METIIB – Paper 2 Question 1 – post-exam crib

Additive Manufacturing technologies offer many advantages when compared to other manufacturing processes for certain applications. These technologies can be applied for rapid prototyping, tool manufacturing, and final part production. The rate of adoption of these technologies has recently increased, but they arguably have not yet reached their full potential because of a number of technical and non-technical challenges.

(a) You are the Chief Technology Officer in a large multinational manufacturing firm that does not currently make significant use of Additive Manufacturing technologies. You notice that recent improvements in the performance of these technologies mean that in the near future they could provide your firm with the capability to produce an entirely new, high-value product.

    (i)   Describe how you could identify some of the major changes within your organisation that would have to be implemented to enable a novel technology such as Additive Manufacturing to be deployed in your firm.

[20%]

    (ii)   Discuss how you could identify the technical and non-technical challenges related to the development of Additive Manufacturing technologies and suggest how these challenges might be overcome.

[40%]

(b) Why and how are national governments reacting to the emergence of novel production technologies such as Additive Manufacturing?

[40%]

Crib:

(a)(i)

A basic answer should cover (50%-60%, 10-12 marks):

Students should be able to describe a number of simple activities, such as talking to manufacturing personnel, thinking about equipment that needs to replaced, skills needs, etc.

A better answer should cover (60%-70%, 12-14 marks):

The above plus one or more of the following tools:
– Technology roadmapping
– ISAEP
– Foresight tools
– Change management

**A 'best' answer should cover (70%-100%, 14-20 marks):**

Comparing the introduction to the introduction of other, similar technologies or firms. Students have an example from the lectures of the labour changes involved in the introduction of computer-numerically-controlled equipment and robotics in manufacturing plants, which they could draw on.

They might also choose to use scenario planning as a method for identifying the key uncertainties related to the technology through the use of scenarios exploring how the technology might evolve.

(a)(ii)

A basic answer should cover (50%-60%, 20-24 marks):

The maturity of the technology either in Technology Readiness Levels (a), in terms of demonstrators and the focus of development attention (b), foresight (c), or technology intelligence (d – from MET IIB-7 - Technology Intelligence lecture by Letizia Mortara). Students should not be confused that while they are asked about a new manufacturing technology, the technology readiness levels apply and not confound them with manufacturing readiness levels.
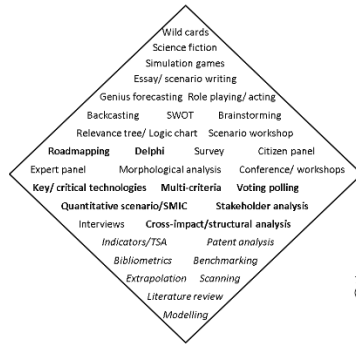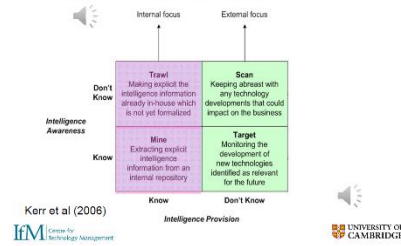

(a)

(b)

*The foresight diamond (Popper, 2008, p.71)*
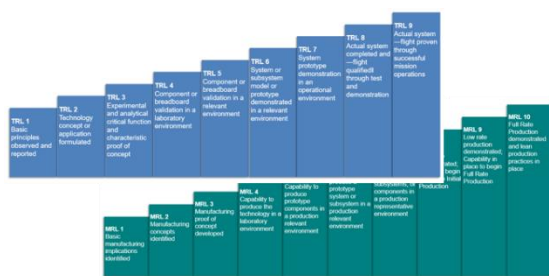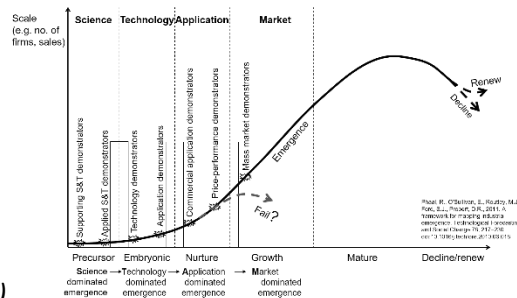
(c)

(d)

In this instance, students would cover challenges related to functioning in various environments (in line with the Technology Readiness Levels) or with the necessity for demonstrators needing to demonstrate different aspects of feasibility.

