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# General design rules

for technical products that are considered humane

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## I Introduction

This document sets out general rules and principles as principles for the design and manufacturing of technical products which, as a matter of principle, aim to fulfil a useful function and thereby serve the welfare of people and the environment. These rules are derived from the basic characteristics of humane technology and the associated code of ethics as laid down in the reference documents 1) and 2) and mentioned in Chapter V.

A designer or manufacturer will to his best judgement and ability act in the spirit of these “General Design Rules (GDR)”.

For the sake of brevity, a product that has been produced in accordance with these principles will be designated as a “technical product that is considered humane (In Dutch: Menswaardig Technisch Produkt (MTP))”.

This document contains the following chapters:

- I Introduction
  - II Architectural aspects, broken down into:
    - 1. Domain architecture
    - 2. Application architecture
    - 3. System architecture
  - III Environmental aspects
  - IV Structural aspects
  - V Reference documents
  - VI Comments from the designer/manufacturer
- Annex A: Extract from the Dutch Personal Data Protection Act.

The General Design Rules serve as principles for product-specific documents that represent the details of products based on these rules. These product-specific documents are not part of this document. These will, as a rule, be drawn up by the designers and manufacturers in question.

Designers and manufacturers who have read the General Design Rules are invited to test the degree of conformity of their product with these rules and to provide feedback to the (potential) client/stakeholder. Please indicate any articles that do not apply as such. Omissions in the articles that are relevant to the MTP in question can be recorded in Chapter VI below.

Feedback of the designer/manufacturer on the findings for the author of this document in order to improve it are appreciated.

## II Architectural aspects

Architectural aspects include a description of the principles of the design and the use of the main components that lead to the creation and evolution of an MTP. It also describes the relationship between these components and the environment of the MTP.

The following architectural aspects are distinguished:

1. Domain architecture
2. Application architecture
3. System architecture.

### 1. Domain architecture

**The domain architecture** contains the description of a domain of human activities that use objects and processes in which the MTP is realised and used.

The social and organisational context in particular play a role in this. The principles that emerge in this regard include the ideas (including product requirements) on which the MTP is based, the purpose, role and destination of the MTP, as well as the environmental, sustainability and ethical aspects.

- The **objects** include the persons and material resources that are involved. Persons can be the customers/clients, designers, manufacturers, project or programme managers, maintenance staff, users, supporting staff and purchasers and sellers, administrative assistants and IT employees. The material resources include all resources and facilities needed to create the MTP. These include, for example, the design and production resources and facilities, raw materials, test and integration resources and facilities, administrative resources, IT infrastructure and the products themselves.
- The **processes** relate to all activities of the above persons in the organisation. These include the acquisition PR and order acquisition, the purchase and sale, the cost and price calculation, the risk calculation, the product design, the manufacturing, integration and testing, providing maintenance and warranty, administrative and IT support.

#### 1.1. Object specification

##### 1.1.1. Material resources

###### 1.1.1.1. Product requirements

- The design of the MTP will be aimed at realising a socially useful product that is not explicitly intended for the exercise of power or the use of violence.
- The goal is to create an affordable MTP by including it in a circular economy in which energy, raw materials and resources can be saved and recovered in a more efficient production process.
- The MTP will not be developed to promote economic dependency or to pursue an economic monopoly.

- An MTP may not take away any responsibility that a person does not want to waive.
- An autonomously operating MTP (e.g. robot, drone and the like):
  - May not cause injury to a person or allow injury to occur by not acting.
  - Must obey the orders given to it by people, except if these orders violate the above rule.
- The design allows for a relatively simple implementation of future product improvements (in form, execution or function).
- An MTP will ensure that components can be easily replaced or repaired up to LSU level to extend its lifespan.\*
- At the end of the lifespan of the MTP, the manufacturer will be prepared to take back the product to allow for the recovery of usable materials and to prevent harmful substances from ending up in the environment.
- Technical products that are or have been specifically developed to be integrated into living beings will not interfere with the integrity and essential characteristics of these beings. The use of these products in people will always be subject to the consent of the individual after he has received adequate information.
- Sustainable technical innovations and solutions will, where possible, be based on principles observed in nature, for example, by imitating natural cycles and functional and material efficiency of ecosystems and natural habitats.
- An MTP will by default be supplied with all the resources required for proper use and recycling, including all facilities for this.

