

Exam WM0324LR

Ethics and engineering for aerospace engineering

January 18, 2012, 14:00-17:00

This exam consists of 20 True/False questions and 2 open questions. For the multiple questions, you can maximally get 4 points. If you do not know the answer, you may make a guess. In the grading of the test, a correction is made for guessing. The two open questions have equal weight and have each 3 points. Sub questions within a question have equal weight.

Check list.

- Each open question should be answered on a **separate page** and handed in separately. So, you will hand in **three** separate pages, one multiple choice form and two open questions.
- Write down your **name** and study number on **each page** and also on the multiple choice form.
- Fill out your **study number** on the multiple choice form.
- You may use a **dictionary**.
- Answers should be either in **English** or in **Dutch**.
- Make sure that you handwriting is **readable**.
- Do not say more than is needed in order to make your point or to answer the questions.
- We appreciate it if you fill out the **evaluation form**. Your feedback is important for improving the course.

Good luck!

True/False questions

1. Professional codes for engineers merely address the legal rights and duties of an engineer. **F**
2. When something is legally allowed, it will always be morally right. **F**
3. Virtue ethics is concerned with people's intention when acting. **F**
4. Quantitative risk assessments do not assess the acceptability of risk. **T**
5. To conclude from the undesirability of something that it will therefore not happen is called the fallacy of wishful thinking. **T**
6. When those who may be affected by some technological project or action have been fully and honestly informed about the possible undesired consequences of that intervention, we speak of "informed consent". **F**
7. The conclusion of an inductive argument is not logically contained in the premises. **T**
8. Two equal risks – in terms of probability times effect – are equally acceptable from a moral point of view. **F**
9. The company's codes of conduct may impose more restriction on the company than legal requirements. **T**
10. A categorical imperative is a conditional duty. **F**
11. According to the precautionary principle, measures to cut the emissions of CO₂ are only to be taken if the greenhouse effect it is scientifically proven. **F**
12. The fact that cultures have different moral values implies that moral relativism must be true. **F**
13. Defenders of the classical view on the social responsibility of companies hold that companies, in addition to respecting the law, must limit their activities in such ways as to avoid doing social harm. **F**
14. In an inductive argument, a general conclusion is drawn on the basis of a number of specific cases. **T**
15. In cases of uncertainty, reliable knowledge to calculate the risks of a certain technology is available. **T**
16. When a person involved in a wrong-doing (e.g. in an accident) does not have freedom of action, it is unfair to hold that person morally responsible for the wrong-doing. **T**
17. Product liability could apply even if there is no proof that the manufacturer acted negligently. **T**
18. The collective model for assigning responsibility in organizations implies that only persons high in the organization could be held responsible. **F**
19. Being an employee is a potential threat to an engineer's professional autonomy. **T**
20. In the case of a valid argument it is impossible that all the premises are true and the conclusion false. **T**

Open question 1

Events such as 11 September 2001, the hijacking of Air France flight in 1994 and many others in recent years repeatedly bring the problem of air transport security to the fore. This has always been a priority for the EU aviation industry, since airports represent a natural target for terrorist acts. Nevertheless, airport security measures have not always been effective and there are many past tragedies which were the result of people carrying explosive materials or weapons inside airports. Today, travelers are only quickly screened by walk-through metal detectors before entering the secure area, while X-ray machines are used for screening both hand and checked luggage. There is evidently the need for a better scanning system.

Whole Body Imaging (WBI) scanner is a technology that produces a very detailed image of the human body beneath one's clothes. WBI involves a process that makes use of several imaging techniques that scan the body and then produce a full-blown image of the body. This image includes the surface of the skin and objects placed on the skin, but it does not provide information on objects in the body or on the physiology of the body. In September 2008, the European Commission (EC) proposed to use WBI scanners at EU airports. The EC claimed that the scanners would be a less intrusive alternative for strip searching which involves the removing of the clothes. The proposal was rejected after the European Parliament said that WBI scanners 'have a serious impact on the fundamental rights of citizens'. Additional studies were instead proposed.