A better answer should cover (60%-75%, 25-30 marks):

Adding to the above with an exploration of one of the others (a, b, c, or d) or an exploration of the categories of technology using (e), missing parts of the value chain (f), or missing actors (g).
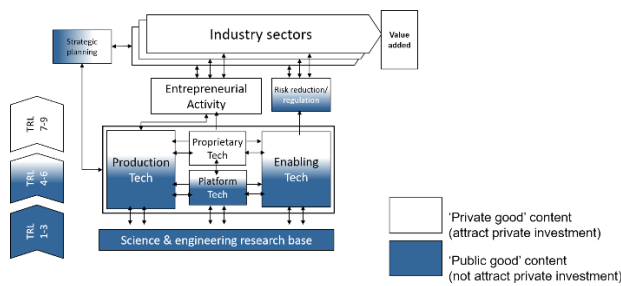
(e)

(f)
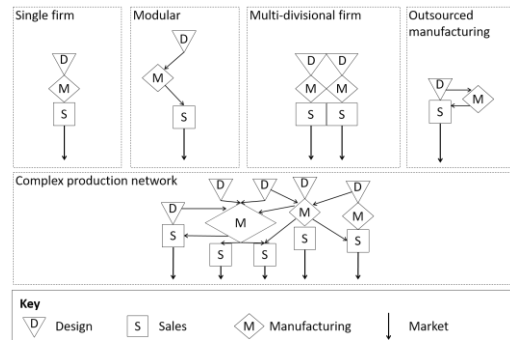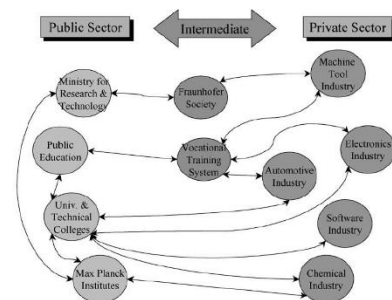
(g)

A better answer will also identify, depending on which of the frameworks are deployed, potential challenges in terms of missing enabling technologies, a lack of basic scientific knowledge, high risk, or a lack of commercialisation activities; gaps in the value chain; or gaps in innovation system actors.

The best answer should cover (75%-100%, 30-40 marks):

Combinations of two or more that reflect both technical and non-technical aspects. They should also identify the limitations of these frameworks and give some indication of where to target attention.

The best answers will begin to draw on the lectures content about the changing nature of firms and government activities and how they might be used to address the gaps.
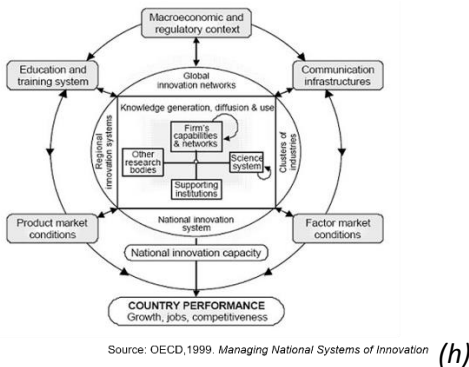
(b)

A basic answer should cover (50%-69%, 20-27 marks):

That governments are concerned with the resilience of the economy, productivity, or the creation of jobs (at least two of these). They should also describe the motivations behind some of general government activities such as apprenticeships, R&D funding, innovation tax credits, etc.

A better answer should cover (70%-85%, 20-27 marks):

All three government concerns: national income, resilience of the economy, productivity, and the creation of jobs. They should also provide some example programmes in a country and a good understanding of what these are doing and trying to achieve.

How governments might be examining their innovation systems to understand how they might ensure the varieties of technology are in place to (e), industrial sectors and the location of wealth creation (f), the configuration of actors within their country (g), the contexts and links to general actors types (h), location of value in the value chain (i) or the valley of death (j)

Source: OECD,1999. *Managing National Systems of Innovation* *(h)*

(i)
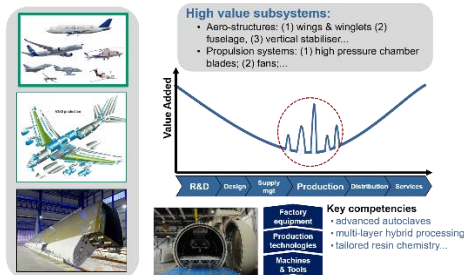
Difficulty of conceptualising the lab-to-market innovation pathway

(a)

(b)
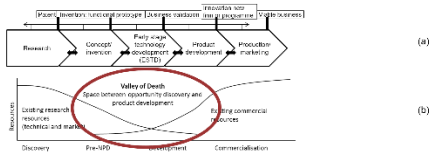
(a) Auerswald, P.E., Branscomb, L.M., 2003. Valleys of death and Darwinian seas: financing the invention to innovation transition in the United States. The Journal of Technology Transfer 28, 227–239
(b) Markham, S.K., Ward, S.J., Aiman-Smith, L., Kingon, A.I., 2010. The valley of death as context for role theory in product innovation. Journal of Product Innovation Management 27, 402–417. doi:10.1111/j.1540-5885.2010.00724

(j)

They should also be able to point to some national policies and programmes, like the UK Industrial Strategy and the Catapult programme. They may mention specific initiatives and policies such as those mentioned in, for example, (k), (l) or (m).

