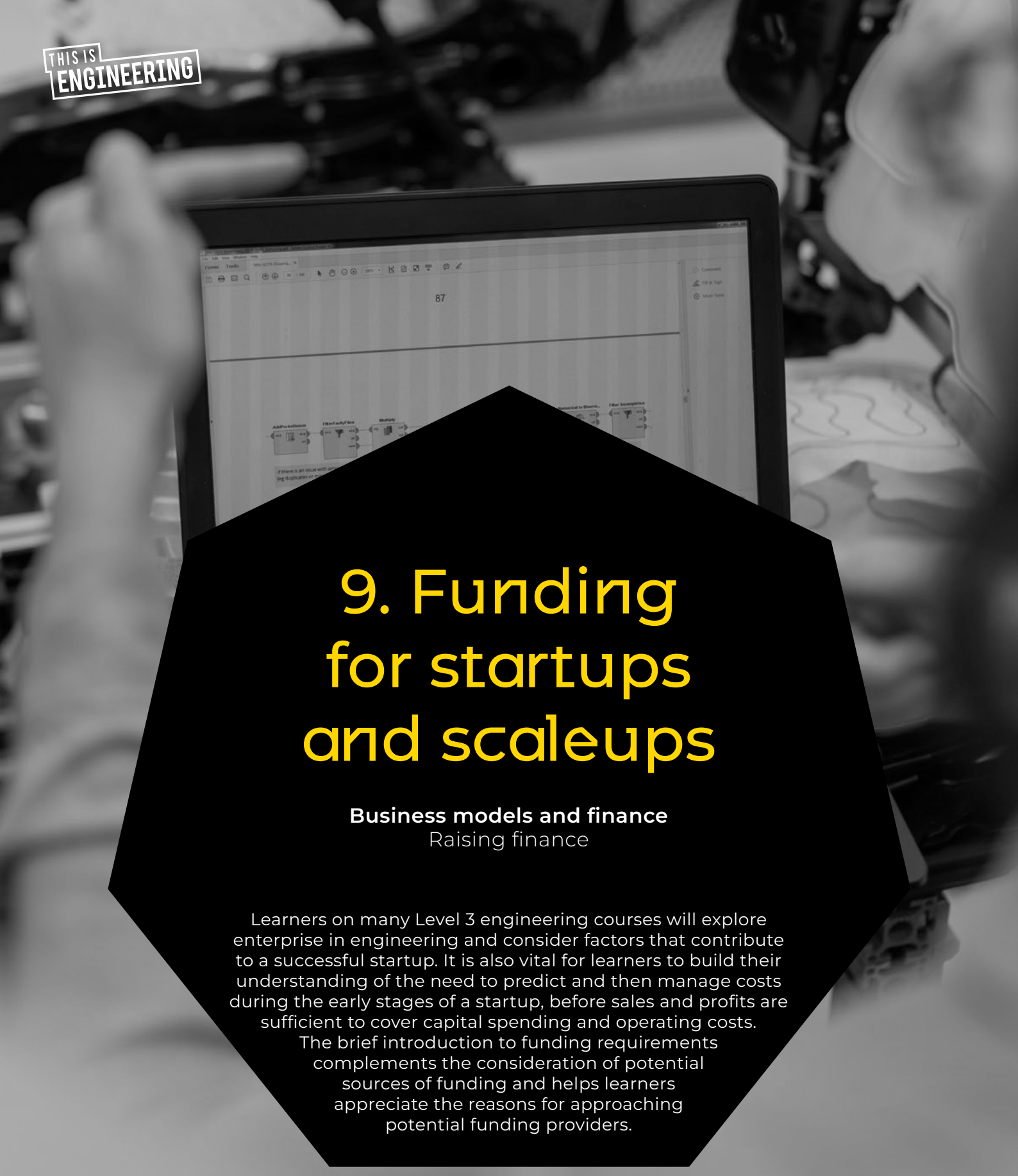


9. Funding for startups and scaleups

Business models and finance
Raising finance

Learners on many Level 3 engineering courses will explore enterprise in engineering and consider factors that contribute to a successful startup. It is also vital for learners to build their understanding of the need to predict and then manage costs during the early stages of a startup, before sales and profits are sufficient to cover capital spending and operating costs. The brief introduction to funding requirements complements the consideration of potential sources of funding and helps learners appreciate the reasons for approaching potential funding providers.

Royal Academy of Engineering

What are your funding requirements?

