Question 1 - EGP question

18/19

As a UK government official you have been tasked to improve the UK's manufacturing innovation system by developing ways to cross the valley of death.

a) **Explain the "innovation system" concept and its three core functions (30%)**

Good answers will describe what is meant by the concept of innovation system and its three core (high-level) functions namely (i) knowledge generation, (ii) knowledge diffusion and (iii) knowledge deployment.
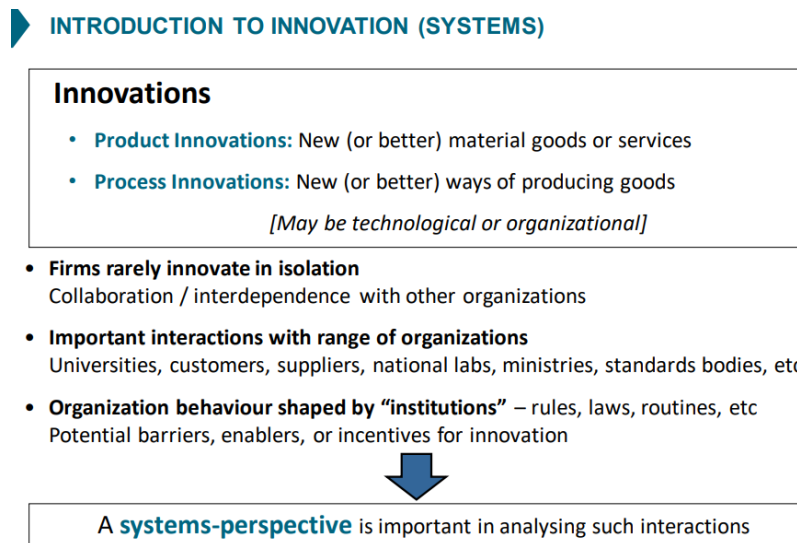

FUNCTIONS OF NATIONAL INNOVATION SYSTEMS

Overall function of an innovation system:
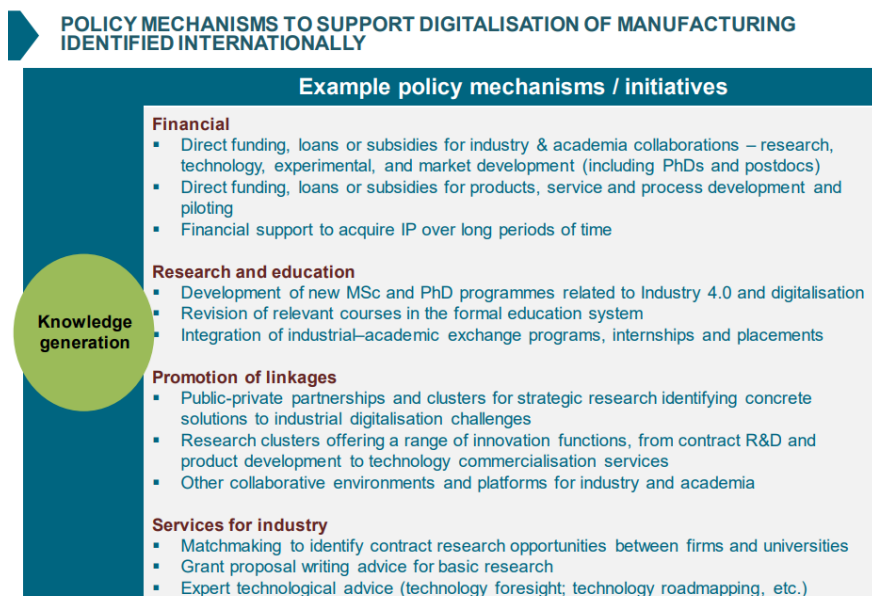To develop, diffuse and use innovations
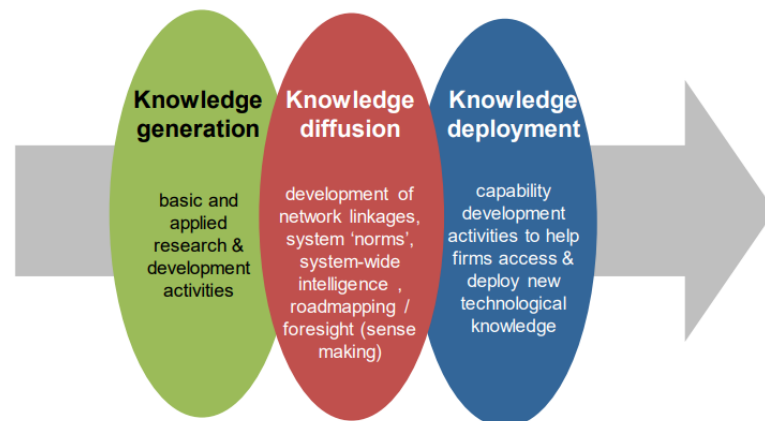
Source: *The Oxford Handbook of Innovation*, Fagerberg, Mowery & Nelson (2005)

A good answer would then be expected to explain that a functioning innovation system then can lead to successful innovations. A good answer would then distinguish the different types of innovations that result from the innovation processes in the system, with the two main types being product and process innovations. Product innovations are defined as new or better material goods or services. Process innovations are defined as new or better ways of producing goods (or services). Besides the two types of innovations good answers would also be expected to explain the system characteristics, i.e. that firms typically do not innovate in isolation, but rather collaborate with other organizations, such as firms of varying sizes (e.g. large, SME, start-ups), but also research institutes, design/ technical/ engineering consultancies, individual inventors, etc. Good answers would also be expected mention that another important element of an innovation system are its institutions that shape (govern) the behaviour of the innovation system actors through rules, laws, routines also creating barriers, but also trying to be enabler of innovation through the creation of incentives (e.g. the patent system, prizes).

In summary, a good answer would provide a detailed explanation of what is summarized in the lecture slide shown below.

▶ **INTRODUCTION TO INNOVATION (SYSTEMS)**

Innovations

- **Product Innovations:** New (or better) material goods or services
- **Process Innovations:** New (or better) ways of producing goods

[May be technological or organizational]

- **Firms rarely innovate in isolation**
  Collaboration / interdependence with other organizations
- **Important interactions with range of organizations**
  Universities, customers, suppliers, national labs, ministries, standards bodies, etc
- **Organization behaviour shaped by "institutions"** – rules, laws, routines, etc
  Potential barriers, enablers, or incentives for innovation

A **systems-perspective** is important in analysing such interactions

On top of good answers, excellent answers would not only provide examples for the different innovation system elements, but also provide further details on the three innovation system functions. For instance, an excellent answer may provide some examples of policy measures for the digitisation of manufacturing (with reference to the three lecture slides below).

