Cambridge International AS Level

Cambridge Assessment International Education
Cambridge International Advanced Subsidiary Level

GLOBAL PERSPECTIVES **8030/03/PRE**

Paper 3 Presentation **October/November 2019**

PRE-RELEASE MATERIAL

To be given to candidates

READ THESE INSTRUCTIONS FIRST

Guidance for Teachers

This Resource Booklet contains stimulus material to be used by candidates preparing their presentation for 8030/03. One copy should be given to each candidate.

Presentations must be prepared in a four-week period.

The Presentation is marked out of 30.

Instructions to Candidates

- You should use the enclosed stimulus material to help you identify the subject for your presentation.
- Your presentation should attempt to answer a question.
- Your presentation must address alternative perspectives on the question you select and must engage directly with an issue, an assumption, evidence and/or a line of reasoning in one or more of the documents within this Booklet (i.e. you should not just pick an individual word or phrase which is not central to the reasoning of or the issues covered by the documents).
- Include in your presentation an explanation of how it relates to these pre-release materials.
- Your presentation should be designed for a non-specialist audience.
- Originality in interpretation is welcomed.
- Your presentation may be prepared in a variety of formats (e.g. PowerPoint, Weblog or web pages) and should normally include an oral commentary.
- The speaking or running time of your presentation should be a maximum of 10 minutes.
- Whether presented or not, the submission must include a verbatim transcript of the presentation.

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Document 1

'Food of the future? It's already here'

Adapted from an article by Sharnee Rawson in *The Age*, an Australian newspaper, May 2017.

Spanish company Natural Machines predicts its Foodini 3D food printer will become as common as the microwave oven within the decade.

Currently pitched to the Michelin-starred restaurant market, for $US4000 ($5400), the machine takes raw or prepared ingredients via capsules and prints them in different forms.

While the results – crisp garnishes in fancy patterns, pizza dough printed into a pizza base – haven't made a strong case for home cooks to take up the technology, the company sees home cooks making their own crackers, pretzels and pasta.

But Dr Angeline Achariya, CEO of the Food Innovation Centre at Monash University, sees beyond home-made Jatz, and believes the technology will answer a range of social problems. The only barrier? Our willingness to take it up.

In Australia, farmers are forced to trash up to 40 per cent of crops as supermarkets have incredibly specific standards for products, as revealed by Craig Reucassel's *War on Waste* documentary. Machines like the Foodini could step in and solve this, Achariya says.

"Look at how much food we waste, the products that supermarkets reject because they're not perfect enough," she says.

"So you could actually take those bananas and add an emulsifier or binder, just like so many other products have, and turn it into a sellable product. Or reuse home leftovers."

Think of 3D printers as piping bags on steroids, with pipes hot enough to melt chocolate or cook pastry, using three dimensional blueprints to build the food into layers and shapes. So hypothetically, a mushy banana, with a binding agent added, could be printed into banana biscuits or snack bars.

"Worldwide, we have to look at how we will be able to feed 9 billion people soon," Achariya says. "There are parts of the world that can't eat, and then parts that waste up to 40 per cent of their food. The technology to change that is here, and households can have a huge impact around how they manage waste."

The Meat and Livestock Association is also looking into 3D printing as a way to reduce waste, retexturising offcuts into more appealing products that go beyond sausages and burger patties. Building the food into thin layers results in a softer texture, eliminating toughness, connective tissue or gristle, but retaining nutrients and flavour.

Sufferers of dysphagia, a swallowing disorder that affects 8 per cent of the population, are often advised to avoid food with coarse or dry textures, and the elderly may also benefit. "Many people lose the ability to chew properly as they age or get dentures, and they are forced to go back to purees and soft foods, like what we ate as babies," Achariya says.

"Imagine 3D printing a carrot so that it still looks like a carrot, but when you bite into it, it's softer. It gives people dignity, and I certainly don't want to eat baby food as I age."

Document 2

'3D printing: another dimension'

Adapted from an article by Kwadwo Sarkodie in *Building*, a UK magazine, May 2017.

The author was a partner in the construction group at Mayer Brown.

3D printing is set to play an ever more important role in the construction process but, with this new technology, new legal safeguards will be needed.

3D printing (among other additive manufacturing techniques) has been around for years. However recent developments mean that the application of such technology to larger-scale projects is becoming, from both a technical and an economic standpoint, increasingly viable.