A startup needs funding to cover its costs during the innovation and design stages and until its sales generate enough income for it to be profitable.

Your costs during this time will include:

- one-off **capital spending** on equipment for research, development, or manufacturing
- **overheads** including recruiting and employing staff, finding and occupying premises, utilities, and monthly operating costs.

Your funding calculation needs to be both **complete** (it includes all potential costs and overheads) and **sufficient** (it includes a realistic amount for each). Just as an engineer will complete a risk assessment, you will need to identify and understand potential sources of **risk** and **uncertainty** in your costs and timescale, and include sufficient **contingency** in your calculations – an amount to cover possible overspends, setbacks, or slower progress.

Example

This startup aims to launch a new diagnostic tool that combines bespoke hardware (designed in-house but manufactured by partners) and software (coded in-house) to diagnose faults in Internet-of-Things-enabled factory automation.

Capital spending	
Design/coding workstations	£20,000
Servers and networking	£30,000
Office equipment	£15,000
Testing equipment	£40,000
+ 20% contingency	£21,000
	£126,000

Monthly operating costs	
Salaries	£50,000
Premises	£3,000
Utilities	£1,500
Supplier/partner costs	£15,000
Marketing	£10,000
Legal and professional fees	£5,000
+ 20% contingency	£16,900
	£101,400

Check your understanding:

1. The startup's **predicted time to market** (launching their product) is 12 months, during which all monthly operating costs must be funded as well as initial capital costs. How much funding will the startup need until it launches a product?
2. How might using a higher or lower contingency affect the funding required and risk of failure?

Calculating your funding requirements

A startup's **time to profitability** will depend on:

- the time needed to develop the right product or service for your market
- an effective promotional strategy that reaches and persuades customers
- other factors that affect your price and sales volume.

In a similar way to an aeroplane needing a long-enough runway to take off, this combination of costs and time is your enterprise's **cash runway**. Entrepreneurs must control their costs so their initial funding lasts until they are profitable.

After launch, the example startup's sales income is predicted as below. The startup expects to make 40% gross profit on sales. Gross profit is the profit after the direct costs of manufacture and distribution are subtracted, but before operating costs.

Month	1	2	3	4	5	6
Sales	£100,000	£200,000	£300,000	£400,000	£600,000	£800,000
Direct costs	(£60,000)	(£120,000)	(£180,000)	(£240,000)	(£360,000)	(£480,000)
Gross profit	**£40,000**	**£80,000**	**£120,000**	**£160,000**	**£240,000**	**£320,000**

Check your understanding:

3. How much extra funding will the startup need after launch, until its gross profits cover its operating costs?

4. To help them, the founding entrepreneurs have hired a finance director with experience of successful startup funding. She wants the founders to assume that sales will be 50% lower in the first six months. How much extra funding will this require?

5. Two entrepreneurs are analysing how best to fund their startup businesses until launch and then, if necessary, until they become profitable. Each startup has different needs.

   Use the **Funding for startups and scaleups online interactive tool** to:

   - Click on the ⓘ information icons to find out more about each company and its spending options and sales predictions.
   - Interpret the information you are given about each startup to set each slider.
   - When you think the sliders are in their correct or optimum positions, identify what funding each company needs, in what month it will launch, and when it may become profitable.

Sources of finance

Entrepreneurs have, in theory, a range of options to meet their funding requirements.

	What is it?	Advantage	Disadvantage
Loan	a borrowed sum of money paid back in regular instalments, with interest	No equity (ownership share) required so founders' ownership is not diluted. Has no say in how the business is operated.	May be hard to obtain. Lender may secure the loan against business assets or the founders' homes and assets, in case of failure to repay.
Angel investor	a high-net-worth person who invests individually or collectively in startups in exchange for equity	Usually only asks for a minority stake. Provides business and startup experience and network access. Will invest 'seed' or 'incubator' funding at an early stage.	Will expect a high return on their investment due to high risk of failure. Can be hard to find, though 'angel networks' can now help.
Venture capital	investor funds that provide funding to startup and scaleup companies in exchange for equity	Can provide a series of large 'accelerator' investments that help to grow and scale up. Provides business and sometimes technical expertise.	Will expect a high return on their investment and sometimes a high or majority stake. May apply pressure for too-rapid growth.

