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Mary Peretz
Inquiry Secretary
Carl Zeiss / Bio-Rad merger
Competition Commission
New Court
48 Carey Street
London
WC2A 2JT

20 January 2004

Dear Ms Peretz

SUBMISSIONS

NON - CONFIDENTIAL VERSION

- 1 I refer to Annex A of the letter from Sir Derek Morris to John Cockerill of Carl Zeiss Limited dated 30 December 2003 in which you asked for a submission on
 - 1.1 (a) Carl Zeiss AIM: Its brief history, together with the details of its organization, financial structure and principal activities.
 - 1.2 (b) The relevant markets: An explanation of the product and geographic markets in which AIM operates, dealing separately with the UK, the EC, and other international markets.
 - 1.3 (c) The acquisition: A statement of the circumstances leading up to the proposed acquisition, the acquisition itself and copies of any relevant agreements, together with the history of the previous relationships between the companies (if any) including relevant legal or financial issues.
 - 1.4 (d) Your views on the purpose and effect of the acquisition: A statement of the purpose and expected consequences of the acquisition on competition.
- 2 You invited us to comment in the submission on:
 - 2.1 the relevant market;
 - 2.2 customers and / or suppliers;
 - 2.3 competition within the product and geographic markets identified in the terms of reference, and any other market definition you may consider relevant;
 - 2.4 barriers to entry to such markets;
 - 2.5 the effect of the acquisition on customers or suppliers;
 - 2.6 level of prices and variety and quality of products;

- 2.7 capital structure and financing; and
- 2.8 any other issues which we consider relevant.

(A) CARL ZEISS AIM: ITS BRIEF HISTORY, TOGETHER WITH THE DETAILS OF ITS ORGANIZATION, FINANCIAL STRUCTURE AND PRINCIPAL ACTIVITIES.

- 3 The Carl Zeiss Stiftung does business as the Carl Zeiss Group which owns Carl Zeiss Jena GmbH which is the holding company for the Carl Zeiss advanced imaging microscopy division ("AIM"). AIM is the buying business, through Carl Zeiss Jena GmbH.
- 4 Further details of the Carl Zeiss Stiftung, its history and the history of CZ AIM is available at <http://www.zeiss.de>.
- 5 The Carl Zeiss Stiftung consists of two independent enterprises – Carl Zeiss and Schott Glass. Substantial details of both enterprises are available on their web-sites (www.zeiss.de and www.schott.com). Annual reports have already been provided by letter dated 7 January 2004.
- 6 The Carl Zeiss Group offers a wide spectrum of high-quality products in the field of optics, electronics and precision engineering. The Carl Zeiss group has six business groups – please see the accounts. The only relevant business group to this transaction is Microscopy which splits into three business areas including AIM. The other two business areas (one a separate division and the other formally part of AIM's business division) are molecular medicine and light microscopy (being traditional microscopes also called wide-field microscopes), neither of which are the relevant buying business in this transaction.
- 7 The formal corporate structure within the CZ Group does not follow the business structure. CZ's AIM business operates out of Jena in Germany and is legally owned by Carl Zeiss Jena GmbH. Carl Zeiss Jena GmbH (CZ J) is a 100 % subsidiary within the Carl Zeiss Group and also owns many other businesses. The light microscopy business division makes a component for some advanced 3D microscopes (because confocal LSM systems starts with a traditional wide-field microscope) and is owned directly by the Carl Zeiss company and is based in a different German city, Gottingen. A list of the major subsidiaries and associated companies within the Carl Zeiss Group are listed on pages 70-73 of the 2002 Carl Zeiss Group Annual report.
- 8 A simplified corporate structure was provided (as amended) on 12 January 2004.

