and prevent success).

This is in addition to the legal obligation to manage health and safety risks. **An engineering entrepreneur must be risk-tolerant in setting up the business, but risk-averse and prudent when managing health and safety.**

Risk control systems identify, analyse, prioritise, and control risks, to guide day-to-day decisions and behaviours. Entrepreneurs need to understand the seriousness of each risk, to identify which are the most important and therefore may need more time and expense to address.

- **Likelihood** is an estimate of the probability that a risk will happen.
- **Impact** is an estimate of how large the effect of the risk will be. This might relate to reputation or it could be a financial amount, like paying for damage or a fine.

Assigning low/medium/high values to the potential impact and likelihood can produce a simple **rating**. For example, when considering how competitors may launch competing products, the likelihood might be high but, thanks to a patent, the impact might be low so the overall risk is medium.

This concept also applies to opportunities: an entrepreneur may choose to pursue a likely gain of £100,000 instead of a very low possibility of gaining £500,000.

Resource **11. Strategic analysis for entrepreneurs** explores how to understand risks alongside opportunities.

Check your understanding:

1. List some personal and organisational benefits of taking risks in enterprise.
2. Explain why obtaining a patent can reduce the risk for a new or growing enterprise.

Sources of business risk

Internal risks come from within the enterprise and are within an entrepreneur's control.

Risk area	Risk type	Risk example
Product	Performance	A CNC machine does not provide the stated precision.
	Quality	Many health sensors have manufacturing defects.
	Innovation	An AI control system lags behind competing products.
People	Skills	A programming team lacks essential coding skills.
	Employment	Employees may leave to join another organisation or startup.
	Compliance	Employees don't follow chemical handling procedures.
Strategic	Business model	A renewable-energy startup's sales channels and leasing plans don't match customer needs.
	Strategy	A battery manufacturer fails to work with automotive partners.
	Change	A machining company fails to evolve with technology and the market.
Operations	Health and safety	Insufficient training is provided for safe work cell maintenance.
	Control	A project team can spend without authorisation.
	Resources	The company is unable to scale up capacity to meet demand.
Reputation	Customers	Customers are disappointed by performance or after-sales service.
	Employees	A manufacturer struggles to attract and retain staff in an unsafe or unpleasant working environment.
	Performance	Sales and earnings do not meet investor expectations.

External risks come from factors that are outside the enterprise's direct control. These include political, economic, social, technological, legal, and environmental factors known as **PESTLE**. The resource **11. Strategic analysis for entrepreneurs** explores PESTLE factors.

All risks can become reputational and financial risks which will affect an enterprise's income, costs, or cashflow (the balance of how money flows into and out of the business).

Check your understanding:

3. What are the two main risks a startup may face with employees?

4. What risks can a startup's founders pose and how can these be reduced?

Risk, growth, and success

Entrepreneurs and their investors want their business to grow. However, growth creates more complex businesses that are not simply 'the same but bigger': it creates new risks.

- Growth needs more investment and investors expect a significant return.
- Larger companies need more complex operational structures and systems.
- Quality must be maintained.
- Scale can create greater sensitivity to changes in markets or the economy.

Growth therefore relies on an experienced and capable leadership team that can identify success criteria and fail conditions that support a decision to stop, pivot, go, or grow.

- **Success criteria** are situations or outcomes in which growth is likely or certain.
- **Fail conditions** are situations or outcomes in which growth is unlikely or impossible.

Meeting success criteria does not exclude also meeting fail conditions. Together these indicate the level of risk associated with each option. Depending on how many of these are met, and which, different options are available.

More success criteria met

Stop
Stop selling this product or cease operating altogether.

Pivot
Change to selling a different or greatly improved product.

Go
Carry on but do not try to scale up for now.

Grow
Invest to scale up the business and grow.

More fail conditions met

It is important to select success criteria and fail conditions that really matter. Judgement must be based on reliable and accurate information.

This comes from how an enterprise researches its internal and external environments to understand the opportunities and threats it faces, challenge its assumptions, identify 'blind spots' in its thinking or awareness, and understand how well it can respond to them. The resource **11. Strategic analysis for entrepreneurs** explores this further.

Check your understanding:

5. Pivot or go decisions, which lie somewhere between success criteria and fail conditions, can be the hardest to make. What might an entrepreneur do when their company fails to meet many of its success criteria, but also does not appear to be experiencing many fail conditions? What are some long-term risks in this situation?

