Vendor-neutral tendering of monitors

Guidelines for public IT procurement

bitkom

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Acknowledgements

These guidelines are the result of the intense cooperation between public policy experts and representatives of Bitkom member companies. It owes its existence to the extensive legwork of the project group »vendor-neutral performance specification monitors«.
We like to express our particular thanks to:

- Mathias Thusek, Procurement Agency of the Federal Ministry of the Interior
- Matthias Schäuble, HP Deutschland GmbH
- Christoph Bansbach, Bechtle Systemhaus Holding AG
- Robbi Teichfischer, Dell GmbH
- Lukas Ickerott, Lenovo (Germany) GmbH
- Andre Kuhlmann, Lenovo (Germany) GmbH
- Jan Samolarz, Computacenter AG & Co. oHG
- Bernhard Wolz, Federal Employment Agency
- Thomas Zapala, Federal Office for Bundeswehr Equipment, Information Technology and In-Service Support (BAAINBw)
- Marco Sönksen, Polizei [Police] Berlin
- Felicia Fischer, Bitkom e. V.

1 Introduction

1.1   Application of these guidelines

These guidelines are designed to offer an overview of the basis and criteria for the procurement of monitors by public bodies. It was created as a result of a working group led by the German Association for Information Technology, Telecommunications and New Media (Bitkom) and the Procurement Agency of the Federal Ministry of the Interior. This document aims to provide public contracting entities at the federal, state as well as municipal levels with a reliable and understandable resource so as to allow them to formulate their tenders for the procurement of monitors in a non-proprietary manner, i.e. in a way that avoids the use of protected brand names or the reference to a specific manufacturer, while taking into account current technical standards.

The core element of these guidelines is a list of technical criteria that can be used to describe and compare the monitors as well as the requirements for their working environments and other characteristics. It should be noted, however, that the listed technical criteria and requirements are subject to constant change and should be evaluated differently depending on where the equipment to be purchased is going to be used. Higher demands on the product will tend to produce a higher offer price, and accordingly, the range of products on the market will decrease. These guidelines are therefore not to be considered as a replacement for professional considerations and weightings of the individual criteria corresponding to the personal needs.

Nevertheless, the authors of these guidelines would like to support procurers of the public administration insofar as they draw particular attention to sensitive criteria and requirements, that may lead to market restrictions, as well as cost-related decisions. The following symbols are used for this purpose. The second and third symbols are not contained in these guidelines. However, we listed them to keep the guidelines for vendor-neutral tendering consistent.[1]

Symbol	Meaning
€	Criteria with this symbol may result in cost increases or market restrictions.
!	This symbol indicates the clarification of a common misconception or highlights critical statements in the text.
Z	This symbol indicates whether certificates can be used to verify specific criteria.

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1 Comparison, for example, ↗ **Guidelines for the vendor-neutral tendering of multi-function devices**

1.2   Vendor-neutral product tendering as a legal requirement

Under public procurement law, the equal treatment of providers and offered products is obligatory. The legal framework foresees that the procurement object is described based on factual and non-discriminatory criteria, i.e. in a non-proprietary manner, cf. Section 97(2) of the German Act against Restraints on Competition (GWB) and Section 31(6) of the German Ordinance on the Award of Public Contracts (VgV).[2] Specific product descriptions or brand names for tenders can only be used in duly substantiated exceptional cases, for example, if a particular description using generic names or criteria is not possible.

Vendor-neutral tenders can also be viewed as an opportunity. They ensure fair and open competition, prevent premature technical determination as well as consequential lock-in-effects. The number of competing providers increases if the procurement takes place according to the general, factual, and technical criteria. This leads to better options, cost-saving measures for procurement; moreover, market opportunities caused by a change of provider can be utilised with minimal difficulty.

For public invitations to tender, the awarding office should create a list of criteria for the product to be procured that permits a comparison of the different offers, and if possible, their sufficient differentiation. The awarding authority is free to decide on the criteria for determining the products or services to be procured, however, the award criteria must be needs-based, vendor-neutral, and transparent.

The vendor-neutral invitation to tender for IT products is not a straightforward task. The concerned public authorities often struggle with uncertainties. The technical complexity of the topic, short product cycles, but also the difficulty of describing the desired performance of a system, taking account of all the technical requirements, often pose a substantial challenge to public procurers.