Entrepreneurs may choose, or need, to find alternative funding if these sources are not available, especially at the earliest stages. This might come through **self-funding**, **bootstrapping** (finding ways to start small and with little money), or **crowdfunding** (using an online platform to raise money from many people in return for early or discounted product access), while **grants** and **tax relief** may be available to cover research and development in certain technological and geographical areas.

Intrapreneurs in an existing company must find internal funding so they must seek project sponsors – senior colleagues who can make this money available and exert helpful internal influence. Sponsors will want to protect their reputation and career prospects so they will need to be persuaded of the opportunity in the same way an entrepreneur needs to convince external funders.

Check your understanding:

6. Bootstrapping describes starting a new enterprise with minimal funds. Suggest some decisions a 'bootstrapper' might make to ensure these funds go further and an advantage/disadvantage of this approach.

7. Give reasons why entrepreneurs need to correctly predict their funding needs.

8. Suggest why a startup might take longer than expected to launch its product or service in the market.

Case study: Risks, gains, and investment

Background

You work in the research and development (R&D) department of a large electronic engineering company. You have developed a new material that you believe will have many commercial applications and which could become a valuable part of your company's portfolio. However, you are at an early stage. You have only manufactured very small quantities of this material and conducted initial tests that suggest its applications and potential.

You are meeting with senior colleagues who could become project sponsors for funding your continued research and development.

Your preferred approach is to ask for a large staff and research budget, while your potential sponsors suggest the opposite: minimal staffing and budget.

Together you begin to explore a third option: start small and then, as you reach agreed milestones and begin to develop specific products or applications, expand the funding for staff and research costs. One of the potential sponsors notes that this is how a cautious angel investor might provide more than one round of seed funding for a new startup, to manage their exposure to risk.

Your task

1. Suggest an advantage that might help you argue in favour of a large initial budget, and an argument the potential sponsors might make against this approach.

2. Now do the same for the sponsors' suggestion: what is an argument for and against a small, more cautious budget?

3. Identify how the third option combines the best of both options, minimising risk while making success more likely.

Extend your learning

- Both angel investors and venture capital firms will use several rounds of funding to help a startup grow step by step. Research 'seed investment' and 'series A, B and C investments' to find out more about their purpose.

- Research angel investor and crowdfunding platforms in the UK and explore what kinds of engineering projects are seeking investment. Which ones would you choose to invest in if you were an angel investor or had crowdfunding money to invest?

Answers: Check your understanding

These are example answers – your own suggestions may differ.

What are your funding requirements?

1. The startup will need (1 x £126,000) + (12 x £101,400) = £1,342,800 before it launches a product. (This might be less if the contingency funds are not used.)

2. A higher contingency is likely to reduce the risk by allowing for unexpected costs or cost increases but will increase the funding requirement.

   A lower contingency would reduce the funding requirement but may increase the risk of running out of cash.

Calculating your funding requirements

3. In the first two months after launch, the startup will need (£101,400 - £40,000) + (£101,400 - £80,000) = £82,800 additional funding. From month 3 onwards, gross profits exceed operating costs.

4. Halving the projected sales will also halve the gross profit and extend the additional funding needed to four months, for a total of £211,600 additional funding.

Month	1	2	3	4
Sales	£50,000	£100,000	£150,000	£200,000
Direct costs	(£30,000)	(£60,000)	(£90,000)	(£120,000)
Gross profit	£20,000	£30,000	£60,000	£800,000
Operating costs	(£101,400)	(£101,400)	(£101,400)	(£101,400)
Funding need	**£81,400**	**£71,400**	**£41,400**	**£21,400**

Answers: Check your understanding

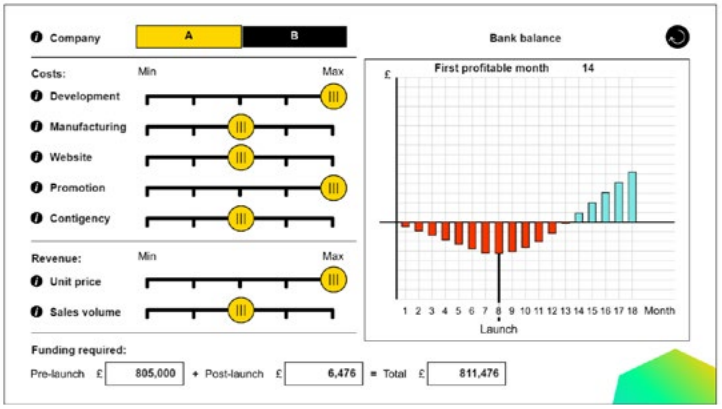
These answers reflect good choices for each company:

5.