As such, 3D printing – the numerous techniques whereby specialist hardware (the "printer") fed with the appropriate materials constructs an object following a three-dimensional computer aided design (CAD) file – may now be set to make a major impact on the construction industry. Progress is gradual but unmistakable, with projects becoming ever more ambitious: a five-storey apartment block in China; a steel canal bridge in Amsterdam; and now a skyscraper under construction in the UAE. The European Space Agency has even suggested plans to harness 3D printing and local materials to construct a lunar base. As technologies continue to develop, and costs fall, it is difficult to envisage a future in which 3D printing does not play a significant role in the construction industry.

The application of 3D printing to construction brings the clear potential for multiple benefits, including increased construction speed, significant reductions in the quantities of raw materials, and the increased ease with which components and structures can be swiftly and precisely replicated. Equally significant is the prospect of the alteration and reduction of the range of trades, and number of workers, involved in the construction of a 3D printed building. This factor may grow in importance, and indeed speed the adoption of 3D printing techniques, if speculation over a looming skills crisis in the shadow of Brexit proves correct.

New skills and trades will also need to be brought to bear on the construction site, and training will have to keep pace. Further still, there is the potential to significantly reduce the environmental impact of construction, with cuts to waste and the ability to achieve the efficiencies and precision of off-site fabrication without the associated transport costs and carbon impact.

As such, the potential of 3D printing as a disruptive, and indeed transformative, technology in the construction industry can clearly be seen. As always, however, with the advent of new technology comes fresh legal issues and considerations. Contractual relationships and frameworks will need to evolve and develop to accommodate the growing incorporation of 3D printing in the construction process. Files which could allow for the construction of the entirety of a building could be readily shared and copied.

Design responsibility is an area expected to require particular focus, with the dividing line between defects of design and workmanship, and the consequent allocation of responsibilities, set to become ever more blurred. It is likely to be prudent to ensure that a single consultant, who would need to be fully abreast of both the design itself and the relevant software and technology, assume an overall co-ordinating role.

Closely related are considerations with regard to insurance, which professionals, brokers and insurers would need to review carefully – cover provided under existing policies may simply not be sufficient. Product liability cover may well be appropriate, not only in relation to the 3D printed building (which might perhaps be considered more closely akin to a manufactured "product"), but also in relation to the CAD file bearing the design, which may potentially be considered a product itself.

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Finally, the protection of intellectual property will require careful consideration. The CAD files which could allow for the construction of substantial elements, or indeed the entirety, of a building could be readily shared and copied (potentially instantaneously and across multiple jurisdictions). Owners of the relevant intellectual property will need to take steps to protect their rights.

3D printing certainly presents exciting possibilities for the construction industry. To benefit fully, the industry will need to meet not just the technological, but also the legal challenges. Fresh thinking and perspectives will be needed, with careful management and allocation of the risks which arise, as construction law enters a new dimension.

Document 3

'Digital economy threatens jobs, warns union'

Adapted from an article in *Irish Examiner*, an Irish newspaper, 31 May 2017.

The Irish Congress of Trade Unions (ICTU) has raised significant concerns that many people could be left behind as Ireland embraces 21st-century advances. David Joyce, ICTU Equality Officer, points out that, while the number of devices connected to the internet is expected to reach more than 20bn by 2020, some 50% of the world's population still has no access to what we call the "worldwide web".

So unless there is massive and rapid investment in connecting those 50%, we are likely to see a huge increase in inequality between the digital haves and have-nots, with dramatic economic and social consequences. Advances in robotics, nano and bio-technology, machine learning and 3D printing can deliver enormous benefits to society. At the same time, these advances will have profound consequences for existing jobs and people at work today. Some estimate that up to 60% of existing work could be partially automated over time, with up to 10% of jobs lost completely.

Joyce said virtually all studies show lower-skilled or routine intensive jobs are most at risk, though there will also be an impact on higher skilled work. He also said workers in the digital economy must enjoy the same rights and protections as workers in other parts of the economy.

He warned about the "gig economy" – short-term contracts or freelance work (as opposed to permanent jobs) – in which he said workers are expected to renounce their rights to employment contracts, regularised working hours, social security, and even job security. In fact none of these standard protections seem to apply once the goods and services are delivered via an app or a web platform.

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Document 4

'How three-dimensional printing can save lives in the medical field'

Adapted from an article by Suzanne Locke in *The National*, a United Arab Emirates newspaper, November 2016.

Three-dimensional printing may still seem more like science fiction than real-life science, but its use in the medical world is booming, with the number of 3-D printers doubling year-on-year.