These guidelines address precisely this issue by providing a compact tool to support compliance with legal requirements when formulating technical specifications and thus ensure fair competition. They identify and explain current technical standards that enable a description of monitors following general pertinent characteristics. The product features and technical requirements are presented in a compact, tabular form. The guidelines will be reviewed at regular intervals with the aim of keeping them up to date. Any revisions will consider the latest technical developments and the current state of the art.

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2   Section 42(4) of the Directive 2014/24/EU of 26 February 2014 clearly articulates this principle as well: Unless justified by the subject-matter of the contract, technical specifications shall not refer to a specific make or source, or a particular process which characterises the products or services provided by a specific economic operator, or to trademarks, patents, types or a specific origin or production with the effect of favouring or eliminating certain undertakings or certain products.

2 Monitors as a procurement object

2.1   Commercial models and procurement

The procurement of a monitor can be done by renting, purchasing, or leasing the object. Unlike renting, leasing tends to provide the contracting authority with the option to purchase the leased object at the end of the contract. Which approach the procurer chooses depends not least on whether a budget is only available once or over several years.

A decision for one of these procurement models shall precede a procurement policy within the framework of a feasibility study. It is also important to consider whether the hardware and software should be obtained from one single source in the framework of uniform contractual agreement (bundling) or different providers. Software manufacturers might offer specific licensing models for software used in public administration.

Following the German statutory provisions on income tax, a monitor use of three (3) years is permitted.[3] The directive on the operating life, singling out and recycling of IT devices and software also stipulates a minimum use of three (3) years for monitors in public administration.[4] The procurement costs can, therefore, be estimated based on that operating life.[5]

Of significant consequence in this regard is how the choice of the procurement model affects VAT. Hire is subject to VAT based on and payable with the respective rental rates. The purchase is subject to the entire VAT upon delivery (= transfer of the equipment to the contracting authority). VAT as a whole also arises upon delivery of the device if the contract foresees that the title to the device shall only be transferred after payment of several instalments. If the transfer of title for rent-to-own depends on the exercise of a purchase option, VAT is payable on the total unit price upon exercise of the option as stipulated by the contract. Where rental payments have already been rendered before the option is exercised, the accumulated VAT payments are to be reversed if the rental payments are counted towards the purchase price. Leasing is subject to VAT Time at which the leased device is attributable to the contracting authority according to tax provisions.[6]

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3 cf. ↗ **depreciation of fixed assets table by the German Federal Ministry of Finance**

4 cf. ↗ **IT-Rat 2013/7, p. 19**

5 However, in its ↗ **position of June 2016**, the German Federal Environment Agency notes that a short operating life, in the framework of ten years, leads to higher life cycle as well as external costs (e. g., costs based on greenhouse gas emissions).

6 Cf. comments on these taxation-related consequences by the tax administration in the VAT Application Decree (UStAE).

	Commercial models		
	Hardware and software from different providers	**Bundling**	**Financing (hire/leasing)**
Hardware	Purchase	Purchase	Hire or leasing
Costs for hardware service (e. g., repair, maintenance)	Born by the contracting authority	Born by the contracting authority	Payment covers services
Ownership of hardware	Contracting authority	Contracting authority	Contractor

Table 1: Commercial models and procurement

2.2 Services

The service portfolio of the provider must not be limited to hardware or software but can also include additional services connected to the delivered object. For example, an offer based on a separate service contract or extended warranty for the delivered hardware, or potentially the maintenance of the bundled software. Furthermore, extra services like troubleshooting or hotline services can be ordered on top of the hardware and software procurement.

If needed, support should be clarified, where necessary, specifying the response or repair time.

Common offers differ depending on:

- contract term,
- response time (time between failure reporting and first support response),
- recovery time (time between failure reporting and recovery of the operational system),
- additional technical services offered (invoicing according to expenditure at hourly rates and travel costs).

Requirements, based on demand, can be:

- Three, four, or five years on-site service.

- On-site service with a response time of x hours. A response time of one hour is typical (can also take place as an auto response) within regular office hours (e. g., between 8:00 and 17:00). Otherwise, the next working day.

- On-site service with a recovery time of x hours (type and scope depending on the intended purpose. Lower surcharge for recovery times of two working days, shorter times are also possible but affect the pricing).

- Availability of a German-speaking hotline x hours and x days per week.

Individual arrangements can be made concerning the procurement of highly available solutions. For this, a needs assessment must be made to compare requirements against created costs.

The purchase of monitors, if required, can follow additional requirements such as:

- maximum delivery time,
- free delivery,
- international delivery,
- delivery to different locations,
- delivery to individual rooms.