(k)

(l)

(m)

A 'best' answer should cover (86%-100%, 20-27 marks):

All of the above, plus programmes in more than one country. They should also demonstrate a good understanding of them. In each of these cases should discuss the limitations and biases of the frameworks applied.

METIIB Paper 2 – Q2 – post-exam crib

(a)   Compare the differences between talent management in:

    (i)   A venture capital-funded start-up company;

    (ii)   A medium-sized, family owned manufacturing firm; and

    (iii)   A large management consultancy firm.

[40%]

Basic answer

Should be able to describe basic elements of talent management (recruitment, training, performance measurement, retention, retrenchment), demonstrate awareness of what activities happen within each element and how these are likely to be differently dealt with within each context at the basic level (i.e. small and new; medium and old; big and complex)

Better answer

Should include more detailed discussion of the features of each context and the impact on talent management that these will have in general, but also how these issues will be dealt with over different stages of evolution of each business.

Best answer

Should demonstrate knowledge of the broader issues implied within each context, e.g. for (i) the influence of the VC fund managers on the process and their very specific needs to focus on value creation with an exit in mind; for (ii) the likely challenge of senior management succession planning within a family-run firm; for (iii) awareness of the impact of the very likely high rate of churn in staff and need to develop standardised processes to cope with this.

Post-exam comments

Almost all those who attempted this question could demonstrate a good awareness of the different elements of talent management – and made that knowledge clear by presenting this in a structured form, and how these differ when applied in the three different contexts.

(b)   A large, long-established European car manufacturing firm is attempting to respond to increasing customer demand for fully electrically powered and hybrid vehicles. The firm's senior management has decided to work with an external organisation to allow the firm to develop its capability to design, manufacture and sell electric vehicles to respond to this growing demand. They have identified a comparatively small Chinese developer and manufacturer of electrical power systems for automotive applications and are seeking to set up and manage a partnership with this firm.

(i) Discuss people management issues that may arise during the setting up and management of this partnership.

Basic answer

Should be able to demonstrate awareness of issues within each of the three broad elements covered in the module as shown below under <u>context</u>, <u>setting up</u>, and <u>management</u>.

<u>*Context*</u>

o *Partnerships are a relationship not a one off transaction*

o *Although they are enshrined in contract, partnerships require people to negotiate them and deliver them*

o *People are idiosyncratic, relationships between people take time to build and depend on trust*

o *Trust enables the deal to be done, and enables problems to be overcome*

o *You will have to deal with people you don't like*

<u>*Setting up - Getting into a contract:*</u>

o *Need early face to face –establish relationships*

o *Very easy to rude on calls unless you have met and "know" each other*

o *Who argues the hard points – will he/she have to manage the relationship as well?*

o *Who makes decisions?*

o *Learn about body language as well as drafting*

o *Issues of culture and humour*

o *Issues with pre-negotiation sales promises and walking away from them in a contract – lose trust*

o *People and project management*

o *Deals lost due to clashes of personalities*

o *Deals lost due to lack of trust – words not backed by contract*

o *Dealing with impasses*

o *Turning oral agreement into agreed words – trust issues*

<u>*Partnering relationship:*</u>

o *Different people – start again*

o *Different people see things differently*

o *Same people – soured relationships*

o *People are not machines*

o *People don't always do what they should do*

o *Dealing with breaches*

o *Dealing with changed relationships*

Better answer

Will demonstrate awareness of the specific issues relating to the context described and the likely impact these may have on the people management issues, e.g.

- *National culture: Small Chinese firm verses large European firm – language, business style, business context, etc.*
- *Geography: Managing over long distances – practical issues of face-to-face versus remote management, separating development from production, etc.*
- *Industry knowledge: Both are involved in automotive so may not be a problem.*
- *Scale differences: likely to present some challenges with communication and operations.*

Best answer

Will demonstrate awareness of the role of the partnership within broader strategic issues. E.g. does the larger firm just want to capture knowledge from the smaller firm to allow it to develop its own electric vehicle capabilities, or is it happy to continue to rely on an external partner as the market and technology mature? What is the long-term ambition of the smaller firm? Could they become a potential competitor on the future? Can the larger firm develop the capabilities of its own workforce via this partnership? Is the larger firm just helping a potential future competitor develop its own workforce? How will the larger firm manage the short, medium and long term issues?

(ii) Discuss the leadership challenges of implementing the organisational changes required to allow the larger firm to respond to its transforming market over the medium to long term.

[60%]

Basic answer

Should demonstrate knowledge of standard processes for change management such as Satir Model, Kotter's 8-steps, and be able apply these to this specific situation at a basic level – i.e. as an organisation implementing a specific change project in response to a single external driver.