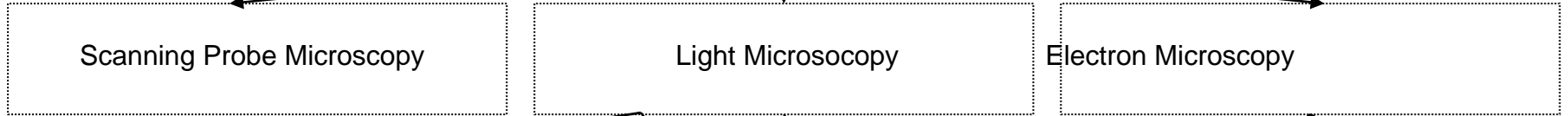
(B) THE RELEVANT MARKETS: AN EXPLANATION OF THE PRODUCT AND GEOGRAPHIC MARKETS IN WHICH AIM OPERATES, DEALING SEPARATELY WITH THE UK, THE EC, AND OTHER INTERNATIONAL MARKETS.

Description of the products within the advanced microscopy market

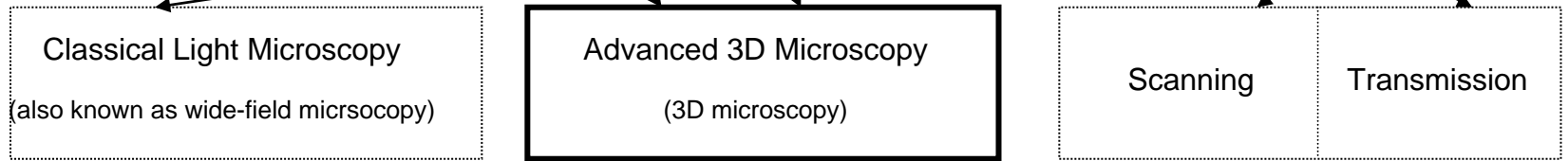
- 9 You are referred to the diagram below.

MICROSCOPY
(imaging)

level 1



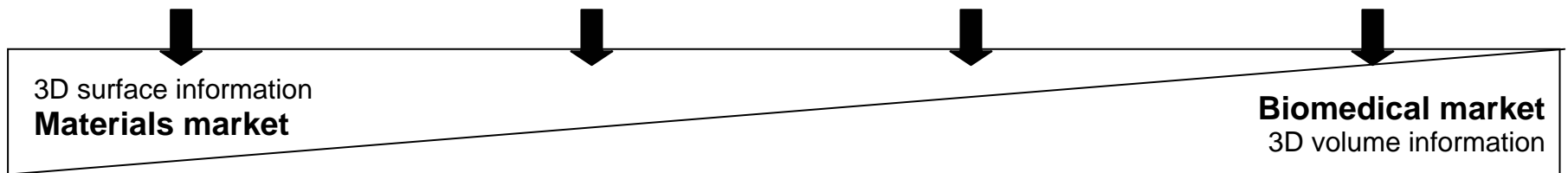
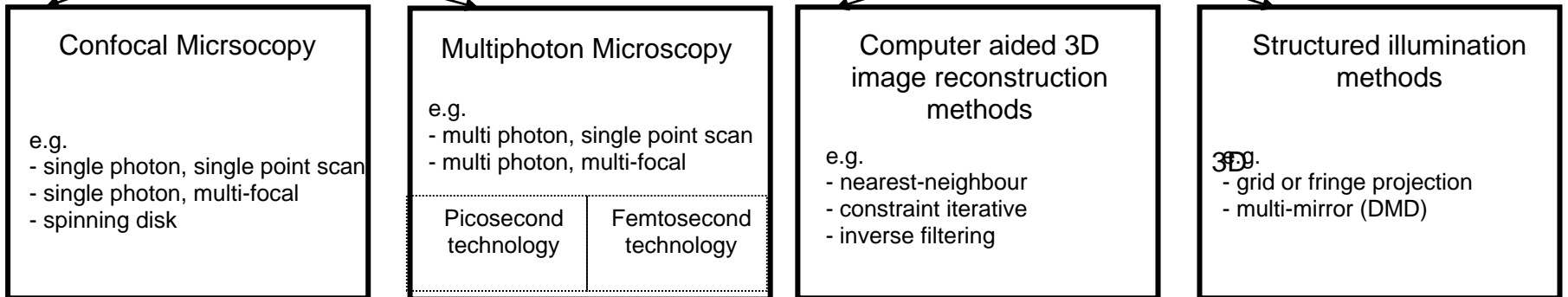
level 2