3 Technical criteria and requirements

The contracting authority shall describe the procurement object according to general characteristics in a way that permits a comparison between subsequent offers. These guidelines lay out various criteria that constitute suitable parameters for the description of monitors, presented in a tabular format. These criteria are assigned technical requirements to make these parameters assessable and comparable. The total of all minimum requirements produces a standard, which can be expected according to the current state of the art and is achieved by all newly designed devices currently offered on the market, which it is necessary to avoid undershooting. The last column provides further information, as well as specifications about the technical requirements.

In addition to the minimum requirements, recommended here, further conditions can be formulated within the framework of weighted evaluation criteria. Moreover, the contracting authority may define further criteria and requirements in the tender documents if particular conditions are placed on the procurement object. The procurer decides what individual performance characteristics belong to which category. Whenever tables of these guidelines list the minimum requirements for the devices, they label them as »minimum requirement«. The guidelines recommend to only use the requirements within the framework of the evaluation criteria if the criteria/requirements are labelled with »evaluation criterion«. Specific requirements are particularly relevant to monitors. The individual technical aspects will be considered below.

3.1   Display

No.	Criterion	Suited as	Comments/Explanations
1	Display size	Minimum requirement	The current standard for screen sizes ranges between 23.8 inches and 27 inches.
2	Resolution	Minimum requirement	Der current standard for display resolution is 1920 × 1080 pixels. See Glossary.
3	Screen brightness (in cd/m² or nits)	Minimum requirement	250 nits are common. See Glossary.
4	Aspect ratio	Minimum requirement	The currently accepted standard for aspect ratios is 16:9 and 16:10. See Glossary.
5	Contrast ratio (static)	Minimum requirement	A contrast ratio of 1000:1 is the current standard. Dynamic contrast ratios are not suited for evaluation. See Glossary.
6	Anti-reflective coating	Minimum requirement	Anti-glare following ISO 9241-300:2008.
7	Pixel defect class	Minimum requirement	Class II following ISO 9241-300:2008, or better.
8	Response time	Minimum requirement	The current standard for response time is 8ms or less (grey-to-grey).
9	Viewing angle	Minimum requirement	The current viewing angle standard is 178° with a contrast ratio of CR 10:1 for IPS (in-plane switching) as well as VA (vertical alignment) panels, and 160°/170° for displays that use TN (twisted nematic) technology. See glossary for panel technologies.

Table 2: Display criteria

3.2   Ergonomics

No.	Criterion	Suited as	Comments/Explanations
1	Ability to adjust height	Minimum requirement	100mm
2	Ability to incline	Minimum requirement	− 5° to + 15°
3	Pivot function	Minimum requirement	Tends not to be used too often and should only be tendered if specifically needed.
4	Ability to swivel	Minimum requirement	45° to the left and right.
5	Eye comfort	Evaluation criterion	Certificates, for example, the TÜV Eye Comfort Certification or TÜV Low Blue Light can attest the eye friendliness (low blue light, flicker-free, reduced reflections).
6	Chassis colour		It is recommended to not insist on specific chassis colours to avoid restrictions.

Table 3: Criteria ergonomics

3.3   Features

No.	Criterion	Suited as	Comments/Explanations
1	**VESA mount**	Minimum requirement	The monitor should have a VESA mount.
2	**Video interface(s)**	Minimum requirement	At least one video interface, e. g., DisplayPort or HDMI should be in the tender. VGA and DVI are not state-of-the-art anymore.
3	**Privacy filter (accessory)**	Minimum requirement	A matching privacy filter can be purchased optionally.
4	**Kensington lock**	Minimum requirement	
5	**Power cable**	Minimum requirement	A matching power cable that is at least 180 cm long. A matching video cable.
6	**User menu**	Minimum requirement	Operation via OSD (on screen display) or similar.
7	**Service/Warranty**	Minimum requirement	Exchange service during regular business hours. Warranty period must be specified, three (3), four (4), five (5), or more years tend to be available for a surcharge.
8	**Speaker**	Evaluation criterion	Speakers are not often used and should only be tendered if specifically needed since they significantly restrict the choice. Speakers can be integrated into the screen or attached as an accessory, e. g., a soundbar. 🟡€
9	**Camera**	Evaluation criterion	Camera with at least two (2) megapixels. An integrated camera should only be included in the tender if specifically needed. 🟡€
10	**USB 3.x interfaces on the monitor**	Evaluation criterion	At least two (2) USB 3.x interfaces. The criterion should only be included in the tender if specifically needed. 🟡€
11	**USB-C interface**	Evaluation criterion	See chapter 4.2. 🟡€