\* LSU = Least Significant Unit.

#### 1.1.1.2. Raw materials and resources

- Raw materials that are fully biodegradable or recyclable will be used.
- When creating the MTP, no use will be made of radioactive substances unless these are essential.
- The use of rare raw materials and resources for the MTP will be limited as much as possible and alternatives will be sought wherever possible.
- Raw materials and resources for the MTP will be purchased from suppliers with an undisputed reputation for environmentally- friendly extraction and trading of these commodities.
- The MTP will indicate in an accompanying document (“raw materials passport”) which raw materials and resources have been or will be used in what aspect of the product.

#### 1.1.1.3. Production tools

- Tools and processes for the production of the MTP will not harm the safety and health of operators.
- If an MTP is delivered packaged, efficient but economical use will be made of packaging materials. Packaging materials will be easy to remove and will not harm the user and the environment.

#### 1.1.1.4 IT infrastructure

- If Information and Communication Technology infrastructure is used for the design, production and/or administration of an MTP, this will only be accessible to authorised personnel, in which case company and personal data will only be available for those who need them. The statutory provisions of the General Data Protection Regulation (GDPR) must be observed for the processing of personal data.\*

\* Refer to Annex A.

#### 1.1.2. Involved persons

##### 1.1.2.1. Involved staff

- In general, the staff involved in the creation of an MTP endorse the objectives of the creation of an MTP and will be aware (whether or not indicated by the designer/manufacturer) of the impact of the introduction on people and the environment.
- Staff involved in the creation of an MTP will be offered good working conditions in accordance with the recommendations of the Internal Labour Organisation (ILO).

##### 1.1.2.2. Customer/client

- The desirability and/or necessity of the MTP will be discussed with the customer or client, regardless of the possibility of its realisation. This discussion may lead to a change in the desired product to a product that is more in line with an MTP.

##### 1.1.2.3. Designer/manufacturer

- The designer/manufacturer of the MTP uses the visions and guidelines of this document as a principle.
- Designers and manufacturers of the MTP will not simply follow the development of technology (following the “technology push”) but make a clear assessment of what the impact of any applied technology on people and the environment will be.
- Designers and manufacturers of the MTP will respect the inventions and intellectual property rights of others.

##### 1.1.2.4. Test and maintenance personnel

- Test and maintenance personnel of the manufacturer/supplier will strive to keep the MTP efficiently operational in order to extend the lifespan and promote user satisfaction.

##### 1.1.2.5. Support staff

- Administrative and IT staff in particular but not exclusively will handle personal data of the own staff and similar data of purchasers/users of an MTP in a discrete manner. These data will not be provided to third parties without a regulatory or legal reason in accordance with the GDPR.\*

\* Refer to Annex A

##### 1.1.2.6. Customer/user

- A customer/user will be asked to share his experiences with the MTP with the manufacturer/supplier in order to allow for product improvements.

- The user of an MTP will be encouraged to return the product to the manufacturer/supplier or another collection point to promote recycling once the product will no longer be used.

## 1.2. Process specification

### 1.2.1. Acquisition/order acquisition/advertising

- 1.2.1.1. The desirability or necessity of the MTP will be in line with the sales market, notwithstanding the possibility of the realisation.
- 1.2.1.2. Advertisements for the MTP will provide the (potential) customers/users with honest and complete information about the own MTP as well as about competing products in product comparisons.
- 1.2.1.3. The (order) acquisition of the MTP will take place in a fair manner, no material or immaterial gifts will be granted or accepted from potential clients.

### 1.2.2. Design process

- 1.2.2.1. When designing an MTP, attention will not only be paid to its physical properties, but also to qualitative aspects such as colour, sound, warmth, feeling and how it looks in a space.
- 1.2.2.2. The design process of the MTP will, where possible, consider unsuitable use or misuse (“dual use”).
- 1.2.2.3. The design process will strive for “sober innovation”, which means the implementation of core features and avoiding unnecessary features and facilities.
- 1.2.2.4. The design process will take future product improvement (in form, execution or function) into account.
- 1.2.2.5. Measures to secure personal data, if incorporated into the MTP, will be included in the design phase (“secure by design”). The customer will always be the owner of the personal data. The measures to secure the personal data will not conflict with the GDPR.\*

\* Refer to Annex A.