A framework for successful change – Kotter's 8 steps

Over four decades, Dr. Kotter observed several hundred leaders and organizations as they were trying to transform or execute their strategies

He identified and extracted the success factors and combined them into a methodology
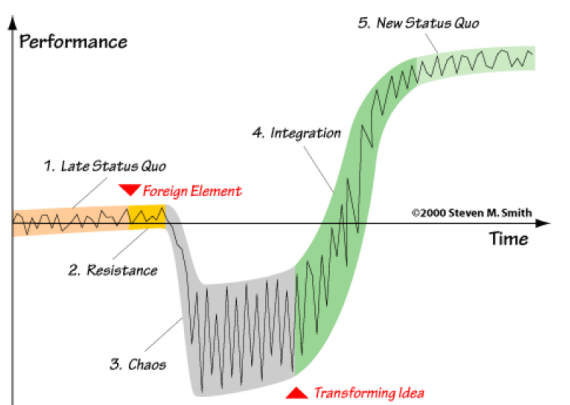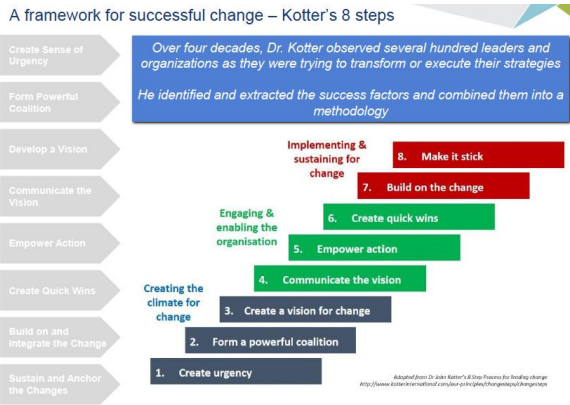
Better answer

Will be able to discuss these issues (i) not just a one-off change, but in terms of the evolving technology and industry context and (ii) in relation to the answer to part (i) of the question where this change is being implemented with an external partner, thus creating an additional level of complexity that needs to be addressed.

Best answer

Will be able to reflect upon how this single change management is made more complex by (i) broader industry and technology dynamics (perhaps referring to content from EGP module), and (ii) the proposed approach to managing change involves an external party that will itself be managing change.

Post-exam comments

This part of the question allowed more differentiation amongst the candidates as some chose to just list various frameworks and tools that could be used to deal with the partnership and change management issues without actually applying them to the specific situations. Some of the weaker answers were those that talked in very general terms about cultural differences without linking these to the process of partnership setup and management. Stronger answers were those that were able to include reflection on the nature of the changes in the automotive industry and how these could affect this particular situation.

2017 MET IIB Paper 2 Question 3

TIM module question

3 (a) Explain what is meant by open innovation and its associated practices.　　[30%]

(b) Discuss how simulations, such as the City Car game, may be useful in understanding the challenges to innovation projects, and in particular the role of collaboration.　　[40%]

(c) Discuss why some manufacturing businesses choose to innovate more openly than others, using specific examples.　　[30%]

Model answer

a) Good students will provide:

- An explanation of open innovation mentioning that organizations and particularly their innovation process has open boundaries allowing collaboration with external partners – not only firms, such as start-ups, but also universities, technical consultants, joint ventures, etc.
- Contrast the open innovation model with the closed innovation model explaining that firms in the past have often innovated internally, but this is becoming increasingly difficult due to technological complexity and other trends, such as globalization and the internet.
- May provide an illustration, such as the innovation funnel model for both the closed and open innovation approaches.
- Mention that open innovation distinguishes two types of activities: inbound (internalizing external ideas and technologies), such as in-licensing and outbound (externalization) activities, such as technology out-licensing, selling, donations.
- May reference Henry Chesbrough, who defined the concept in his 2003 book .

Excellent answers will:

- Provide a definition or attempt to specifically define open innovation.
- Introduce and describe the three OI approaches, possibly provide illustrations and examples for each approach (see below).
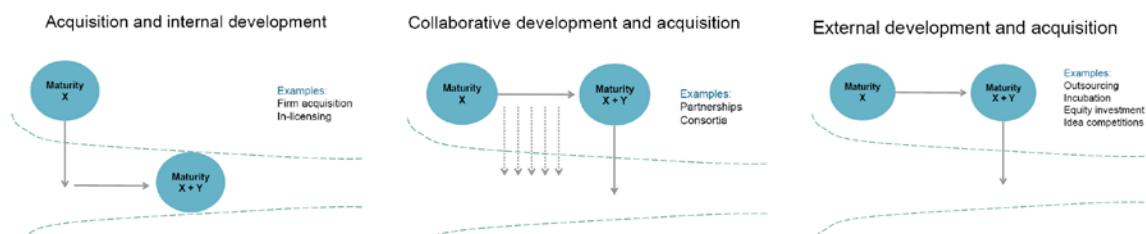
- Provide specific examples of open innovation strategies, e.g. in- and out-licensing
- May critically reflect on the concept mentioning some problems associated with open innovation, such as the different company cultures between large and small firms and how these can be overcome.
- Discuss companies, such as Qualcomm that employ licensing business models and non practicing entities - NPE (e.g. patent trolls)
- May discuss that also in the past firms have innovated openly before the concept was named as such.