Table 4: Criteria features

4 Workplace concepts

4.1   Use of multiple monitors

The use of several monitors simultaneously can increase user productivity. For office workstations, these guidelines recommend the use and procurement of at least two monitors with a minimum diagonal of 23.8 inches. Another technical option is the use of one ultra-widescreen monitor, e.g., often referred to as »curved monitor«. In some cases, it can be more economical to purchase two individual monitors instead of one ultra-widescreen monitor (smaller than 34 inches). However, the simplified setup, cabling, and maintenance of one ultra-widescreen display (curved), instead of two individual 16:9 monitors, might translate into cost savings.

4.2   USB C as connector system of the future

USB Type-C (with associated data transfer protocols USB 3.1 Gen1 or Gen2) as a connector system is being increasingly used in monitors at the time the guidelines are published. Not only can this interface transfer data via USB and a video signal (via the DisplayPort Alternate Mode), but it is also capable of charging a device (at least 65W are recommended to charge a standard business notebook). It should be possible in this scenario to use USB peripherals through the monitor's USB ports. In doing so, it is possible to design a tidy single-cable solution that may one day take over the classic docking station. However, the use of a docking station is recommended if an RJ45 connection, along with features such as Wake-On-Lan, is a customer requirement, which the monitors typically do not offer.

The USB-C monitor must have a DisplayPort out, which permits forwarding the video signal to a second device (Daisy Chaining) if it is desired to operate two screens with one USB cable only.

When procuring monitors, USB-C connectivity should be considered since it will become more common but will also be more future-proof and a sounder investment from an economic perspective.

5 Award criteria, consideration of lifecycle costs

The award must be granted to the most economically advantageous tender as per Section 127(1) of the German Act against Restraints on Competition (GWB). The determination of the most economically advantageous tender takes place following the best price-performance ratio. Apart from price or cost, this consideration can also take into account qualitative, environmental or social award criteria. Energy-related supplies must also adequately account for the energy efficiency of the devices as an award criterion, as per Section 67(5) of the German Ordinance on the Award of Public Contracts (VgV). To that end, efficiency should not be limited to compliance with maximum electricity consumption. Instead, the evaluation price should take into account the estimated lifetime electricity costs.[7]

As stated in Chapter 3, the service requirements may be expressed within the framework of award criteria with minimum technical specifications or within the framework of evaluation criteria. The wording of the service requirements with the help of the evaluation criteria can provide competitors with specific leeway. This wiggle room permits a differentiated consideration of the tendered services in the evaluation. In doing so, the individual forms of services can be taken into account; this is favourable for the latitude of the competition. The wording of the service requirements should be concise, comprehensible, and objectively appraisable.

The increased or exclusive use of minimum technical requirements in the terms of reference can result in undesired restriction of competition. The guidelines recommend the use of evaluation criteria to promote diverse competition.

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7   See for example ↗ **https://www.berlin.de/senuvk/service/gesetzestexte/de/download/beschaffung/VwVBU.pdf (only available in German)**

6 Contractual provisions

6.1   Supplementary terms of contract for the procurement of it supplies/services

Relevant contracts govern the provision of the advertised services or delivery of the advertised products after the successful completion of the procurement procedures. The Federal Ministry of the Interior and Bitkom have developed several contracts that can be used to support the awarding bodies. The contracts can be found on the website of the Federal Commissioner for Information Technology.[8]

6.2   Social sustainability

The procurement procedures must consider the economic and ecological criteria as well as social aspects (Section 97(3) of the German Act against Restraints on Competition (GWB), Section 31(3) of the German Ordinance on the Award of Public Contracts (VgV) above the threshold level, Sections 2(3), 22(2) of the German Sub-Threshold Procurement Ordinance (UVgO) on the award of contracts below the threshold level). Such social aspects include, in particular, labour rights, the ban on child labour, discrimination against employees, but also the observance of bandwidth working hours by the tenderer as well as its suppliers. The awarding office can ask each bidder to provide a declaration concerning social IT sustainability to ensure that the aspects of the procurement procedures for IT products and services are guaranteed. A model declaration on social sustainability for IT is available on the website of the Procurement Agency of the Federal Ministry of the Interior.[9]

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8 ↗ **http://www.nachhaltige-beschaffung.info/SharedDocs/DokumenteNB/141211_Erkl%C3%A4rung_soziale_ Nachhaltigkeit_IT_en.pdf?__blob=publicationFile&v=4**

