



## THE TIMES 100

### BUSINESS CASE STUDIES

## Research and development - ARM

ARM is a Research & Development (R&D) focused business. Its 'products' are intangible and cover a diverse range of applications. They are used in everything from sensors to servers. Mobile phones, tablet computers, washing machines, car braking systems and network routers all use ARM technology. To date, over 20 billion chips containing ARM technology have been manufactured.



The **research** process involves inquiry into and discovery of new ideas to solve a problem or create an opportunity. ARM invests around £140 million per year into its research programmes. ARM's R&D is predominantly market-orientated. It is influenced by feedback from hundreds of customers – and their customers – from different industries and with different needs. ARM employs a 'Push/Pull' model. The push is where ARM puts its latest developments out to manufacturers to drive new technical innovations. The pull reflects what customers and consumers are asking for, i.e. market demand. ARM's R&D team talks to people at every level within key industries to establish what they need and what demand there is for different products in order to ensure products are customer-orientated. External influences also affect ARM's research. For example, energy efficiency is high on the public agenda. R&D into low power techniques has always been a key focus for ARM. The microprocessor market is now focused on evaluating the benefits of similar products across competitors. For example, which has lowest power, highest performance (speed) and the smallest scale (which is vital for mobile devices)?

**Development** involves transforming ideas into a product fit for market. From numerous ideas at the research stage, ARM will take only a few with potential into the development stage. The key elements of the development process include:

- A product brief – identifying what market need it fills. To produce a product brief, ARM works with around 1,000 companies. These companies may be ARM customers, competitors and collaborators all at the same time. ARM's engineers talk to partners who make the microchips to establish what is possible technically and its market-focused people identify what the market is asking for.
- A product specification – outlining the main features, benefits and costs. ARM combines this feedback and establishes priority needs. These are then evaluated to focus on the application which will lead to a deliverable product.
- A process of evaluating alternative solutions – through computer modelling, samples or prototypes. ARM will select lead partners for specific projects. The partners' R&D teams then work with ARM's R&D team to develop the initial idea.
- A sequence of testing – to check the product meets requirements. Once tested, the design is then licensed to the partners to manufacture, on which ARM receives royalties.

The challenges of a typical R&D process include:

- large costs – of people, time and equipment
- long timescales – for example in the pharmaceutical industry it can take as long as 10-20 years to complete full testing
- high risk – difficulties in anticipating changing market and consumer needs over the duration of R&D projects, which leads to uncertain outcomes.

ARM meets these challenges and reduces the potential risk of its projects by:

- working with lead partners to understand what is technically possible
- listening to what its customers and their customers are asking for
- managing timescales by adjusting the team size and ensuring the right skills are in place in order to deliver on time.



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### Questions

1. What is research and development?

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2. Describe the stages within the development process.

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3. Explain the challenges of R&D.

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4. Analyse how ARM deals with the challenges of the development of new products.

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### Task

Working in a small team, go through the R&D stages for the creation of a new soft drink:

- Generate ideas – carry out small scale research with other groups
- Write a product brief
- Determine the product specification
- If possible, make a prototype of the packaging
- Explain how you would test the product
- Consider the promotion that could be carried out to support the launch of the new product

### What have you learned?

*Mind the gap* - write a paragraph about research and development with some key terms missing. Swap with a partner and fill the gaps.