▶ **POLICY MECHANISMS TO SUPPORT DIGITALISATION OF MANUFACTURING IDENTIFIED INTERNATIONALLY**

Example policy mechanisms / initiatives

Financial
- Direct funding, loans or subsidies for industry & academia collaborations – research, technology, experimental, and market development (including PhDs and postdocs)
- Direct funding, loans or subsidies for products, service and process development and piloting
- Financial support to acquire IP over long periods of time

Research and education
- Development of new MSc and PhD programmes related to Industry 4.0 and digitalisation
- Revision of relevant courses in the formal education system
- Integration of industrial–academic exchange programs, internships and placements

Promotion of linkages
- Public-private partnerships and clusters for strategic research identifying concrete solutions to industrial digitalisation challenges
- Research clusters offering a range of innovation functions, from contract R&D and product development to technology commercialisation services
- Other collaborative environments and platforms for industry and academia

Services for industry
- Matchmaking to identify contract research opportunities between firms and universities
- Grant proposal writing advice for basic research
- Expert technological advice (technology foresight; technology roadmapping, etc.)

Knowledge generation

POLICY MECHANISMS TO SUPPORT DIGITALISATION OF MANUFACTURING IDENTIFIED INTERNATIONALLY

Example policy mechanisms / initiatives

Knowledge diffusion

Awareness
- Forums, innovation courses, seminars, workshops, conferences and international events
- Communication campaigns for industry

Demonstration
- Piloting and demonstration projects (products, services, processes) in laboratory or industrial environments
- Grants for pilot projects that serve as models for nationwide roll-out of new generic technologies, products and services that can be used in several industries
- Development of 'toolboxes' or 'toolkits' made available to consortia member firms

Internationalisation, networking and linkages
- Foreign and domestic industrial stays and study visits
- Matchmaking events (industry and academia)
- Networking and cluster collaboration
- Personal exchange programmes where people can rotate from industry to academia or research institutes, or from academia/research institutes to industry
- Collaboration schemes between high-tech industries and young start-ups
- International cooperation agreements at government level

Services for industry
- Private consultancy services brokered by government
- Access to technical expertise to address individual company challenges together with follow-up implementation advice

POLICY MECHANISMS TO SUPPORT DIGITALISATION OF MANUFACTURING IDENTIFIED INTERNATIONALLY

Example policy mechanisms / initiatives

Knowledge deployment

Skills / workforce
- Competency-development courses for employees and managers based on practical challenges of individual companies
- Business-oriented education programmes for long-term research competence building, to develop knowledge on how to implement digital technologies across entire value chain

Financial
- Direct funding, loans or subsidies for digital products, service and process development
- Direct funding, loans or subsidies for companies to test new technologies and train their workforce
- Direct funding, loans or subsidies for tailored diagnosis of company challenges and technical assistance
- Grants or tax deductions for capability building and training, including overseas study trips

Services for industry
- Personalised consultancy services and access to technical expertise to address individual company challenges (e.g. process innovation, replacing old facilities, adoption of Industry 4.0 techs and solutions) together with follow-up implementation advice (e.g. technology roadmapping)
- Access to facilities and networks of expertise located in intermediary research and technology organisations (e.g. Catapults, Fraunhofers)
- Support for technology adoption by offering packaged technical solutions to SMEs at reasonable cost

Internationalisation, networking and linkages
- International cooperation around standards and other technical issues
- Online tools for assessing digital level of companies and finding specialised consulting services

Framework conditions / ecosystem generation
- National strategies and sectoral roadmaps implemented by government

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b) Explain the "valley of death" concept (30%)

A good answer would describe the valley of death (VoD) concept in line with the illustration shown below from the lecture material. Any good answer would be expected to explain the two dimensions of relevance for the VoD. First, the VoD looks at technology development along the technology readiness levels (TRL) ranging from 1 to 9. As such, a short TRL description would be part of any good answer. The second dimension of the VoD concept is the scale of R&D investments. A good answer would then explain that governments and universities are typically investing in developing novel technologies from TRL 1 to 4, with most investments focused on early TRLs 1-3. Private sector actors then often only start investing in technologies with TRL of 7 and upwards, focusing the major share of their investments on TRL 7-9. This leaves an investment gap from TRL 4-6 (approximately).

On top of a good answer, an excellent answer would be better structured and provide examples to illustrate the core arguments. An excellent answer may also discuss some of the consequences resulting from the VoD concept for an innovation system. For instance, the lack of investments available to develop novel technologies from TRL 4-7 means that technologies coming out of early

stage innovation processes (e.g. from universities) are too immature for the private sector to pick them up and develop them towards a market readiness, with the risk that those technologies may "die".

Technology Readiness Levels and the Valley of Death
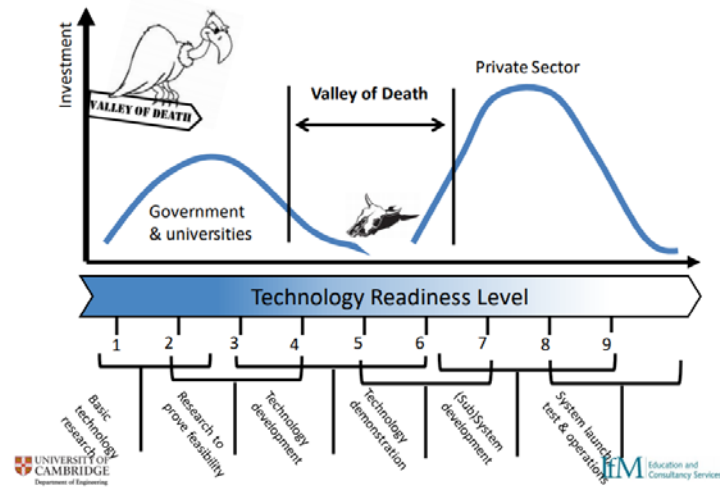
Additionally, an excellent answer could discuss the role of different innovation system actors in crossing the "valley of death" (e.g. public vs private institutions), or highlight the fact that distinct intermediates are being created around the world to address the "valley of death", namely Reserch and Technology Organisations (RTOs), and provide example names of such institutions (e.g. Catapults; Fraunhofers, etc.). Alternatively, an excellent answer could indicate that in some countries Higher Education Institutions carry out this intermediate function, rather than RTOs (although this might be too advanced). This refers to the slide below:

Different innovation system actors making different contributions to crossing 'Valley of Death'
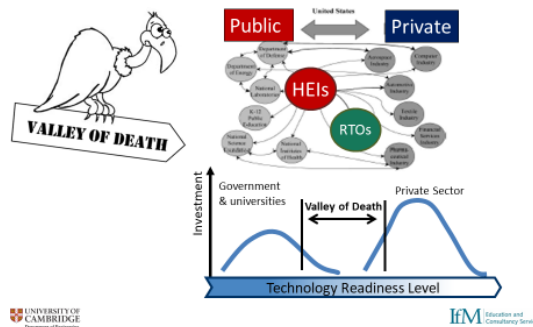
c) Discuss, using examples, how you as UK governmental official could use Research Technology Organisations (RTOs) as policy measure to cross the valley of death in the UK manufacturing innovation system. (40%)

A good answer would be expected to first explain the RTO concept based on the lecturing material. Accordingly, RTOs occupy the intermediate space between the early exploratory science and engineering research often conducted at universities (i.e. lower TRLs) and the more proprietary innovation and development activities conducted in the private sector (i.e. higher TRLs).

THE ROLE OF RTOs

RTOs occupy the intermediate space between:
- (a) the exploratory **science and engineering research** endeavours of universities and;
- (b) the more proprietary **innovation** activities of firms.