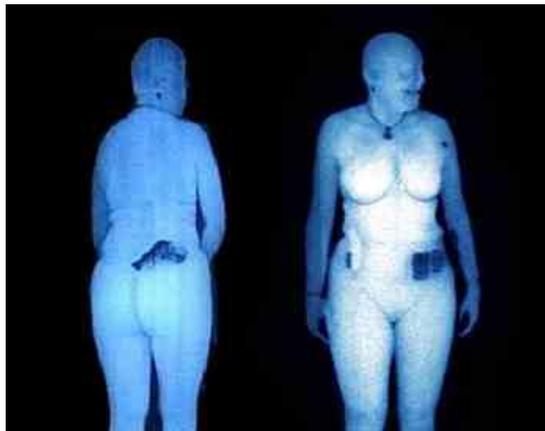


Figure 1. Image of a woman made by a WBI scanner using the backscatter method.

Source: Cavoukian, A. 2009. Whole Body Imaging in Airport Scanners: Building in Privacy by Design. Retrieved April 5, 2010, from <http://www.ipc.on.ca/images/Resources/wholebodyimaging.pdf>.)

- There are multiple moral values at stake in this case. Identify two values and explain briefly what they entail.
- Make clear to what extent these values conflict with each other and explain how a trade-off between these values could be made. (max. half a page)
- Value Sensitive Design refers to an approach to the design of technology that accounts for human values in a principled and systematic manner throughout the design process. This approach entails dealing with value implications in the design pro-actively. Suppose you are as an engineer involved in designing a WBI scanner. Propose a change in the design in which the value conflict discussed in the last sub-question could best be addressed.

Open question 2

The French government has decided to build a new airport in the north of Nantes. This airport, called l'Aéroport du Grand Ouest, should replace Nantes Atlantique (NA). In preparation for the new project, a social cost-benefit analysis (SCBA) has been performed in 2006 (see Scenario 2 in the Table below). This shows that the benefits of the new airport exceed the costs. This SCBA, however, has been criticized for having too optimistic projections, particularly in passenger demand and in travel time saving. Alternative SCBAs have been proposed in which the social costs and benefits of a new airport have been recalculated; see Scenarios 4,5,6, and 7 in the Table. The authors claim that they take more realistic projections of passenger growth and of their value of travel time saving into account. In monetary terms, the travel time savings are the product of the time saved (in hours) and the value of time (in Euros). In the new calculations, authors have used a lower monetary value of time that is better compatible with the value recommended in France.

Table 1 Alternative social cost-benefit analysis (benefits or costs in million Euro, 2006 price level)

Cost/benefit category	Airport Grand Ouest (existing SCBA, 2006)	Airport Grand Ouest: Realistic costs and passenger numbers, realistic values of time, etc.	Airport Grand Ouest: Conservative estimate of construction costs	Optimisation of Nantes Atlantique: Capacity extension, local radar system, fast taxiways	Optimisation of Nantes Atlantique: Capacity extension, local radar system and new runway in 2023
	Scenario 2	Scenario 4	Scenario 5	Scenario 6	Scenario 7
Travel time	911	317	317	297	297
Road safety	-1	-1	-1	-1	-1
Emissions road	-1	-1	-1	-1	-1
Emissions air	-10	-26	-26	-24	-24
Noise	20	19	19	0	0
Exploitation of airport	45	42	0	40	40
Interactions with other modes	-121	-114	-114	-107	-107
Public authorities (construction costs)	-330	-304	-757	-93	-134
Water management	-	PM (-)	PM (-)	0	0
Value of nature	-	-15	-15	0	0
Loss of agricultural land	-	-26	-26	0	0
Construction of tramway/renovate train track	-	-70	-98	-4	-4
Agro-environmental plan annual cost	-	-5	-5	0	0
External safety	-	PM (+)	PM (+)	PM (-)	PM (-)
Cost of adjusting aircraft fleet	-	0	0	PM (+/-)	0
Net benefit	514	-184	-707	106	65
Effects on urbanisation through property market	93	93	93	0	93
Net benefit	607	-91	-614	106	158

PM = To be determined due to a lack of data (in between brackets the direction of the effect: plus or minus). A minus sign represents a cost to society, a plus sign represents a benefit to society.

Source: Brink, L and Faber, J. Review of the Social Cost-Benefit Analysis of Grand Ouest Airport, Comparison with Improvements of Nantes Atlantique, Report written by CE Delft, Delft, October 2011

- The ethical theory *utilitarianism* underlies a cost-benefit analysis. Briefly explain what this theory entails and how that – in an elaborated form – could lead to a cost-benefit analysis. (max. half page)
- Name two problems of cost-benefit-analyses and explain how ethical theories other than utilitarianism can be helpful in complementing the SCBA in order to address these problems?
- Explain, based on the presented data, which scenario – either building a new airport or optimize the existing one - you would recommend?