level 3



level 4



Level 1

- 10 Microscopy can be split into three areas – microscopes which use light, electron microscopes and scanning probe microscopes. Microscopes in all of the three areas can be used to examine both inorganic and organic specimens. Microscopes in each area work in significantly different ways and samples need to be prepared in different ways prior to being viewed.
- 11 There is a wide range of different techniques involved in microscopes which use light which are further described at the subsequent levels. Different techniques have different characteristics. Many systems can examine a little way beneath the surface of the samples. Systems can be used with marking technologies to highlight what is relevant. Some systems can image moving specimens and some systems can image living specimens without killing them.
- 12 Electron microscopes work by bombarding the sample with electrons. Electron microscopes can work to finer resolutions / higher magnifications than any microscope using light. They can examine both materials (inorganic specimens) and organic samples but all previously living samples must be killed and very carefully prepared prior to examination because samples are viewed in a strong vacuum.
- 13 Scanning probe microscopes use a fine probe that is scanned over a surface (or the surface is scanned under the probe) and measures some property of the process to produce the image. Scanning probe microscopy is a general description used for a growing number of different techniques eg scanning tunnelling microscopy or atomic force microscopy. A scanning probe microscope can provide much finer resolutions than techniques using either light or electrons. It can resolve down to individual atoms, *ie* typically at least 100 times finer than can be achieved with any techniques using light. It also examines the surface of the sample. It is exceptionally difficult to examine organic samples which are still living. It is also exceptionally difficult to examine samples (organic or inorganic) which move. Scanning probe microscopes cannot be combined with any marking technology to highlight interesting elements.
- 14 Microscopes in each of the three different areas have different characteristics which make them suitable for different research. Each can show images down to different smallest resolutions. Each requires the sample to be prepared for viewing in a different way thus ruling out that technology's use on certain (and in each case mostly) different categories of samples. Large laboratories tend to purchase both electron and light microscopes. Increasingly, some laboratories supplement this with a scanning probe microscope.
- 15 CZ believes that the three areas of microscopy are so different that microscopes they are not substitutable to buyers. Microscopes which use light are discussed further in the different levels.

Level 2

- 16 A fundamental distinction is made within microscopes which use light between traditional microscopes, known hence-forth as wide-field microscopes, and advanced 3D microscopes which give a clearer and more three-dimensional image.
- 17 Very many people will be familiar with a simple wide-field microscope from science at school. Wide-field microscopes focus the light reflected back from or transmitted by the sample to provide an image. The image is all gathered at the same time and, quite literally, what you see is what you are looking at. That image will be truly in focus and clear only at one particular height within the sample, the optical plane. The optical plane will very often be narrower than the depth of the sample (however carefully the sample is prepared) so those elements of the sample which are above and/or below the optical plane will be out of focus to the viewer in the image.

- 18 Advanced 3D microscopes are significantly more complex than wide-field microscopes. Advanced 3D microscopes use a variety of different techniques. Typically, they process substantially more data to generate their image and it is probably easiest to start by thinking of them acquiring several images focussed carefully at different heights in the sample which are re-combined to generate a substantially clearer image which shows depth within the sample. A useful visual aid has also been provided. This shows a wide-field image of a biological sample and then of a fly where stray light from above and below the optical plane causes blur. The visual aid then demonstrates how approximately 15 advanced 3D microscope images, known as sections, can be combined to show a very clear and spatial image of the fly with additional 3D information.
- 19 There are two reasons why customers want an advanced 3D microscope system. First, many scientists desire the spatial information easily visible with an advanced system which cannot be provided by a wide-field microscope. It is actually impossible to analyse certain structures without it. Secondly, an advanced image is crisper. As outlined above, a wide-field's two dimensional image is adversely affected by light above and below the optical plane. Advanced systems strip such distorting effects out and produce crisper images with higher contrast.
- 20 CZ believes that the advantages of an advanced system are attractive to so many buyers that advanced systems form a separate market to wide-field systems.