b) A challenge for this question was for students to abstract from the city car game they have attended or other similar experiences during the MET course and present their arguments in a sensible structure to avoid the answer being merely descriptive of the different game elements, nor speculative about possible advantages of simulations. Good answers thus presented a framework upfront to structure their answer. Good answers also use examples of real world cases to illustrate how simulations can help.

Good student answers discuss the difference between experiencing a certain situation (e.g. innovation project) in comparison to a lecture and the benefits from a simulation of a real life situation (e.g. possibility to experience a difficult situation in a no-risk environment). It was hardly sufficient to obtain a good mark if the different elements of the city car game are only described and linked to the elements of innovation processes.

When answering this question, excellent students would have concluded that the game rather resembles a closed than an open innovation model. While students collaborate internally, within their teams during the game facing different communication and coordination challenges the game hardly emphasizes collaboration between teams, i.e. external collaboration (open innovation).

Excellent students will further provide a more detailed account and line of argument, for instance, explaining how a simulation model may look like that also resembles external collaborative activities. Excellent answers will also conclude their argument by summarizing their main points.

c) This question requires students to show they have understood that open innovation is not a dichotomous concept (open vs. closed), but rather needs to be interpreted as a continuum ranging from closed to open (degree of openness).

Good answers will find that different firms operate in different environments and different industry life cycle stages wherefore they may choose to open or close their innovation processes. It is not sufficient to state factors, such as size or industry and claim these are important ones, without however providing evidence or referring to a framework. Instead, good answers at least refer to different types of firms, such as the two-by-two matrix for firm types presented in the lecture with the two dimensions technology intensive vs. contingent and small vs. large (see below).

Different types of technology-based firm

	Technology intensive	Technology contingent
Small	Specialist Hi-tech University spin-offs Corporate spin-offs Science park based	Most numerous class Regional companies No R&D
Large	Leading innovators Global competitors R&D intensive Multinationals e.g. pharmaceuticals, electronics	Incremental innovators Mature markets Low R&D/Use suppliers e.g. large commodity manufacturers, food, agriculture

Instead of just providing a list of factors that potentially impact the choice of openness, excellent answers may bettwer structure their answers, e.g. refer to the five management challenges in open innovation as introduced in the lecture and choose these as a framework to discuss why firms employ open innovation to a different degree (see below).

There are (at least) **five management challenges** for open innovation

1. Organisational culture
2. Skills
3. Metrics
4. Intellectual property
5. 'Asymmetric' partnerships

Another approach for an excellent answer would be to start with providing examples from both ends of the spectrum, e.g. very open (e.g. TESLA) and very closed (e.g. defence companies) example. Such answers then discuss and compare other cases that sit somewhere between the two extremes and highlight specific aspects of openness. Excellent answer may also provide examples of companies that use both open and closed strategies at the same time, i.e. close against certain actors, but free licensing to others.

Notes from the examiner's report:

This question refers to one of the core concepts discussed in the TIM module, i.e. open innovation. Overall, students performed very well in answering the question, even though the question was only attempted by 15 students. Part a) of the question was mainly descriptive asking students to explain the concept. By far most students answered this part of the question very well. Part b) asked students to reflect on teaching techniques, such as the role play game used within the TIM module for gaining an in-depth understanding of open innovation. Given the nature of this question most students still performed very well. In the final part of the question students had to demonstrate they have understand that firms do not innovation either in an open or closed manner, but rather that this is a spectrum ranging from open to closed and discuss reasons for manufacturing firms to be more open or closed. This part of the question appeared to be the most difficult one, with only few students providing very strong answers.

MET IIB Paper 2 2017 Question 4

Question 4

The first two sections of this question are closely related to material presented in the module, and Companies A and B are broadly based on the Riversimple and Vitsœ case studies respectively. The third part of the question requires some interpretation by the student of material presented in the module.

a) Basic answers will describe a sustainable business model as one that creates, delivers and captures economic value while maintaining or regenerating economic, natural and social resources beyond its organisational boundaries. Principles that place sustainability at the core of the business, and define a sustainable business model include:
- Re-thinking the purpose of the business.
- Adopting a broader meaning of value to integrate economic, environmental and social value.
- Considering a broader set of stakeholders beyond shareholders, customers and suppliers.
- Including Natural Environment and Society as stakeholders of the firm.
- Aligning interests and encouraging responsible actions from all stakeholders.
- Adopting a long-term and systems view of the business.