RTOs are organisations **linking public and private innovation efforts**
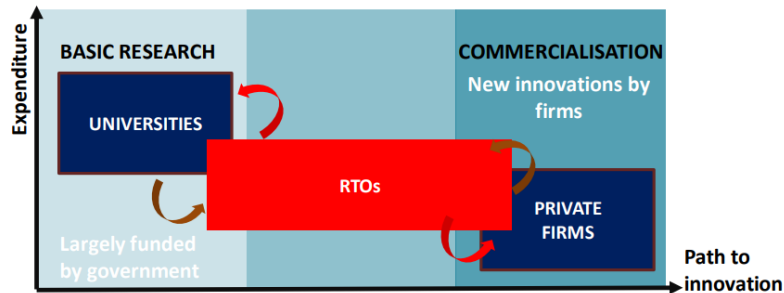
A good answer would then be expected to explain how RTOs can be used to bridge the VoD by providing examples. A way to structure the arguments in an excellent answer would be to explain how RTOs can support the three core functions of an innovation system. For instance, through helping with proving the concept of novel technologies and validating laboratory experiments in scale up environments would support the innovation system's knowledge generation function. Helping to establish technical standards through building networks and institutions would support the knowledge diffusion function. RTOs can support knowledge deployment through training and education programs for new technologies.

THE ROLE OF RESEARCH & TECHNOLOGY ORGANISATIONS (RTOs)

Technology R&D (product and service innovation)
- **Proof of concept/application feasibility**
- **Concept validation in laboratory environment**
- **Prototype demonstration in realistic environment**
- **System demonstration in real-world environment**

Knowledge generation

Network & institution building for knowledge diffusion
- **Technical standards, certifications & regulations**
- **Network building, industrial dialogue and brokering industrial consortium development**
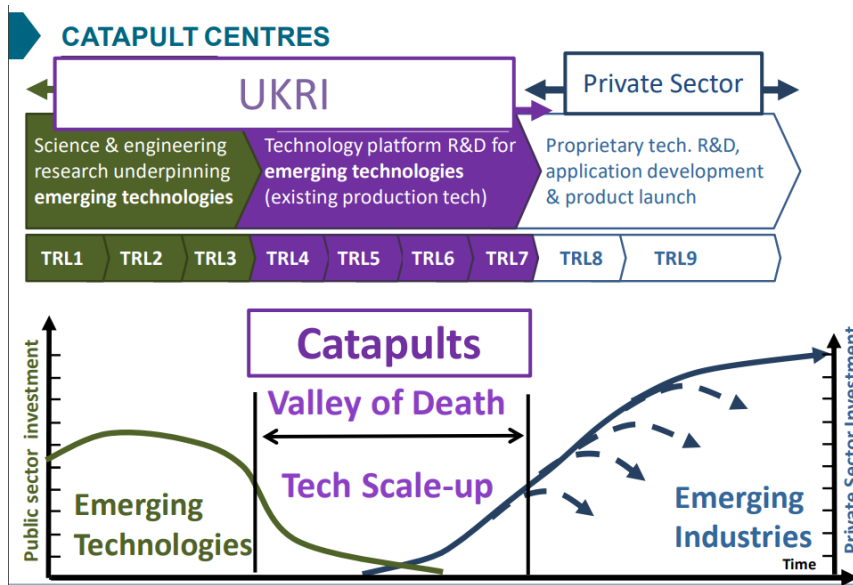- **System intelligence, international benchmarking and technology foresight**

Knowledge diffusion

Capability development for knowledge deployment and use
- **Skills & education**
- **Access to facilities & experts**
- **Advisory & incubation services**

Knowledge deployment

In contrast to a good answer, an excellent answer would be expected to refer to the Catapults (e.g. the High Value Manufacturing catapults), which have been established in the UK as RTOs to help bridging the VoD and provide specific examples of how the Catapults integrate different actors from the innovation system, their mission, key services and sources of impact.

CATAPULT CENTRES

UKRI		Private Sector
Science & engineering research underpinning **emerging technologies**	Technology platform R&D for **emerging technologies** (existing production tech)	Proprietary tech. R&D, application development & product launch

TRL1	TRL2	TRL3	TRL4	TRL5	TRL6	TRL7	TRL8	TRL9

Catapults

Valley of Death

Tech Scale-up

Public sector investment

Private Sector Investment

Emerging Technologies

Emerging Industries

Time

High-Value Manufacturing Catapult Centre
Mission and services

A national network of manufacturing innovation centres

Mission
- Catalyst for the future growth and success of UK manufacturing
- De-risk, accelerate and scale-up new concepts to commercial reality without companies incurring significant capital costs

Key Services

Equipment leasing and pilot lines	Technical advice & consultancy	Analysis & testing	Workforce training	Collaborative & contract R&D	Prototyping and demonstr.

Sources of Impact

7 centres of industrial innovation
3,036 private sector clients, of which 1,700 were SMEs
39% budget contribution from industry
1,913 engineers, technicians, and support staff employed
£1 of government funding generates £15 of net benefits to UK economy

UNIVERSITY OF CAMBRIDGE
Department of Engineering

IfM Education and Consultancy Services

MET 2B Paper 2 question

Question2 - TIM module

Year 18/19

You are the Chief Technology Officer (CTO) of a large and internationally distributed company that manufactures and sells production equipment, which is used in assembly lines across different industries. After becoming aware and concerned about some changes in market demand, you have identified what new key features need to be integrated in the products to help the company stay competitive in the era of industry 4.0.

It was decided that the next generation of products needs to be able to communicate with equipment from other manufacturers within internet-of-things (IoT) networks through the embedding of specialised software. However, your company hardly possesses any internal software development capabilities and has a low understanding of the key emerging software technologies in this field.

a) **What technology intelligence approaches can your firm use to identify available software technologies? (30%)**
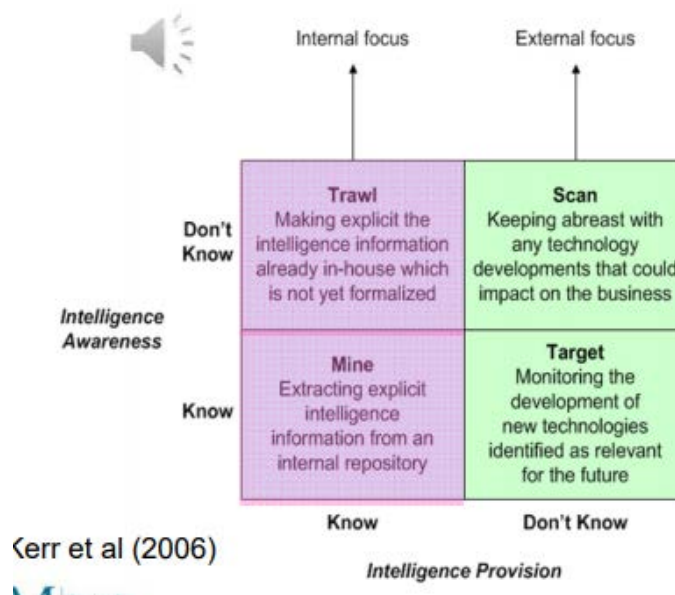
Kerr et al (2006)

Basic answers: This question asks for an explanation of the Kerr et al (2006) framework with its four approaches for technology intelligence known as trawling, scanning, mining and targeting. Students providing good answers would explain the two-dimensional framework discussing the 4 modes for searching information which a company needs to setup. They might explain the figure in terms of the modes being directed to discover known/knowns, known/unknowns etc. (distinguishing its two dimensions "intelligence awareness" and "intelligence provision"), possibly providing an illustration of the figure shown above.