### 1.2.3. Manufacturing process

- 1.2.3.1. The safety of the staff involved in the manufacturing process of the MTP will always be pursued.
- 1.2.3.2. The manufacturing process of the MTP will take harmful consequences for people and the environment in mind.
- 1.2.3.3. The manufacturing process will strive to save raw materials, resources and energy.

#### 1.2.4. Integration and test process

1.2.4.1. The safety of the staff involved in the integration and testing of the MTP will always be pursued.

#### 1.2.5. Cost and price calculation

1.2.5.1. The costs and the price will be based on the principle of a fair price for the MTP, so that it can be made available earlier for those who need it.

1.2.5.2. The goal is to establish a calculation method including hidden costs which is transparent to the customer/user.

#### 1.2.6. Risk analysis

1.2.6.1. Risks related to the use of new techniques, technologies, raw materials and resources during the production and use of the MTP will be estimated and communicated in advance.

1.2.6.2. A general distinction can be made between safety risks (incidental risks during the production and use) and risks during continuous exposure (e.g. because of the use of hazardous technologies, processes and raw materials). Both forms may not exceed dangerous levels for people and the environment.

#### 1.2.7. Maintenance and warranty process

1.2.7.1. The maintenance of the MTP, if the responsibility of the manufacturer/supplier, will be carried out efficiently and in due course in accordance with a maintenance plan.

1.2.7.2. The MTP will be easy to maintain for both the manufacturer/supplier and the user, which means easily accessible for the manufacturer and suitable for the recovery of errors.

1.2.7.3. The user will be able to carry out any necessary maintenance without special tools based on maintenance instructions.

1.2.7.4. If the maintenance of the MTP requires special tools and knowledge, the manufacturer/supplier will indicate this.

1.2.7.5. A sound warranty scheme will apply to the MTP in case of maintenance in accordance with the instructions by the manufacturer/supplier and/or user.

1.2.7.6. The manufacturer will reasonably compensate the damage suffered as a result of the unavailability of the MTP during the warranty period.

## 2. **Application architecture**

**The Application architecture** gives a description of what the MTP must be able to do with respect to the features and the mutual relations between them and the performance requirements of the MTP. This also includes the desired quality, reliability and availability of these performances. Important aspects are the requirements with regard to ergonomics (human-friendliness) and user-friendliness (the “human-machine interface”).

## 2.1. Features

- 2.1.1. The primary features used in the MTP must serve the main objective of the MTP and ensure the proper accessibility and simple and unambiguous use thereof.
- 2.1.2. The relationships between the primary features ensure a logical operation of the MTP.
- 2.1.3. Clear error messages will inform the user that the main features of the MTP no longer work properly and how these problems can be resolved.

## 2.2. Use and controls

- 2.2.1. The goal is an as a simple as possible, clear operation of the MTP by the user. A clear and easy to read (online) operating manual is part of the delivery.
- 2.2.2. The controls of the MTP will take into account special groups of users such as young people, the elderly and the visually impaired and unfamiliarity with new operating methods.
- 2.2.3. If possible, the “human-machine interface” will have an educational impact on the user of the MTP.
- 2.2.4. The “human-machine interface” will be adaptive if possible to ensure the user can adjust settings.

## 2.3. Reliability

- 2.3.1. For complex MTPs, the theoretical reliability will be determined in advance, where possible, which means that the product will be able to carry out its features for a certain period under predetermined conditions.

## 2.4. Desired performance

- 2.4.1. The desired (theoretical) performance of the MTP will be stated in terms that are considered feasible and are clear, qualitative and/or quantitative.

## 2.5. Delivered performance

- 2.5.1. The delivered performance in a prototype will do justice to a well-functioning MTP and will be stated in clear and demonstrably qualitative and/or quantitative terms. Any deliberate departure from the desired performances will be substantiated.

## 3. **System architecture**

**The System architecture** is the least implemented architecture at this transparent general product level. General requirements are set for IT products, for example, in terms of the implementation, e.g. the use of the hardware such as displays (e.g. type), processes (e.g. type) and application and operating system software (e.g. programming languages and licenses), if applicable.

### 3.1. Use of hardware (general)

- 3.1.1. In general, hardware components will meet the applicable requirements in terms of safety, electromagnetic compatibility and radio frequency radiation.
- 3.1.2. Applicable licenses or patents will be respected for the use of hardware.