Case study: Responses to due diligence

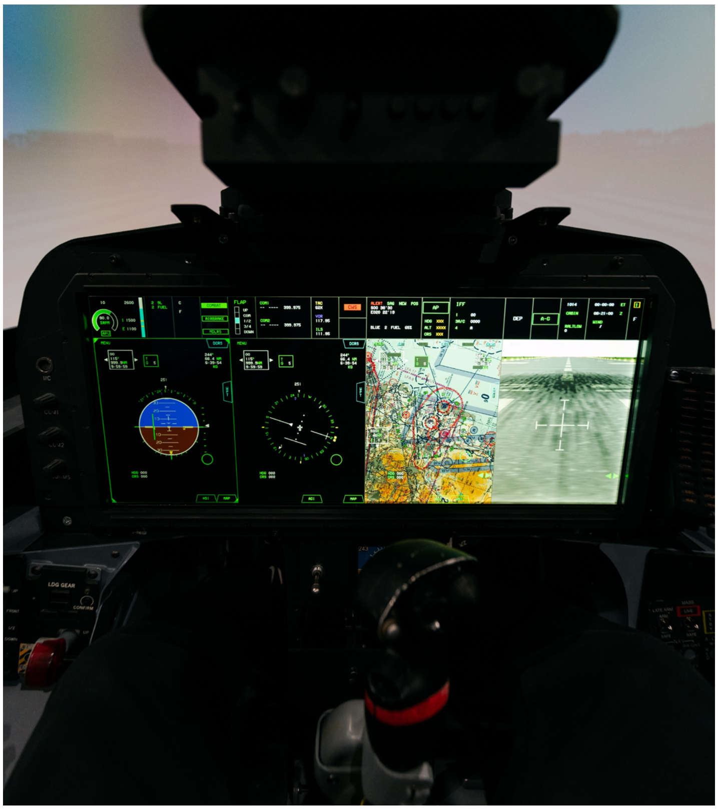
Background

When an investor is asked to fund an enterprise's growth strategy, they will carry out **due diligence**: detailed research into how the enterprise is run and how well it is performing, to verify what the entrepreneur tells them about current and predicted performance.

Two entrepreneurs set up a business to design and produce solar-powered floating drones that provide environmental and security monitoring at sea. While initial sales have been slow, the founders believe that, with investment, they can significantly grow.

The investor has determined the following risks:

- The founders disagree about the core function of the drones. One wishes to focus on environmental monitoring that can help understand global climate change and identify pollution, while the other believes defence or security applications are more promising markets.
- There is a lack of production and sales expertise. This means production is slow and prone to manufacturing errors that must be corrected. The company is failing to reach and persuade possible customers in each market and there is confusion over how one product can support two different markets.
- A defence contractor is believed to be developing its own maritime drone range, although these are believed to focus on attack capabilities.
- There is poor cost control across the company, which greatly reduces profits. For example, the true cost of producing one unit is not accurately known.
- The company does not have access to the best monitoring or surveillance technologies.



The investor still sees potential and has asked the entrepreneurs to explain how they will respond to each risk.

Your task

1. Discuss and identify how you would respond to each risk, to reassure the investor. Your responses might require investment as well as a good decision.
2. Present your ideas to one or more learners from another group or class.
3. Your audience must decide whether to invest and, if not, whether they would recommend to the founders that they carry on with the business or consider winding it up.

Answers: Check your understanding

These are example answers – your own suggestions may differ.

Risk and enterprise

1. Personal benefits of taking risks in enterprise can include personal growth, financial success, the ability to innovate and to make an impact in an industry, or to have a positive social or environmental impact.

   Organisational benefits can include competitive advantage, reduced costs or increased profitability, increased company valuation, and the ability to attract investment.

2. A patent grants an exclusive right to use an invention. In the UK a patent lasts five years and after that can be renewed each year for up to 20 years. This prevents competitors using a new technology, giving the enterprise a competitive advantage because of a protected feature or performance.

Sources of business risk

3. Broadly speaking, the main employee risks relate to hiring unsuitable employees and losing good employees, possibly to a competitor. Hiring risk can be reduced by properly understanding the needs of the role, creating a detailed job description and person specification, and using a thorough application and interview process carried out by an experienced recruiter.

4. Founders pose their own risks because they can begin to differ in their vision for the company, may lack critical qualities, skills, or experience (and fail to understand and accept this), or be unwilling to delegate decisions to more capable colleagues.

   Founder risk can be reduced by agreeing the mission, vision, and values of the company in its business model and by hiring employees with complementary skills, experience, and qualities (which investors may also provide).

Risk, growth, and success

5. When a company lies somewhere between success and failure, it can be difficult to make a clear decision (for example, to pivot or go). This can lead to no decision being made. The company may be able to continue (effectively making a 'go' decision) but is likely to be overtaken by its competitors and, over time, will lose customers, market share, income, and profitability. The company must revisit its success criteria and fail conditions, and create a more effective business strategy that will deliver growth (see also the resource **8. Business strategies for enterprise**).

Answers: Case study

These are example answers – your own suggestions may differ.

1.

Risk	Response to investor
The founders disagree about the core function of the drones.	The founders might agree to develop two separate product lines that make it easier to promote to two very different sets of customers. Alternatively, they might agree to focus on a single market, for example, environmental monitoring. This might be based on market size or their relative competitive advantage in each market. The information about the defence contractor (below), and the investor's preference and knowledge, would influence this.
There is a lack of production and sales expertise.	This is a key risk that the founders need to accept. The founders need to recruit experienced, capable production and sales leaders, and could ask the investor to fund this as part of their stake in the business.
A defence contractor is believed to be developing its own maritime drone range.	This is an important but unknown risk. The founders do not know if this company will extend its drone range to include surveillance. The company's existing brand awareness in the market would give it an advantage over the startup. The core function disagreement above, and the issue of access to technologies (below), also influence this response.
There is poor cost control.	This is a key risk that the founders need to accept. As for production and sales above, this might be solved through recruitment, but it is also a management issue that reaches across the enterprise. The founders might agree to implement the right systems and employee training to resolve this.
There is a lack of access to the best monitoring or surveillance technologies.	Drones act as 'platforms' for the technology they carry, so the technology behind the drones themselves, which the startup has developed, is distinct from the technology that is behind their function. The founders might suggest one (or more) of three different strategies: • Create a partnership with a best-in-class technology provider, who may even take a stake in the business or be an exclusive supplier. • Choose to sell the drones as 'platforms' onto which customers can add their own sensors. • Recruit a team to develop sensors in-house. Each option carries different costs and risks.