Good answer: On top of the part above, the students might explain that the trawling and mining approaches have an internal focus, and remark on how much potentially the firm knows about the new technologies while the targeting and scanning strategies have an external focus (i.e. outside the firms' own boundaries). The students might venture to list some examples of sources of information which can be useful to tap into (internal and external) and the potential roles /activities (e.g. IP manager, scouts going to fairs, talking to consultants, internal conference, crowdsourcing etc) which could be contributing to building a technology intelligence system for understanding the key emerging technologies in the embedded software for IoT.

Excellent answers will be critical and will discuss the choices of TI indicated above. For instance they might

- discuss the pros and limitations of the sources of information.
- discuss the balance between modes (e.g justify how much effort for target and how they might consider scanning to keep track of any new external technology),
- discuss how, being the new technology a software, some sources of information might be better than others (e.g. scanning patents might be less useful) .
- talk about the triangulation of sources (some sources of information need to be integrated with others to be able to get the full picture).
- the difficulty in deciding the right effort/balance in technology intelligence – and mention that there is no one solution for this question (what is appropriate? They can mention it is costly and needs to be balanced to the level of threat the company is in; they can mention the internal vs external effort in TI (e.g. given that the company is large and fairly old, much knowledge could have been accumulated inside, or they might discuss the importance of building cross disciplinary teams which link the TI outcome with the roadmapping layers discussed above).

b) **As a result of the technology intelligence exercise you have identified that suitable software technologies are available from different providers. Describe the generic structure of the technology acquisition process, particularly expanding on the key issues that need to be considered when evaluating technology providers. (30%)**

Students providing basic answers would provide a description of the four stages on the technology acquisition process (point (i)), possibly supported by an illustration along what is shown in Figure 1 below. Good answers would then indicate the student understand that the question focuses on the second step of the process, providing more details on this stage.
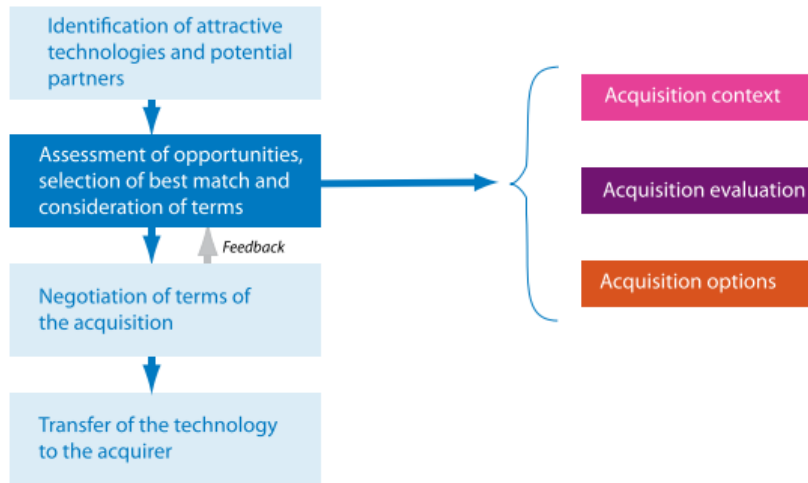
Figure 1: The technology acquisition process

Good answers would also cover point (ii), including and explanation of the fact that a technology always comes with a partner, and a review of how different providers/technology combinations can be assessed and compared to find out whether one is a good match for the firm. We would expect the students to discuss that technology acquisition involves assessing the match between (1) technological capabilities and (2) market opportunities, as well as the (3) internal capability of the firm to absorb and make good use of the technologies that other firms are developing. Students may find it helpful to use the illustration provided below to structure their arguments distinguishing between internal, technology and partner issues.
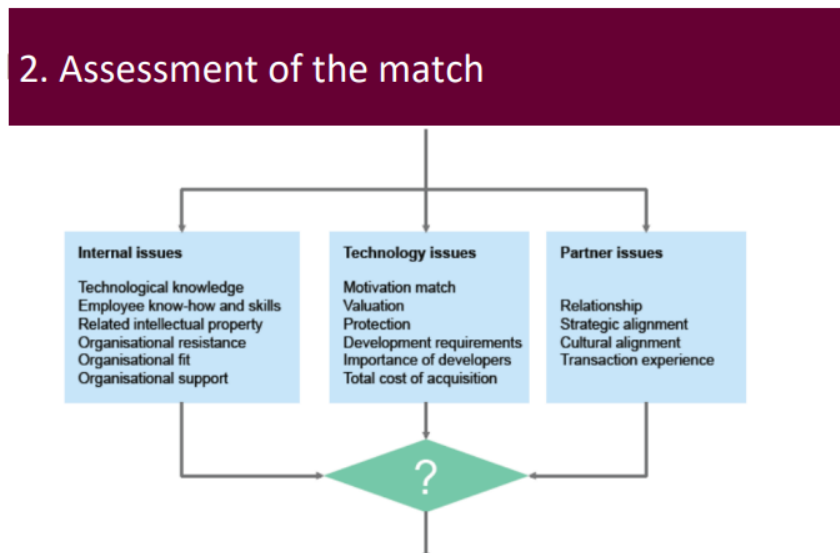
In addition, for an answer to be of excellent quality students would be expected to provide further details, reflection and discussion on the three evaluation issues. For instance, excellent answers would provide examples of questions to be included in the checklist for evaluating acquisition options. Excellent answers may also reveal that students have got to grips with the importance of (and some literature about) absorptive capacity. Excellent answers may further illustrate how the checklist questions and answers could be mapped to select the provider with the best (positive) match, possibly using examples to enrich their answer.
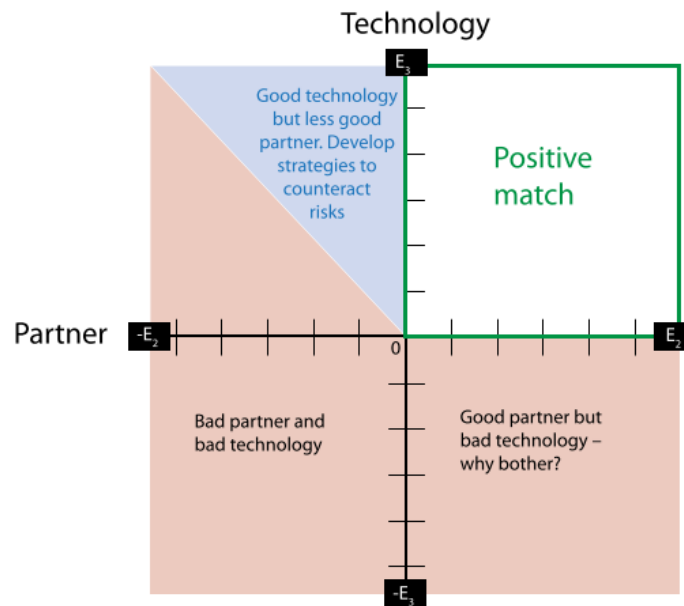
c) **The technology intelligence exercise also revealed that a young start-up is providing a suitable open source solution. Describe three IP-related risks of this acquisition option and evaluate their potential consequences for your company. (40%)**