Traditional prosthetic hands, for instance, can cost anywhere from US$6000 to $40 000 (Dh22 000 to Dh146 900), but 3-D printing is allowing volunteer groups such as the global, web-based Enable Community Foundation in the United States to offer their bionic "Raptor" hand for free and to print it within a couple of days.

For the two million hand amputees in the world, including children who outgrow their artificial limbs far too quickly, this is life-changing. Even veterinarians are beginning to use the technology. Earlier this year, a mutilated toucan bird in Costa Rica was given a new 3-D-printed prosthetic beak.

The technology, also known as additive manufacturing or rapid prototyping, turns digital models into solid objects, printed in successive layers of materials such as glass, metal, plastic or ceramic. The mechanism has been available since the 1980s, but printers became much cheaper after a 2009 patent expired. Costs have dropped rapidly and, according to consultants Frost & Sullivan, the healthcare industry is now driving the growth of 3-D printing, which will become a $6 billion market by 2025.

Research firm Gartner calculates that up to 500 000 3-D printers have been shipped worldwide this year. The figure will more than double each year, it estimates, to reach 5.6 million 3-D printers in 2019. 3-D printing has the potential to "revolutionise" a number of sectors, including health care, says Dr Thomas Bartel, section head of the Heart and Vascular Institute at Cleveland Clinic Abu Dhabi. "In health care, 3-D printing's most impressive function is its ability to replicate organs to help plan for or simulate surgeries," he says. "3-D printing helps us personalise care while minimising risk." The clinic is one of the few hospitals in the region to use the tool for heart surgeries and catheter-based interventions.

"Everyone has a unique anatomy," says Bartel, "and in complex procedures, where we perform surgery in hard-to-reach areas around the heart, 3-D organ replicas are highly accurate and serve as a helpful aid for procedural planning. The 3-D model shows separation of cardiac and vascular structures from the surrounding tissue, giving us clear sight of any target region and what to expect in the operating room."

Ahmad Mackieh, chief executive of Abu Dhabi-based 3DCreations, has full-colour printers, wax printers (which print parts in wax to be cast in alloy metals) and stereolithography (SLA) printers, which deliver resin-based materials and have been used by 3DCreations to make dentistry moulds.

"Bones can be replaced by printed parts by fixing them directly – if the printed material can be accommodated by the human body – or by casting the element out of the printed part," he says.

"Some hospitals these days examine 3-D printed parts that simulate fractures in a bone or skull, and research centres are developing tissue 3-D printing that can reconstruct the face, nose or ear."

US- and UAE-based Medativ, one of 30 companies recently chosen by the Dubai Future Accelerators programme to work directly with the Government – in this case, the Dubai Health Authority – creates patient-specific anatomical models. Founder Mohamed Elawad says 3-D use has been "limited" in the UAE because of a lack of awareness and because 3-D models are not reimbursed by health insurance. But, he says, Japanese insurance firms have now started to cover costs, which is a "good sign".

“Once the clinical and economic benefits of using 3-D printing in medicine are better quantified, and physicians are more aware of the technology, I believe you will see widespread use,” he says. It is likely to start being used in universities in the place of cadavers, he says, adding that 3-D printing offers “affordable, personalised solutions” for patient-specific implants, prosthetics, bionics and orthotics.

Other medical uses are also emerging. In 2014, neurosurgeons in the Netherlands made the first successful implant of a 3D-printed plastic skull in a 22-year-old woman with a rare bone disease, whose skull had thickened from 1.5cm to 5cm, destroying her vision. Last year the US Food and Drug Administration approved epilepsy pill Spritam (levetiracetam), the world’s first 3-D printed medicine. The tablet is made by layering powder with printed drops of liquid to make a high-dose drug that can dissolve rapidly.

It may not be long until the pharmacy is dispensing your medication hot off the printing press.

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Document 5

'Digitalised manufacturing drives sustainable economic growth in the Middle East'

Adapted from an article in *Muscat Daily*, an Omani newspaper, May 2017.

The line between the physical and virtual worlds is blurring further every day. Headlines on self-driving cars, artificial intelligence and 3D-printing no longer raise eyebrows. Today, with a click of a button I can control my lawnmower in Germany via an app, from my home in Abu Dhabi. Such is life in the fourth industrial revolution.