### 3.2. Human-machine interface

3.2.1. The human-machine interface will use ergonomic technologies. If the MTP uses a display to show information, for example, technologies will be used which minimise user fatigue, particularly of the eyes. This also applies to the correct use of colours.

### 3.3. Use of built-in processors

3.3.1. Built-in processors and Programmable Logic Controllers (PLCs) will, where possible, be of a common type; use of specifically designed ("special purpose") processors will be avoided as much as possible. The same applies to other OEM components.

3.3.2. If the user can adjust features, the necessary tools will be provided. These include a clear description and any special interfaces. Special tools may fall outside the scope of the default delivery.

### 3.4. Use of software

3.4.1. Where possible, the MTP will, if applicable, use common standard operating system software, application software, and programming languages.

3.4.2. Software licenses or patents will be respected.

3.4.3. The MTP will not use software products that actively exploit weaknesses in the software of third parties in order to disrupt them or take control of them (so-called "exploits") or "spyware".

3.4.4. Pure software MTPs from third parties (such as "applications") will be able to work in the MTP as much as possible.

3.4.5. Game software developed and used in social computer games will not promote user addiction.

## III Environmental aspects

1. These concern the requirements that MTPs must meet to operate according to the specifications in a particular climate (temperature, humidity, etc.) or a specific environment (e.g. in which radiation is not permitted or limited). Or the requirements of the MTPs for the environment (e.g. the supply of energy, air, water, etc.).

### 1. Climate requirements:

1.1. The MTP will continue to work properly within the applicable environmental conditions (of temperature, water tightness, pressure, etc.) (*the applicable default specifications may be referred to*).

### 2. Energy requirements:

2.1. The production process of the MTP will make use of alternative ("green") energy sources as much as possible and strive to limit the energy use.

2.2. If the MTP requires an external power source, standardized mains voltages will be used as much as possible.

- 2.3. The goal is to have the MTP use as little energy as possible.
- 2.4. Built-in energy sources in the MTP will be rechargeable or reusable if possible.

### 3. Radiation requirements

- 3.1. During the manufacturing process of the MTP, any non-ionising EMF radiation\* that the MTP may emit will remain within the non-hazardous limits for living beings (based on biological effects) to the extent this can be achieved by the use of the best possible technology.

*Note: In the absence of legal standards for biological effects, the precautionary principle will be applied, in which the emitted ELF radiation does not exceed the value of 2 mG (miliGauss). The radio frequency radiation will not exceed the value of 0.1  $\mu\text{W}/\text{cm}^2$  (ref.: BioInitiative report, 2012 edition).*

- 3.2. An MTP emitting radiation as referred to in 3.1. will be provided with an external warning label indicated the amount of radiation emitted by the MTP and an indication of safe use.

*\* Note: EMF = Electro-magnetic field radiation emitted by Extreme Low Frequency (ELF) radiation or radio frequency (R.F.) radiation.*

- 3.3. During the design and creation of a light installation, the **light nuisance** of the MTP will be studied and checked to determine it does not exceed common standards and statutory requirements for local residents and nature to the extent that can be achieved by the application of the best possible technology.

### 4. Returning facilities and rental

- 4.1. The manufacturer of an MTP will make arrangements to take back his product at the end of its lifespan to reuse materials and the responsible disposal of non-reusable materials.
- 4.2. If possible, the manufacturers of the MTP will encourage the second-hand trade in its products that are still working well.
- 4.3. Where possible, the MTP or its feature will be made available under the terms of use and be taken back in case of still-functioning ageing or the end of its lifespan.

## IV Structural aspects

These concern the high-level requirements imposed on the external and internal structure and materials, as well as the form, implementation and intended lifespan/reliability of the MTPs.

### 1. Materials:

- 1.1. Where possible, the used materials will have a positive impact on the lifespan of the MTP.
- 1.2. The MTP will be made using reusable materials where possible.
- 1.3. The used materials will be biodegradable as much as possible.