Good answers would be expected to first explain how IP and open source software are related. Answers may reveal that students understand that different risks emerge from the collaboration with external partners and particularly from licensing terms and conditions. Good answers would then select three IP associated risks and explain them. For instance, different risks include:

- A certain risk results from being dependent on a partner, in this case a start-up with potential uncertainty if the company would survive in the long run or ownership changes might occur. In any case, while current licensing conditions seem to be open source, it should be checked if there is a risk that licensing terms and conditions may change in case of any disruptive change to the company. For instance, could a new owner of the start-up (e.g. competitor) suddenly start charging royalties?
- Another risk that students could discuss relates to the uncertainty of the specific open source license type. Certain open source licenses (e.g. GPL) require users of the technology to make their complete open source code freely available (i.e. share back with community).
- Another IP risk can result from the fact that the company will need to ensure internal compliance with the licensing conditions or the lack of competitive advantage gained from acquiring the software as it comes through a non-exclusive license so that others can use the technology as well (which might not be a problem in this case as the company would want to use a technology that is widely compatible).

While good answers would then briefly describe possible consequences for the acquiring company, excellent answers would be expected to provide a more structured evaluation of consequences using the approach discussed during the lecture that distinguishes the likelihood of a risk occurring and the consequences along the five categories (strategic, operational, compliance, financial, reputational).

Consequences: How IP risks impact organisations

- **Strategic**
  - Big ticket items that can affect an organisation's overall mission, business objectives and strategy, market acceptance, future growth and/or shareholder value
  - e.g. wrong valuation of patent portfolio for acquisition target during due diligence

- **Operational**
  - Problems and hazards that can arise in the day-to-day running of an organization
  - e.g. trade secret leakage from employees

- **Compliance**
  - Related to government regulations, laws, industry standards etc.
  - e.g. not complying with open source licensing terms before new product launch

- **Financial**
  - Negative effects on an organisation's income, profits or expenses
  - e.g. litigation costs and ultimately damage payments from infringing others' IP

- **Reputational**
  - Events that undermine public trust in an organisation and its products or services
  - e.g. large scale leak of customer data

Paper 2 - Sustainable Manufacturing

Question 3

Nucar is an innovative start-up in the automotive industry, which makes highly fuel-efficient and zero emissions small cars for local driving. Nucar was set up not to sell the cars but to sell mobility service. The company created a simple pricing structure that enables customers to pay a single monthly fee that covers everything – the car, the maintenance, the insurance and the fuel. These mobility contracts make more profit for the company whilst delivering a more fuel-efficient vehicle.

In this context:

(a) Explain the concept of a sustainable business model and provide examples of sustainable value created for the company and customers from Nucar's operations.

[60%]

(b) Explain the concept of the *Circular Economy*, illustrating your answer using examples from Nucar and other industries.

[40%]

Crib

(a) Answers should define what is meant by a sustainable business model: typically, how a company creates, delivers and captures value that is also fair and equitable for its stakeholders. Sustainable business models seek to go beyond delivering economic value and include a consideration of other forms of value for a broader range of stakeholders. A sustainable business model explicitly considers the environment and society as key stakeholders of the business. Sustainable business models are characterised by i) adopting a broader meaning of value beyond economic value, i.e. sustainable value; ii) striving for stakeholder mutuality, i.e. aligning of interests and responsible action from all stakeholders; and iii) adopting a long-term system view of the business.

In the context of sustainable business models, value is referred to as the benefits derived by stakeholders from tangible and intangible exchanges in a stakeholder network. The scope of value, whereby, includes not only economic transactions but also social and environmental aspects. Sustainable value, hence, is defined in terms of the triple bottom line whereby its three dimensions of economic, environmental and social value are pursued simultaneously. Examples along the three dimensions of value include:

- Sustainable economic value: cost savings, profit, return on investment, growth, financial resilience;

- Sustainable environmental value: reducing negative impacts, e.g. resource efficiency and pollution prevention of air, water and soil; and creating positive impacts for the environment, e.g. use of renewable resources, lowering emissions and waste levels;
- Sustainable social value: job creation, well-being, health, secure livelihoods, community development.

A good answer would provide reasonably complete descriptions of a sustainable business model and sustainable value and link the two concepts together, using one or more examples to demonstrate further understanding of the concepts.

An excellent answer would additionally make assumptions based on the case studies presented (AB Sugar, Formula E, Elvis & Kresse, Riversimple) and trends covered in the Sustainable Manufacturing module as well as general knowledge and understanding of the automotive industry. Examples of sustainable economic value from Nucar's operations could include profitability from selling the service of mobility instead of selling cars. Building a zero emissions-car is a prime example of creating sustainable environmental value. Sustainable social value can be created for the local community in the form of new local jobs.

(b) The most renowned definition of the Circular Economy has been proposed by the Ellen MacArthur Foundation (Fig. 1), introducing the Circular Economy as "an industrial economy that is restorative or regenerative by intention and design". The Circular Economy represents the move from a linear economy dominated by the sale of product, that directly rewards maximisation of resource consumption, to an economy that rewards resource conservation and restoration. The aim is to create a regenerative system, in which resource input and waste, emission and energy leakage are minimised by slowing, closing, and narrowing material and energy loops. This can be achieved through long-lasting design, maintenance, repair, reuse, remanufacturing, refurbishing and recycling.

A good answer would present a reasonably complete understanding of the Circular Economy concept using one or more examples to further illustrate the concept.

An excellent answer would additionally bring in specific examples of the application the Circular Economy principles. Such examples might include: emphasis on better management of the end of life of products, e.g. reverse logistics; service-based business models, e.g. rental of bicycles or clothes and recycling of clothes at the end of their life when they are beyond repair; upcycling of leather waste; utilising by-products and production waste through industrial symbiosis; longevity of products; developing closed-loop material flows; repair services; repurposing, recycling and remanufacturing at the end of life of the products. Specific examples of companies applying a range of Circular Economy principles discussed during the module include AB Sugar (industrial symbiosis), Elvis & Kresse (upcycling of firehoses waste and leather waste) and Riversimple (mobility service).