But behind the hype and headlines, a powerful transition is taking place. The digital revolution is changing our lives, informing how we build cities, travel and communicate. It's also shifting the way we do business, creating new models and making existing ones obsolete. The capture, analysis and use of data is changing our world, quickly.

In our industrial world the digital revolution is in full swing. Automation is meeting digitalisation, devices are being connected and gaining the ability to store, share and analyse data to drive value. The way we design, test and manufacture is happening in the virtual world, but the results are very much real-world. Today you can walk into a Maserati showroom and buy a car that was brought to market 30 per cent faster using our own digital enterprise. This is the future of manufacturing.

For the Middle East, which continues to build increasingly diverse economies, industrialisation presents great opportunity. Globally, almost 80 per cent of financing for research and development is spent on the manufacturing sector, which also accounts for 70 per cent of trade. We can't ignore these statistics. Nations with established industrial sectors are stronger, more resilient, highly skilled and better equipped to deal with economic volatility. Our future is industrialisation.

Being a relatively new player in global manufacturing and engineering has its advantages. The Middle East can swiftly embrace and implement new technologies and build expertise at a pace other regions may struggle to match. Digitalisation technologies are a differentiator, and we believe the Middle East has the potential to use them to leapfrog the third industrial revolution, becoming a world leader in Industry 4.0, or the Industrial Internet of Things.

Digital technologies such as 3D printing will enable the region to position itself with high-quality, medium cost, flexible manufacturing. We no longer need expensive machinery, tooling and time-consuming lifecycle management, or the space they take up. Software can build a virtual representation of the entire value chain for digital design, testing and production. We can make changes at any stage, and instantly see the effects. The days of the physical prototype are numbered; it can be done better and faster in the virtual world. This is the future of manufacturing in the Middle East.

Document 6

'The era of efficient health care is ahead of us'

Adapted from an article by Waseem Samad in *Kashmir Observer*, a Pakistani newspaper, April 2017.

We are riding the cusp of a technological wave that promises to improve almost every aspect of day-to-day living. In health care, these advancements will bring benefits such as more personalised care, lower costs and improved quality of life. Imagine capsules that are designed and manufactured to not only release the right amount of medication, but in the right place at the right time. Similarly, prosthetics could self-adjust with the growth of patients.

Health care systems around the world are challenged with failing infrastructure and often the inability to provide people with access to the right treatments and solutions due to budget constraints and inefficiencies. It is estimated that health care spending globally will go from nearly $10 trillion now to $18.28 trillion by 2040. But does a successful health care system require increased government spending or do we need to reinvent the model as we know it?

The industry has been built on a philosophy of medical solutions for the masses and this model has not dramatically changed since inception. With time, this has resulted in growing pressures on our health systems, while limiting the potential benefit of treatments. There is now an exciting period of hope and transformation in health care that looks to use data and technology. While two patients may have the same diagnosis, future treatments might be altered based on their medical history and genetic make-up.

At the health care group I founded, we recently created a 3-D printed model of a patient's hip before carrying out a complex hip replacement surgery. This enabled doctors to learn the precise points where implants were required, saving operating time, reducing blood loss, and speeding recovery.

Looking further into the future, medicines themselves will be transformed, with the potential of being customised for every patient's requirements. 3D printing of medicines can offer significant improvements over conventional manufacture. The next stage, 4-D printing – in which printed structures change form in response to environment such as temperature or water – will push the boundaries further, paving the way for materials that can adapt as patients recover and heal.

These types of technologies offer safer, faster and tailored treatments. They harness the power of innovation, achieving a far greater degree of personalisation and precision in medicine than has ever been possible.

The journey towards a diversified economy has only just begun. Robust manufacturing capabilities, together with the vision of the leadership, will drive progress and the broader transformation of the health care industry. However, to make this a long-term success, we need to create a system of efficiency that benefits all concerned.

Document 7

'Fourth industrial revolution'

Adapted from an article by Uzair M. Younus in *Dawn*, a Pakistani newspaper, May 2017.

Bill Gates made headlines earlier this year when he argued that robots taking away human jobs should be taxed. His argument is that governments have a responsibility to intervene in order to slow down the proliferation of automation, as it has the potential of creating mass unemployment. It is a sign of the times that the person who has made his fortune because of technological innovation is now arguing for the curtailment of coming technologies. Welcome to The Fourth Industrial Revolution.