Company A

Company A should maximise its spending on development, because it must develop its idea into a working prototype, and promotion, because raising customer awareness is vital. There is no benefit to overspending on manufacturing or web development, and it is prudent to set a medium level of contingency to cover unforeseen costs.

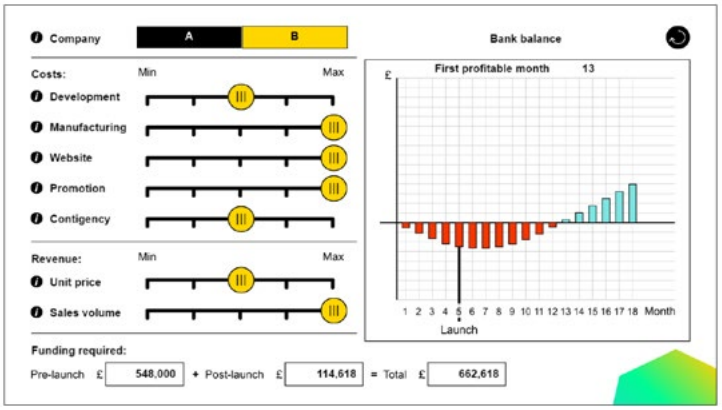
With realistic predictions for a high unit price but medium sales volume, company A will require £805,000 funding. Maximum development spending helps it launch in month 8 and it will become profitable from month 14. The improving bank balance after launch shows that just £6,476 funding after launch is likely to be needed.



Company B

Company B should maximise its spending on manufacturing (to meet high demand), web development (for high online sales) and promotion. There is no benefit to overspending on development as a working prototype already exists.

With realistic predictions for a medium unit price but high sales volume, company B will require £548,000 funding. It will launch in month 5, after which it will need a further £114,618 until eventually becoming profitable from month 13.



Explore the interactive

- How do the figures change if you make more or less optimistic predictions about each company's unit price and sales volume?
- How do higher and lower contingencies change the financial predictions? What real-world impacts might a different approach to contingency planning have?
- Both companies maximise their promotional spending to attract customers. What happens when you reduce this promotional spend?

Answers: Check your understanding

Sources of finance

6. A 'bootstrapper' needs to focus spending on essential tasks such as technology and product development, intellectual property (IP) protection (eg patent applications), building relationships with potential customers, developing a strong brand that helps to drive sales, and minimising spending on areas like premises.

   Bootstrapping can allow an entrepreneur to make progress without external forces or expectations. However, this approach can fail due to limited funds and a lack of external advice and guidance.

7. Entrepreneurs need to correctly predict their funding needs so:

   - they have enough funds to complete their innovation, design, and pre-production tasks, and develop a viable product
   - they can continue to fund their activities until they have launched the product and made enough profit to cover their operating costs
   - they include enough funds to cover marketing and selling their product, which can be a significant overhead for any company.

8. A startup might take longer than expected to launch its product or service in the market because:

   - there are technical problems in turning a core innovation into a viable product
   - testing uncovers the need to improve features, performance, quality, or costs
   - the team lacks the skills and experience to manage the process.

Answers: Case study

These are example answers – your own suggestions may differ.

1. A large budget may allow for a larger team that can bring together greater experience, skills, and creativity to solve technological challenges and develop viable products, and might be needed in cases where the materials, equipment, or time needed for development are inherently expensive. However, the idea is at a very early stage, so the risks of failure are high. The project sponsors might argue that, instead, the team should remain small until further progress is made and the apparent risks are reduced.

2. A small team and budget would minimise the risks to the company and the effects (or 'opportunity cost') of this money being diverted from other uses, which may include funding other projects, paying for operating costs, or paying bonuses or dividends to the owners. Until the innovation is developed further, the sponsors will argue that, when viewed from the company's perspective, there are better ways to spend this money. However, a small budget may limit what the team can do to develop the technology into viable applications. It may prevent investment in important tests or prototypes, and may mean that progress is slow.

3. The third option combines these advantages while minimising the disadvantages. In the short term, the risk and opportunity cost to the company is minimised while the technology is developed and tested. Reaching agreed milestones, such as passing certain key performance tests or developing a way to manufacture the material at acceptable cost, can unlock additional funding for more expensive equipment or a larger team, once the risks are seen to reduce. These milestones can also focus and motivate the team, leading to better leadership and delivery.