OUTLINE OF A CIRCULAR ECONOMY

PRINCIPLE

1

Preserve and enhance natural capital by controlling finite stocks and balancing renewable resource flows ReSOLVE levers: regenerate, virtualise, exchange
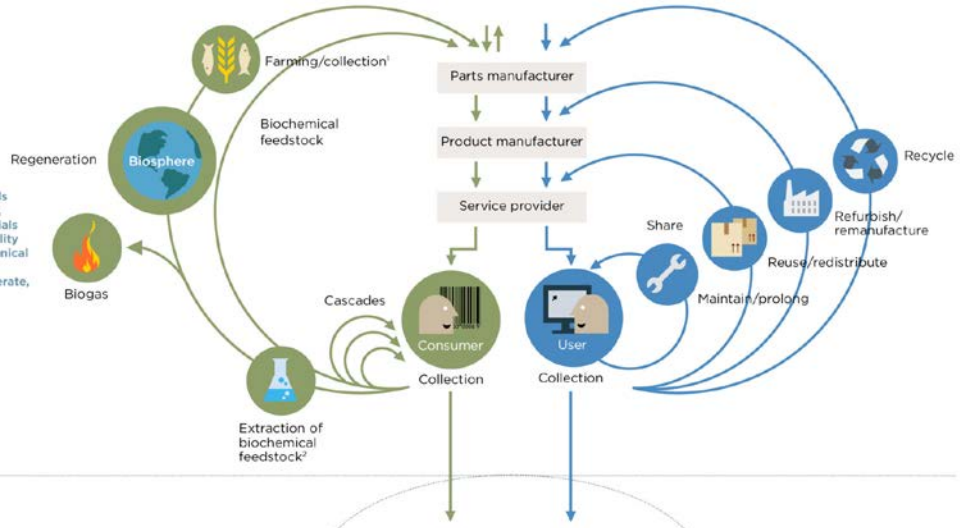
Renewables flow management

Renewables · Finite materials

Regenerate · Substitute materials · Virtualise · Restore

Stock management

PRINCIPLE

2

Optimise resource yields by circulating products, components and materials in use at the highest utility at all times in both technical and biological cycles ReSOLVE levers: regenerate, share, optimise, loop

Regeneration · Biosphere

Farming/collection[1]

Biochemical feedstock

Parts manufacturer

Product manufacturer

Service provider

Biogas

Cascades

Consumer

Collection

User

Collection

Share

Maintain/prolong

Reuse/redistribute

Refurbish/remanufacture

Recycle

Extraction of biochemical feedstock[2]

PRINCIPLE

3

Foster system effectiveness by revealing and designing out negative externalities All ReSOLVE levers

Minimise systematic leakage and negative externalities

1. Hunting and fishing
2. Can take both post-harvest and post-consumer waste as an input

Source: Ellen MacArthur Foundation, SUN, and McKinsey Center for Business and Environment; Drawing from Braungart & McDonough, Cradle to Cradle (C2C).

Figure 1 - Circular Economy

MET 2B 2018/19 Exam Question Q5 crib

Pt1

Recognise the difference between manufacturers 'pushing' their products down the channel and those companies that concentrate on developing a strong brand identity so that the consumer consciously looks for the product and 'pulls'.

However the reality is – it's a bit of both.

Smart candidates will draw the parallel with Push & Pull strategies in Production – and possibly mention KANBAN

Pt2

Important to recognize that we are looking at the difference between B2B or Trade Marketing to the 'professional' and 'rational' (!) supermarket Buyers, and B2C the Consumer or end user (individuals and families).

Consumers have different Needs and interests to Company Buyers and this is best analysed using the Marketing Mix – the 4Ps – Price, Product, Promotion & Place (grade the analysis) *(This needs expanding)*

Good candidates will also use Porter's 5-Forces – power of the supermarkets, competitiveness of the industry, strength of the Suppliers (manufacturers) and relative 'weakness' of the Consumers.

Other models such as Value Chain may be mentioned, No negative marking but getting less relevant.

Pt3

This is the battle between Brand and Own Label. The supermarkets are becoming increasingly powerful and trying to reinforce their own company brand over the famous manufacturers' Brands. Own label/brands tend to be less expensive (but are they as good?) and make more profit for the supermarket and less margin for the manufacturer.
Manufacturers have to invest to support their Brands eg marketing and promotions.
Increasingly consumers are realizing that own label is just as good as the big brands – and when times are hard (recession etc) people tend to buy the cheaper products. If you take the business you will increase production volumes but probably dilute gross margins. May become too dependent on one big customer. If you do not accept, one of your competitors probably will. If you accept will it damage your own Brand?
In today's world the reality is that any competent manufacturer with the right equipment could replicate/reproduce any product given the right formulation – eg tomato sauce, vegan soup etc It's only when you get into artisan, specialty and exclusive brands that you pull away from the mass market – and they tend to be niche and reassuringly expensive – real French bread, hand made shoes, super cars etc
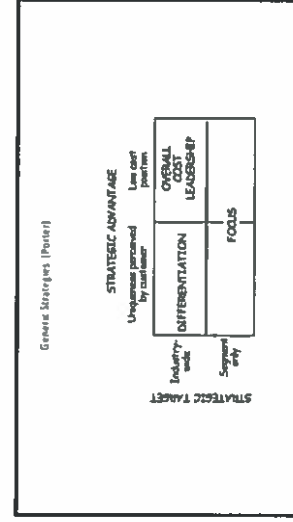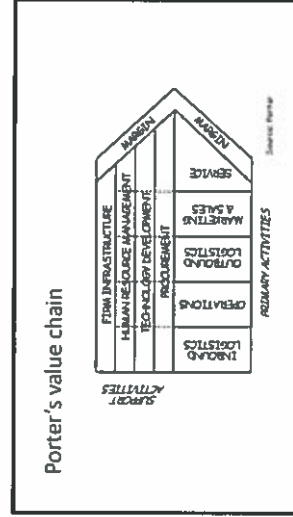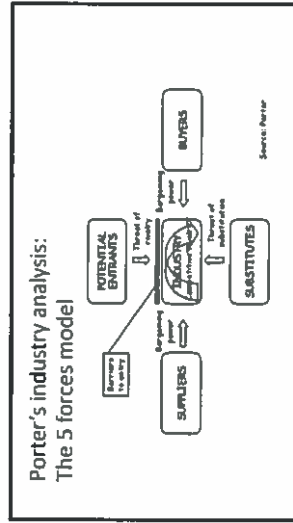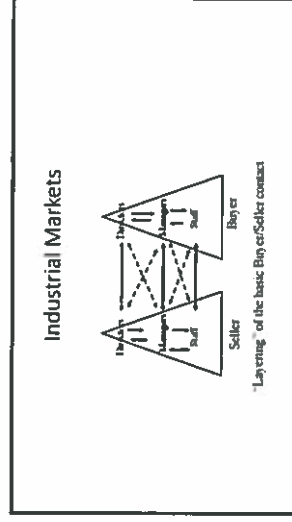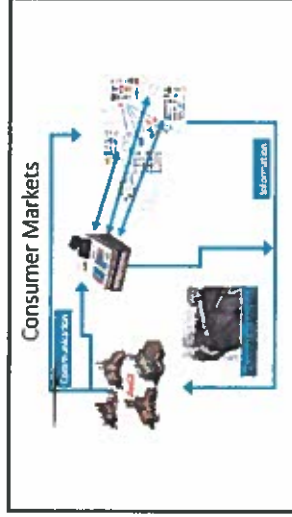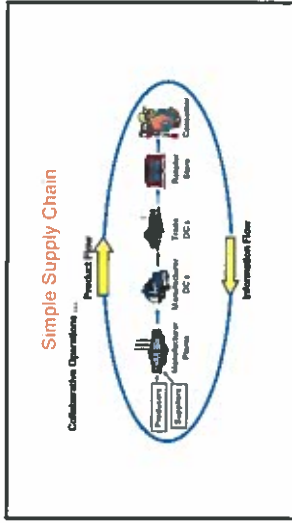
Pt4

Premium products highly differentiated. High quality, high price and margin targeted at the 'upper end' of the market. Segmentation
Porter's generic strategies – Unilever/P&G "Industry-wide" Differentiation Strategy as opposed to a 'Segment only" Focus or Niche Strategy
Unlike Unilever/P&G relatively little power in the channel (lack breadth and depth of categories and clout).
Need to identify the market segment and (again) the 4Ps
Must avoid the rivalry (and discounting) of the main supermarket industry. How to gain access to the segment? You don't sell premium products through Aldi – but you might well try Waitrose, M&S, some independents, farm shops, Delis, direct marketing etc

Industrial Markets

Buyer

Seller

"Layering" of the basic Buyer/Seller contact

Consumer Markets

Information

Simple Supply Chain

Collaborative Operations ...