The world has seen three such revolutions in the past: the first began in 1784 when humans harnessed mechanical power and systematically shifted away from animals. The second came about in the late 19th and early 20th century, as new forms of power generation, electricity, and division of labour brought about mass production of industrial products. Digital systems, modern communications, and the advent of the modern computers ushered in the third industrial revolution, bringing to us products such as the smartphone and social media.

Each revolution built on the progress made in the previous era and the fourth industrial revolution is no different. During the current revolution we can expect existing and future technologies to become fully embedded in societies and humans. Advances in robotics and automation, artificial intelligence, nanotechnology, and material sciences will fuel this era and fundamentally change the functions of the modern economy. The effects of the fourth industrial revolution are expected to be far more profound, for better and for worse, than what we have ever seen. To put things into context, the third industrial revolution led to more people having access to a mobile phone than basic sanitation, a fundamental human need.

A report suggests that two-thirds of all jobs in the developing world are at risk of being lost through automation.

Automation and robots have led to much of the gloom in industrialised economies. At the beginning of this century the US employed over 15 million people in the manufacturing sector. In the 17 years since, the country has lost close to 3m manufacturing jobs while manufacturing output has increased by almost 30pc. This has transpired during a period in which the US underwent its worst economic crisis since the Great Depression.

New research by Daron Acemoglu of M.I.T. and Pascual Restrepo of Boston University concludes that there are 'large and robust negative effects of robots on employment and wages' and that the adoption of a robot for every 1,000 workers decreased employment by 6.2 workers and wages by 0.7 per cent in the US. These industrial robots have destroyed jobs in sectors that have traditionally created millions of blue-collar jobs such as the manufacturing of cars, electronics, metals, plastics, and chemicals.

These technological advances could also eliminate the benefits of wage-arbitrage that attracted manufacturing companies to developing economies where labor was relatively cheaper. As industrial robots become ever-cheaper and advances in material sciences enable 3-D printing of products, companies would not stand to gain as much by moving their manufacturing to developing economies. In fact, they would be attracted to setting up manufacturing in industrialised economies due to the availability of skilled labour capable of using these technologies.

If developing economies are to grow, they must implement policies that equip people with the skills required to operate and develop new technologies. Basic reading and writing skills will not be enough: the workforce of the fourth industrial revolution must know how to write and read computer code and work in conjunction with sophisticated hardware and software. The fourth industrial revolution is like a bullet train coming and it is up to policymakers to prepare and enable the masses to either get on board or risk being a casualty in its path.

Document 8

‘The new Mac Pro: Made in America’

Adapted from an article in *The Bates Student*, a US magazine, January 2016.

Apple’s latest release, the ‘all American made’ Mac Pro, not only pushes the boundaries for technological innovations in the 21st Century, but also opens up new opportunities for American cities in decline to possibly turn their economic turmoil around.

Apple’s Mac Pro is not only a very cool looking device – it is a statement and a possible catalyst in moving assembly and manufacturing work for the Apple product back to America (Austin, Texas specifically). Sure, it is slightly more expensive on the scale of current electronic devices, but here’s why you/your parents should want to spend that money. For years, Apple has outsourced much of its labor to Chinese and Taiwanese companies like Foxconn that employ controversial labor conditions and extreme hours for their workers. The conditions in factories and factory-cities like those of Apple’s Chinese partners are brutal and the apparent cause for many worker suicides. So why work in places such as these? For one, these jobs are some of the highest paying in China for workers who are undereducated and jobless. Moreover, since Foxconn has often overlooked illegal overtime, it is a way for someone who has little education to provide for his or her family. And Apple is not the only company that outsources to such a place – any consumer electronic that you can think of is most likely assembled or manufactured in labor camp factories similar to Foxconn’s.

By bringing factory work like the assembly of the Mac Pro back to America in factories that hopefully manage hours and work conditions better than those of “iPod cities”, Apple has singlehandedly made an enormous strategic move to provide more jobs to Americans in a recovering (but not fully recovered) economy. The learning curve for trainees working in these American factories is only slight. Apple’s effect could stimulate not only city and state economies, but the national economy as well.

Now, Apple has not moved all of their manufacturing back to the States, but this first step in the “back-to-Made-in-America” movement of labor is a significant one that will hopefully open the door to more change amongst powerhouse corporations similar to Apple.

So, if you hear about Apple’s new Mac Pro, consider what its production means. And when you look at that price tag (which is undoubtedly a shocker), consider whether or not it’s worth it, even if you’re not going to buy one. Consider the implications of its very existence. Hopefully we can remember this moment as a turning point in the history of consumerism, technology and economics.

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