- 1.4. Use of rare materials will be avoided as much as possible.
- 1.5. If nano-structured materials are used, this will not have any adverse consequences for staff or users during the production or use.
- 1.6. The risk of use of nano-scale materials will be estimated in advance. This estimate can consist of a number of steps:
  - Development of the nano-materials and its intended use;
  - Development of the risk of use and the profile of exposure to the nano-material throughout the product life-cycle;
  - Evaluate the generated information to determine the probability of the risks;
  - Evaluate risk management options and a recommended plan of approach;
  - Decide whether or not to use the intended nano-materials together with the responsible stakeholders;
  - Regularly update the risk assessment and share relevant information with relevant individuals and institutions.
- 1.7. When using radioactive substances, any released ionising radiation will remain within the standards that are safe for people and the environment using shielding or otherwise.

## 2. Design and appearance of the MTP

- 2.1. In order to support a longer (economic) lifespan of the MTP, the goal is to create a design that is as timeless as possible and appearance that avoids “throw-away behaviour” of a still functioning product.
- 2.2. If possible, an artistic design of the MTP will be pursued in which the appearance can be an expression of the intention of the process and/or its internal process.

## 3. User interface

- 3.1. The MTP will be equipped with user-accessible controls that match the character of the culture of the market for which it is intended.
- 3.2. If the MTP uses wireless controls, these will be adequately protected to prevent undesirable external influences.

## V Reference documents

1. Characteristics of humane technology (v9), drawn up by the Humane Technology Work Group (HTWG).
2. Code of Ethics (v5), also drawn up by the HTWG.

## VI Comments from the designer/manufacturer

If omissions are found in the above articles that are characteristic of an MTP, they can be recorded below.

Feedback on the findings of this document to the HTWG can be reported to the contact address of the HTWG: Nordhornstraat 17, 7559WR, Hengelo.

## **Annex A: Extract from the General Data Protection Regulation (GDPR)**

Personal data provide direct or indirect information about a person. The [General Data Protection Regulation \(GDPR\)](#) gives rules to protect the privacy of personal data. The GDPR concerns, among other things, the following:

1. Personal data information duty
2. Right to access and correction of personal data
3. Right to motivation
4. Objection against use of personal data for marketing purposes
5. Special position of the government concerning processing of personal data.

There are various types of personal data:

- Direct personal data: data that provide direct and factual information about a person (e.g. a date of birth, address or gender). This also applies to data that give an assessment of a specific person (e.g. IQ).
- Indirect personal data: give indirect information about a specific person. Examples are the social status of a person: the profit of a sole proprietorship says something about the income of its owner. An IP address of a computer indirectly determines the address where a person is located. If these data can be traced back to a certain person, they are personal data.
- Special personal data: These include data about the following aspects of a person:
  - race;
  - religion or belief;
  - political affiliation;
  - health;
  - criminal past;
  - sex life;
  - membership of a trade union.

Criminal personal data are also special data. This includes, for example, information about crimes, offences and convictions. The Judicial Information Service manages these data in the Judicial Documentation System (JDS).

The processing of special personal data can result in a major breach of the privacy of the data subjects. This is why there are strict conditions and rules for the processing of special personal data. Data about the health of a person may, as a rule, only be processed by health care institutions.

### **Provision of personal data:**

An organisation may only provide personal data to others if this provision of data is based on the GDPR. This serves to protect the privacy of the person.

This act contains six grounds based on which the data provision is allowed. These are the following:

#### **1. Express permission:**

Organisations may share personal data with others with the express permission of the person. This permission applies only if it is clear for which permission is being granted and what the consequences of this are.

2. Implementing an agreement:

If personal data are needed to carry out an agreement, personal data may need to be exchanged (e.g. a telecommunications company may share personal data with a postal company in order to deliver a mobile phone to the home of a customer. This requires a name and an address).

3. To carry out a statutory obligation (e.g. Dutch General Act on National Taxes). The tax inspector can claim all data that may be relevant to taxation on this ground.

4. Vital importance (e.g. an urgent medical need): For example, someone who is unconscious cannot give permission. The personal data may then be shared with a physician without his/her permission.

5. Carrying out a public-law task:

The government may provide personal data if this is necessary for the proper performance of its tasks. The Public Prosecution Service (OM) may share information, for example. For example, information about a fraud case to insurers.

6. Legitimate interest:

The organisation must ask itself whether the same result can be achieved with less data or in a less invasive way. The organisation must also carry out a privacy check. This means that the organisation must balance the interest and rights of a person against the interest of the organisation.