Product Flow

Information Flow

Suppliers · Producers · Manufacturer Plants · Manufacturer DC's · Trade DC's · Retailer Store · Consumer

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Generic Strategies (Porter)

STRATEGIC ADVANTAGE

Uniqueness perceived by customer — Low cost position

DIFFERENTIATION | OVERALL COST LEADERSHIP

FOCUS

STRATEGIC TARGET

Industry wide / Segment only

Porter's value chain

FIRM INFRASTRUCTURE
HUMAN RESOURCE MANAGEMENT
TECHNOLOGY DEVELOPMENT
PROCUREMENT

INBOUND LOGISTICS | OPERATIONS | OUTBOUND LOGISTICS | MARKETING & SALES | SERVICE

MARGIN

SUPPORT ACTIVITIES

PRIMARY ACTIVITIES

Source: Porter

Porter's industry analysis:
The 5 forces model

POTENTIAL ENTRANTS

Threat of entry

SUPPLIERS

Bargaining power

INDUSTRY (Rivalry amongst firms)

Bargaining power

BUYERS

Threat of substitution

SUBSTITUTES

Source: Porter

Push v. Pull Strategies

PUSH

PULL

PUSH STRATEGY

Buyer

Brand 2

Brand X

Buyer

Channel Choice

Buyer

Distributor 1

If buyers choose the channel first, you need a PUSH strategy focussed on the distributor

If buyers choose the brand first, you need a PULL strategy focussed on the end user

Marketing Strategy: 4/5Ps

- The Primary Marketing Levers
- Price/Profit
- Product
- Place
- Promotion
- Collectively known as the Marketing Mix
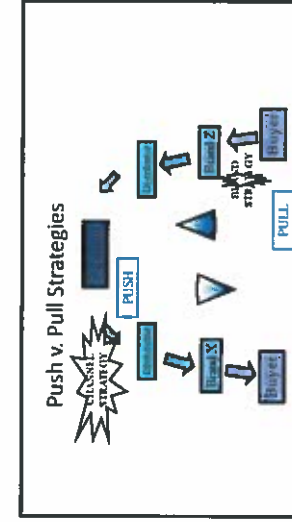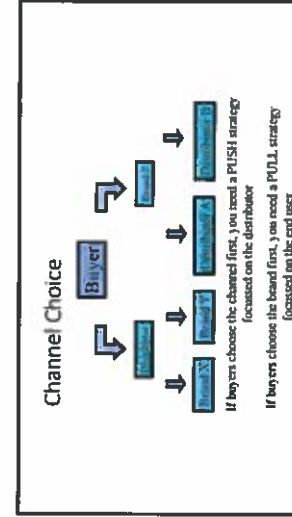
Question 4 – Paper 2

    a. Corporate strategy;
    b. Business strategy;
    c. Functional strategy;
    d. Operations strategy.

[40%]

(b) Discuss how Technology Roadmapping, can be used to support the development of the strategies listed in part (a) of this question within a large multinational corporation.
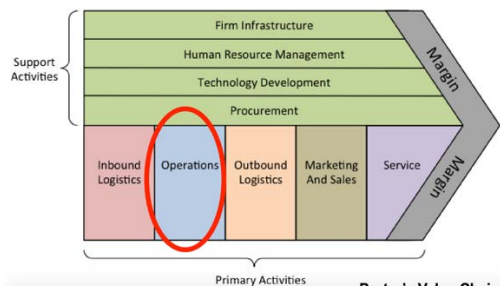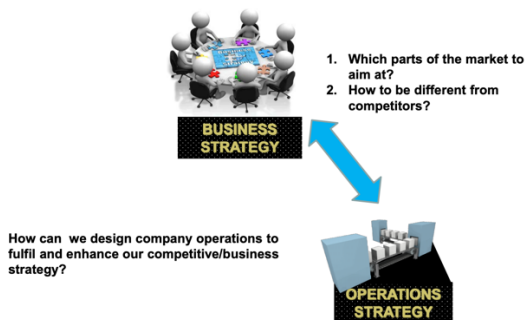
[60%}

Crib:

(a)

Basic answer would provide a mostly descriptive answers to each of (i) to (iv), drawing upon the material presented and discussed in the lectures based around the core content given below.


Stronger answers would explain the interplay between the strategies and explore, in particular, the multitude of factors that link business strategy and operations strategy. To support this discussion, students could draw in a broad range of factors from the lectures, including the process for developing a business linked operational strategy (understanding competitive priorities / competitive priorities / competitive factors and dimensions), order winning and order qualifying, performance objectives et al. All of these could be illustrated

with any of the numerous examples introduced in the module, or from elsewhere in the course or the students' own experiences.

(b)
Basic answer would describe what Technology Roadmapping is, and its role in helping firms address questions associated with attempting to manage an uncertain future (e.g. where do we want to go, where are we now, how do we get there, why do we need to act, what should we do, how can we do it?). The basic answer would cover the material discussed in class in relation to the summary figure below, and link these to the basic concepts of (i -iv) in (a) in terms of funcational and/or corporate alignment:
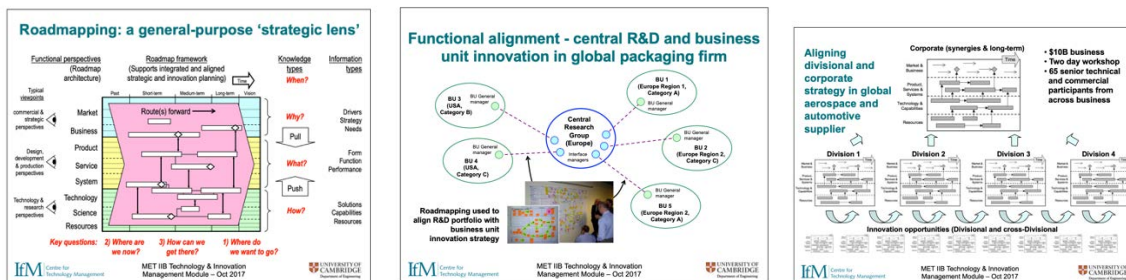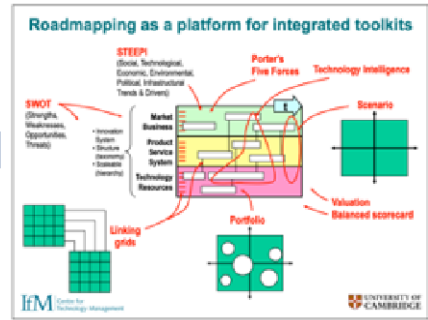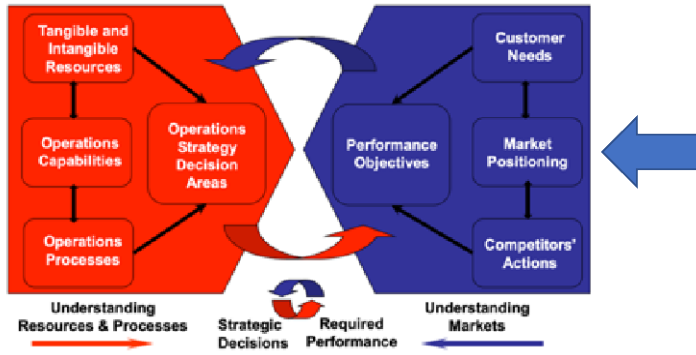