Good answers will interpret and relate these principles to Company A and Company B respectively, and propose company-specific principles. In both cases, the sustainable business models would deviate from the traditional car-manufacturing and furniture-making models.

In the case of Company A, this might include rethinking the purpose of the business to pursue the elimination of the environmental impact of personal transport; open source design of the vehicle; retaining ownership of the cars and selling mobility as a service where the service includes the car and all associated running costs, including fuel.

In the case of Company B, this might include rethinking the purpose of the business to allow more people to live with less, that lasts longer; encouraging more customers to buy less; encouraging reuse of furniture and modular upgrade over time; considering repair, reuse, exchange, leasing and re-manufacture of furniture.

b) Basic answers will describe sustainable value as the integration of economic, environmental and social value into the business model, and identify generic forms of sustainable value such as:
- Sustainable economic value **-** profit, growth, return on investment, financial resilience, long-term viability and stability.
- Sustainable environmental value - use of renewable resources, low emissions and low waste levels within the ability of the environment to metabolise safely, pollution prevention (air, water, land), protection of bio-diversity, positive benefits to the environment.
- Sustainable social value **-** secure and meaningful livelihoods, fair labour standards and practices, well-being, health, community development, poverty alleviation, social justice, equality, diversity.

Good answers will interpret and relate these forms of value to Company A and Company B respectively, and identify company-specific forms of sustainable value.

In the case of Company A, this might include seeking long-term financial resilience; building a lightweight zero emissions vehicle; open source design; creating local jobs.

In the case of Company B, this might include prioritising long-term viability and stability over short-term growth; a new eco-building to reduce energy use and emissions; reusing all packaging; trust between company and customers; secure livelihoods of employees.

Good answers will also apply the concepts of value captured and value uncaptured (missed/destroyed/surplus/absence) to categorise different forms of sustainable value for the various stakeholders of company A and company B.

c)   Good answers will highlight innovations in the proposed sustainable business in comparison to the traditional business models of a car manufacturer and a furniture manufacturer. The answer to this question would build upon and reflect on the analysis performed in the previous two answers, as well as draw upon wider material from the module.

In the case of Company A, novel characteristics that highlight the differences to the traditional mainstream car manufacturing business model might include elements such as selling service rather than selling the car; a custodian company governance model; and raising financial capital through crowdfunding.

In the case of Company B, novel characteristics that highlight the differences to the traditional mainstream furniture manufacturing business model might include elements such as avoiding built-in obsolescence in the products; building long lasting relationships with customers by under-selling to them; employee ownership of the company; selling quietly with no marketing campaigns; and raising investment from long-term customers.

In part (a) of the question, some differentiation in the answers was found, as candidates chose to apply various sustainability concepts to discuss the business models of company A and company B. Some of the weaker answers adopted the broad definition of 'sustainable development' to define sustainable business models. Other weaker answers adopted the 'triple bottom line', which is another broad definition of sustainability, to define sustainable business models. Stronger answers went into more depth and applied concrete principles of sustainable business models to the case studies, and performed a more thorough analysis.

In part (b), candidates demonstrated good awareness of the various forms of economic, social and environmental value that constitute sustainable value, and this question was answered by almost all those who attempted it. Weaker answers suggested generic forms of sustainable value for each company. Stronger answers related the concept of sustainable value directly to each case, and some also applied the Cambridge Value Mapping Tool as a lens of analysis to identify value captured and value uncaptured (missed/destroyed/surplus/absence) for the various stakeholders of company A and company B.

Part (c) of the question also allowed for some differentiation among candidates. Weaker answers listed a few basic differences to the traditional business models of car and furniture manufacturers. Stronger answers provided a coherent reflection on new business models in the two industries.

Answer

(a) A pattern of decisions, both structural and infrastructural, which determine the capability of a business and specify how it will operate to meet the manufacturing objectives which have been derived from the business objectives.

The decision areas are in the structural and infrastructural categories, and as given by Hayes and Wheelwright are:

Structural

Facilities	-	size, location, specialisation
Capacity	-	amount, timing, type
Span of Process	-	vertical integration, make or buy
Process	-	the transformation processes and the way in which they are organised

Infrastructural

Control Policies	-	production/inventory control, decision making
Human Resources	-	recruiting, training, motivating
Quality	-	defect prevention, monitoring, intervention
Suppliers	-	sourcing policies, supplier relationships
New Product Introduction	-	how to manage all the above when introducing new products
Performance Measurement	-	how to measure the above

Weak answers gave an approximate version of the definition (covered in lectures), and an incomplete list and explanation of the decision areas. Better/good answers were fuller and more accurate, and excellent answers expanded on the concept of 'fit' and other implications of strategy formulation.

(b) A good discussion covered the role of performance measurement in manufacturing strategy (see above), in driving behaviour (you get what you measure), and the means to link measures to strategy.