9 ↗ **http://www.nachhaltige-beschaffung.info/SharedDocs/Kurzmeldungen/DE/2019/190507_Verpflichtungserkl %C3%A4rung.html?nn=3631298 (only available in German)**

7 Glossary

Term	Comments/Explanations
Resolution	The resolution or screen resolution refers to the number of distinct pixels arranged horizontally and vertically on a screen. The most common resolutions are 1920×1080 (Full HD), 1920×1200 (WUXGA), 2560×1440 (QHD), and 3440×1440 (WQHD). The associated aspect ratios arise from the corresponding resolutions. An aspect ratio of 16:9 corresponds to a resolution of 1920×1080, an aspect ratio of 16:10 corresponds to a resolution of 1920×1200 and so forth.
Viewing angle	The viewing angle is a parameter of monitors, which states the maximum angle at which a viewer can look at the display without having to accept certain constraints. More specifically, we distinguish between a vertical (v) and a horizontal viewing angle (h).
Screen brightness	Humans perceive brightness as a fundamental characteristic of colour. The brightness of a screen or luminance is expressed as candela per square metre (symbol: cd/m^2) or nit (symbol: nt), whereby 1 nt equals 1 cd/m^2. A luminance of around 250 to 300 cd/m^2 is optimal for the eye.
Contrast ratio	The contrast ratio is defined as the ratio of the luminance of the brightest colour (white) to that of the darkest colour (black) that the monitor is capable of producing.
a. static	Static contrast ratio refers to the luminosity ratio of the brightest white to the darkest black that the monitor is capable of producing in one frame (simultaneously). One possible method of measurement is the ANSI contrast. The measurement is performed with a checkerboard-patterned test image, which serves to measure the brightest whites and darkest blacks simultaneously. This setup is representative of how the monitor is used in reality and thus of significant value to the user.
b. dynamic	Dynamic contrast ratio refers to the luminosity ratio of the brightest white to the darkest black that the monitor is capable of producing in two consecutive frames. Accordingly, it only refers to moving images and is not relevant for systems that display a static motionless image (typical office applications). Moreover, there is no standardised test for this parameter. Manufacturers perform the measurements under ideal (while unrealistic) laboratory conditions with variable backlighting, which means that the dynamic contrast has no relevance for the user experience in a typical working environment and thus should not be part of tenders.
Panel technologies[10]	▪ IPS (in-plane switching) panels offer extra-wide viewing angles (178°/178°), exceptional colour reproduction/colour accuracy, reasonable response times and excellent contrast ratio. ▪ TN (twisted nematic) panels are cheap panels that provide particularly fast response times. However, both the colour reproduction and the viewing angles (from 50°/90° to 160°/170°), as well as the contrast ratio, are limited. ▪ VA (vertical alignment) panels are capable of displaying a particularly high contrast ratio but fall behind in the response time. The viewing angles are the same as the IPS technology (178°/178°). VA panels may be slightly more affordable than IPS panels but offer inferior colour reproduction and image quality.
Response time	Response time refers to the time it takes a monitor to change a pixel from one colour to another.
Aspect ratio	The aspect ratio specifies the ratio of the horizontal screen width to the vertical screen height. The most common aspect ratios are 16:9, 16:10, 21:9.

Table 5: Glossary

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10 All of the technologies noted here have advantages and disadvantages. Another comparison can be found in the
   ↗ **guidelines by the German Social Accident Insurance (DGUV) for designing computer and office workstations of 2019**

Bitkom represents more than 2,700 companies of the digital economy, including 1,900 direct members. Through IT- and communication services alone, our members generate a domestic annual turnover of 190 billion Euros, including 50 billion Euros in exports. The members of Bitkom employ more than 2 million people in Germany. Among these members are 1,000 small and medium-sized businesses, over 500 startups and almost all global players. They offer a wide range of software technologies, IT-services, and telecommunications or internet services, produce hardware and consumer electronics, operate in the digital media sector or are in other ways affiliated with the digital economy. 80 percent of the members' headquarters are located in Germany with an additional 8 percent both in the EU and the USA, as well as 4 percent in other regions of the world. Bitkom promotes the digital transformation of the German economy, as well as of German society at large, enabling citizens to benefit from digitalisation. A strong European digital policy and a fully integrated digital single market are at the heart of Bitkom's concerns, as well as establishing Germany as a key driver of digital change in Europe and globally.

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