Stronger answers would unpack issues of how roadmapping can be used in different ways at different levels of strategy (i-iv) above, and emphasise how the question asks about "development and implementation" and so should discuss issues along the whole process (as shown below):
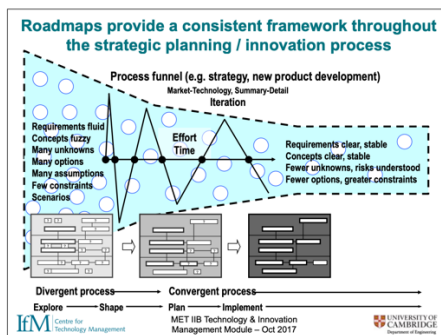
The strong answers might also make an attempt to map the broad range of tools used to support the development of roadmaps with the process of linking issues revealed by the roadmap through to operations strategy development (as shown below):

(Slack & Lewis, 2003)

Roadmapping as a platform for integrated toolkits

1

a) Describe and compare the following four procurement strategies using examples:

- Performance Based Partnership
- Competitive Bidding
- Securing Continuity of Supply
- Category Management and e-Procurement Solutions   **[40%]**

b) Many manufacturing and industrial organizations are adding services to their existing product portfolios.

i)   As part of the servitization of manufacturing, discuss the business and operational implications for organisations moving from a product-based business model to a service/solution-based business model.   **[30%]**

ii)   You have been appointed Head of Business Strategy in a large international aerospace firm producing aerospace engines. The current business strategy focuses on making and selling engines to major aircraft manufacturers. The current business model generates a conservative and steady growth for this aerospace firm's key stakeholders, but maintaining this growth is not sustainable in the longer term. Therefore, the board would like you to explore opportunities for new services based on existing products that could stimulate growth. Provide a complete analysis on how you could use the phases of *service design thinking* to propose a new service.

[30%]

MET IIB Part 2
Exam Question and Crib

1

      a) **Describe and compare the following four procurement strategies using examples:**

- **Performance Based Partnership**
- **Competitive Bidding**
- **Securing Continuity of Supply**
- **Category Management and e-Procurement Solutions**   **[40%]**

The basic answer needs to be able to describe the strategies and highlights the differences in the following ways:
     :

     Procurement strategies:

- Performance Based Partnership
  - Objective is to create mutual commitment in long-term relationship;
  - This procurement strategy is suitable for Strategic products
  - Supply risk is quite high
  - Purchasing impact on financial results is high
  - Its activity involves:
    - Accurate forecasting of future requirement
    - Supply risk analysis
    - Careful supplier selection

- Competitive Bidding
  - Objective is to obtain best deal for short term
  - This procurement strategy is suitable for Leverage products
  - Supply risk is low
  - Purchasing impact on financial results is high
  - Its activity involves:
    - Improved product/market knowledge
    - Alternative products/suppliers
    - Reallocate purchasing volumes

- Securing Continuity of Supply

- o Objectives are to secure short and long term supply and to reduce supply risk
- o This procurement strategy is suitable for Bottleneck products;
- o Supply risk is high
- o Purchasing impact on financial results low
- o Its activity involves:
    - Accurate forecasting of future requirement
    - Supply risk analysis
    - Determine ranking in supplier's client list

- Category Management and e-Procurement Solutions
    - o Objectives are to obtain best deal for short term
    - o This procurement strategy is suitable for Routine products;
    - o Supply risk is low
    - o Purchasing impact on financial results is low
    - o Its activity involves:
        - Accurate forecasting of future requirement
        - Supply risk analysis
        - Careful supplier selection

Medium answer will present product examples in the four strategies and strong answer would present and discuss the differences in structured format with discussion on balance of power between buyer and supplier along with characteristics of leverage, strategic, bottleneck and routine.

b) Many manufacturing and industrial organizations are adding services to their existing product portfolios.

    i)   **As part of the servitization of manufacturing, _critically explain_ the business and operational implications for organisations moving from a product-based business model to a service/solution-based business model.**   **[30%]**

    i.   **A basic answer should cover (50%-60% - 10-12 marks).** Students should be able to explain a number of simple operations and business activities that would entitle to move from building and selling products to services

    ii.   **A better answer should cover (61%- 70% - 13-14 marks).** The above plus one or more of the following.
- Transformation from designing/making/delivering/selling products to from designing/making/delivering/selling services
- Detail at least two to three types/levels of services. E.g. the basic, intermediate or advanced types of services or the product-based services, user-oriented services and pay-per-use services
- Give different examples and illustrate of shift to a service- from basic to advanced services by describing the operations and business implication through the discussion of the of the examples.

    iii.   **A 'best' answer should cover (71%- 100% - 15-20 marks).** The student should be able to compare and contrast the operational and business implications of a basic to intermediate to advanced level services. It is expected that the student talks about the changes on the ecosystem and business model at each level (again comparing and contrasting between levels).

ii) **Recently, you took a role as a Head of Business Strategy in a large international aerospace firm producing aerospace engines. The current business strategy focuses on making and selling engines to major airlines manufacturers. Current business model generates a conservative and steady growth for this aerospace firm's key stakeholders, but this growth is unsustainable for future. Therefore, the board would like you to explore some services based on existing product.** *Provide a complete analysis* **on how you could use the** *phases of service design thinking* **to propose a new service.** **[30%]**

i. **A basic answer should cover (50%-60% - 10-15 marks**). Students should be able to introduce a service/solution describing the five phases of design thinking – Empathise, define, ideate, prototype and test. An example of a service/solution could be the company can contact a preventive maintenance service. The service could have
   - information about the use of the asset in-use and the problems including diagnostics data.
   - Shipment of spare parts to fix an identified problem
   - Installation instructions to help fix the problem

ii. **A better answer should cover (61%- 70% - 16-22 marks**). The above plus one or more of the following:
   - This will lead to a win-win results: a) the company secures part of the sale, and b) the company recommending this service to other similar firms
   - Critically describe individual phases of the design thinking- Empathise, define, ideate, prototype and test – and give examples of how the service is moving from one phase to the next.

iii. **A 'best' answer should cover (71%- 100% - 23-30 marks**). The student should be able not only to describe the possible solution but critically analyse how these phases could be developed – *step by step for each phase of the service design thinking process*, and to link this explicitly to the challenges being faced by the firm due to the changing commercial context.