A key aspect in a manufacturing business is the fit between the choices made in the decision areas, and the competitive criteria (cost quality, delivery, flexibility and product features). Thus the matching of market requirements and manufacturing performance is very important, and should drive the choice of appropriate measures. Better answers also explored the means to set up effective measures (and measurement systems), such as use of success mapping and the measures design template.

Giving good examples of three possible measures for the proposed sectors, requires consideration of the competitive priorities in each sector, and some rational speculation as to the firm's objectives. Good answers were thoughtful (ie giving evidence of the rationale) rather than prescriptive about this choice, and could make reference to the need for balance in measures, as exemplified by techniques such as the balanced scorecard.

Possible answers could include the following suggestions:

Passenger airliners: Delivery to schedule, cost and quality (safe operation) are all key requirements, and measures should focus on these aspects of the manufacturing operation. Good students could reason further as to what this could mean for factory operations.

Fresh (short date life) food: Flexible (responsive to demand) capacity, quality (hygiene, food safety) and cost (efficient operations) are all requirements in a competitive sector with low barriers to entry. The sector is generally characterised by labour intensive processes, and measures which relate to operator performance and motivation could be expected.

Steel making: In this sector international competition is very severe, and cost and efficiency (yield, energy usage) are paramount factors. Labour costs are a small part of the overall cost, so measures will be geared to asset utilisation and yield. At the same time, operator safety is critical (inherently dangerous operations) and accident monitoring and reporting will be prominent.

A common mis-alignment of answers, compared to the question, was to address performance measurement in the context of operations strategy, rather than manufacturing strategy (similar, but not the same).

(c) Increasing data availability opens up new opportunities and challenges for firms. A basic answer defined big data in terms of the 3 (or possibly 4) V's:

- Increasing **<u>volume</u>** of data – with greater digitalisation and increasing use of connected devices the volume of data available is growing. A common quote is that 80% of the data that exists today was created in the last two years.

- Increasing **variety** of data – the sources of data available to organisations are increasing significantly. In addition to operational and transactional data, firms are able to access data from social media (Twitter and Facebook) to develop insights into customer services.

- Increasing **velocity** of data – the speed at which data is made available increases as the number of connected devices grows.

- Some commentators mention a fourth V – **veracity** – questioning the underlying quality or validity of the data generated.

In addition to commenting on the 4V's, some students explained how increasing availability of data makes it easier to measure a wider range of things – both operational measures as well as new ways of generating customer insight.

More complete answers explored the challenges of big data. In particular they commented on the phenomenon of "drowning in data" – with firms struggling to make sense of the data they have access to. Some also commented on ethical and social issues associated with increasingly connected datasets – in particular when data sets are connected and therefore reveal deep personal and individual insights.

The best answers explored the multiple roles of measurement, recognising the distinction between measurement as a control system and measurement as a learning system. Students could comment on Chris Argyris' concept of single versus double loop learning. Single loop learning is a classic control loop – targets are set, progress is monitored and corrective action is taken if the target is likely to be missed. In double loop learning the "system" will challenge the target itself, asking whether it is valid. Big data offers opportunities to use measurement as a learning system and therefore to explore relationships between different dimensions of performance, thus challenging managers assumptions.

2017 MET IIB Paper 1 Question 6

Question combining TIM and Strategy and Marketing modules

6 (a) Explain the three concepts:

   (i)   strategy;
   (ii) technology strategy;
   (iii) marketing strategy.   [30%]

(b) Explain the concept of "strategic alignment" in the context of manufacturing businesses and discuss why this might be difficult to achieve in practice.   [30%]

(c) Summarize the principles of strategic roadmapping as a management tool and discuss how a manufacturing business may implement roadmapping to help align its technology and marketing strategies.   [40%]

Model answer

a) Excellent students refer to theories in their answers, such as Penrose theory of the firm and demonstrate they have understood the concepts using examples to substantiate their explanations.

i) Strategy

Good students may provide a definition and then explain the strategy concept referring to the five Ps for strategy by Mintzberg (Plan, Ploy, Pattern, Position, Perspective). Answers from good students will show the students have understood that strategies have a typical time horizon of 3-5 years, in contrast to operational tactics (e.g. production planning) with a shorter time horizon and normative long term plans (e.g. corporate policies) with an even longer time horizon.
Good answers will also discuss two strategy types or rather extremes (deliberate strategy vs emergent strategy) with the real strategy somewhere between these; maybe even providing an illustration. Excellent students will further distinguish different levels of strategy, such as corporate, business unit and function strategies, where technology and marketing strategies should be considered as functional strategies.

ii) Technology strategy

Good students will explain that a technology strategy focuses on the planning of future technology generations to enable product and service innovations, possibly linking to the ISAEP framework, shortly explaining each of the ISAEP elements. Good answer will also discuss some factors influencing the choice of a technology strategy, e.g. technology intensive vs contingent company, with examples. Good answers may mention and discuss different technology types and their role in the technology strategy, e.g. disruptive vs sustaining or base, key, pacing, emerging.

Excellent answers discuss firms' considerations for make or buy decisions, i.e. the extent to which a technology strategy is open vs. closed. Excellent answers also mentioned different tools for developing a technology strategy, such as roadmapping.

iii) Marketing strategy

Good answers will discuss that a marketing strategy focused on how the marketing departments can support the product / service and technology roadmaps with long term marketing activities. A framework to be discussed would be the 7P (product, price, place, promotion, people, process, physical evidence). Excellent answers may provide more depth in discussion, e.g. discussing the importance of brand management within the context or a marketing strategy.

b) Good answers are well structured and preferably begin with an explanation of the strategic fit concept. An explanation may refer to the different types of strategies within a firm, such as corporate, business (unit) and function levels, and the degree to which they are aligned in order to achieve common goals often dictated by the highest strategies (e.g. corporate

strategy). All strategies should complement each other. Please note, even in manufacturing companies it is not the manufacturing strategy that drives what a manufacturing company does. The concept of strategic alignment is rather generic and encompassing, wherefore it is considered insufficient to only narrow the answer to a few selected strategies, such as those discussed in part a) of this question. Students may then explain that roadmaps can be integrated and linked together in a hierarchical way that enables coordination across different organizational levels and thus alignment of strategies at different levels (vertically) and/or functions (horizontally). Good answers may provide specific examples illustrating how selected strategies, e.g. marketing and innovation strategies can be aligned. The questions was focused on internal strategy alignment, but one may also discuss the concept of strategic alignment for aligning multiple partners' strategies, e.g. in joint ventures, innovation cooperation projects.

Good answers will then continue with a discussion of a few problems of strategic alignment. These may include, but are not restricted to different targets of different units, communication, flexibility, organizational structure, culture and people, ambition and scope and performance measures. The discussion of problems should be substantiated by examples, such as Riversimple, the VW Beatle.

Excellent answers will clearly demonstrate that the students have understood the distinction between alignment on the strategic level vs the organizational implementation of alignment, e.g. processes and routines. Excellent answers may discuss the dynamics of strategy, e.g. industry evolution and the consequences for different strategies. Excellent answers may also refer to theoretical concepts explicitly, possibly even referencing these, e.g. resource based view, and use contradicting theoretical views to discuss the related challenges. When discussing specific challenges in detail, excellent answer may not only provide examples, but may discuss possible solutions, i.e. tools for aligning strategies.

Please note, the question did not ask to explain how a strategy can be developed!

c) Please note: The answer was about strategic roadmapping and not about technology roadmapping (TRM), which is the broader view as emphasized during the lecture. Also note, roadmapping is not a particular framework for the innovation process only.

Good answers will first explain the generic nature of roadmapping as strategy planning tool which can be used across different organizational levels. Good answers may then explain the generic roadmapping framework providing an illustration, explaining the purposes (e.g. strategic alignment, communication) and the process for developing roadmaps asking the three key questions: Where do we want to go? Where are we? How do we get there? Answers may also discuss how roadmapping integrates technology push and pull perspectives. It is insufficient to discuss that roadmapping is a workshop activity where all stakeholders get together and use post-it notes, wall charts and a lot of paper.

Good answers may further find that it is not important that all senior managers of the company are involved in developing technology and marketing roadmaps, but rather the relevant decision makers responsible for both functions. They may also discuss that roadmapping can integrate different other types of analyses, such as SWOT, STEEPL, scenario analysis or technology intelligence. Good answers may also suggest that the

roadmapping process might be an important activity to foster communication between different functions.

Excellent students will find that the question asks about the alignment of two functional strategies, i.e. manufacturing and marketing and discuss that those need to be aligned with the corporate strategy, which needs to be considered in the implementation process. Excellent students will furthermore critically reflect on the difficulties when using roadmapping, such as keeping roadmaps alive and updating it continuously.

Notes from examiner's report:

This question combined elements from the TIM and Strategy and Marketing modules. Overall, students attempting to answer this question did very well, with some few students outperforming with particularly strong answers. Part a) was a largely descriptive question of three different strategy types. Most of the students demonstrated a thorough understanding of these strategy types. Part b) was of explanatory nature. Students had to explain the concept of "strategic alignment", which again most did very well, while few answers were really strong. The final Part c) of the question referred to a specific tool to support manufacturing firms with achieving strategic alignment, i.e. the concept questioned in the previous part. Again, most answers were to the point, unfortunately few answers showed that the students were able to abstract on a higher level (e.g. discuss that the tool can be used not only for the two strategies as part of the answer, but also to align other functional and higher level strategies).