Level 3

- 21 A wide diversity of techniques is used within advanced systems. Each has different technical and cost characteristics. Buyers consequently choose the 'best fit' for their budget and the characteristics of the investigations they will undertake.
- 22 CZ submits that all advanced 3D microscopes (the entirety of level 3) fall within the relevant single market.
- 23 Although it is not a very easy read, we include a recent article from "Science", the highly reputable journal of the American Association of the Advancement of Science. It is written by scientists from Bristol and Manchester Universities, who explain the pros and cons of the main different advanced 3D microscope technologies for one particular use, that of live cell imaging. To be clear, advanced 3D microscopes have very many other uses including the analysis of materials. The article, however, makes abundantly clear how all the different techniques within advanced 3D microscopes compete with each other, depending upon the precise needs of the scientist.
- 24 A scientist will be considering several things in combination - the characteristics of the technology used, the sensitivity and characteristics of the detectors of the light, the impact of preparation on a sample and the costs, as follows:
- 25 *Sensitivity* - They will consider the sensitivity of detection provided by the system.
- 25.1 More or less light may be required to generate the image.
- 25.1.1 You need the image to be clear both in the sense of not blurred but also in the sense of showing you what you actually want to see and not irrelevant other information. The ratio of signal (what you want to see) to noise (what is irrelevant or harmful to the image) can be important.
- 25.1.2 A huge diversity of techniques for marking specimens are available. Scientists very often apply chemicals or processes (markers) so that light is emitted (fluorescence) when a light source is shone at the sample. The light emitted is then picked up by some kind of detector to create the image. Marking is highly useful because different chemicals attach to or combine with precisely known different structures. The scientist consequently knows that when they see a

particular colour in the image they are looking at a particular biological structure. Many scientists will wish to use more than one marker at a time (eg literally both green and red fluorescence) to examine several related things at once. Systems can provide for several detectors (each looking for its own colour).

- 25.1.3 Many different types of detectors are available. Each has their own characteristics affecting sensitivity and other aspects. Some (eg photo-multiplier tubes) measure the intensity of light but not its position (so you need to know exactly where the detector was pointed in the sample at the time). Others (eg a very wide range of digital cameras) give spatial information. Different light sources give different characteristics (eg mercury lamps, many different types of lasers, Xenon lamps). There are also different ways of splitting the light that is emitted from the markers into each different colour and its detector.
- 25.2 *Speed of acquisition* - The speed of acquisition of the optical sections (think about different pictures being stacked up together) by the system can be vital. It is particularly important if scientists wish to examine how the same sample changes with time. Some systems need only one acquisition step for each section. Others take longer because several acquisition steps are required for each section. Some systems are faster than others.
- 25.3 *Photo-toxicity* - Many samples are sensitive to light and/or the operation of the marker involves a chemical reaction which produces a toxic bi-product. Some living samples will be impaired or killed if they see too much light. If this matters, less light will be desired.
- 25.4 *Processing time* - The speed of provision of the image can be important. Some research scientists may be unaffected by waiting minutes or hours for an advanced image but some users particularly in healthcare perform many of the same few investigations each day (so cannot tolerate capacity limits caused by the computer still processing the last image) or otherwise must act on a time critical basis.
- 25.5 *Cost* - Costs of different systems vary.

Level 4

- 26 All sub-divisions below advanced 3D microscopes relate to how different systems generate sections using different technologies plus how the system cleans up each section so that the combined advanced image is as crisp as possible.
- 27 There are two broad groups of techniques here - optical and non-optical. Although both optical and non-optical techniques use light in the creation of the image, the description relates to how the section is generated. Optical systems use optical components, i.e. physics to exclude light from outside the required plane of focus. For non-optical systems, all the light is gathered but a section is produced by mathematical treatment of the raw data to remove the "out of focus" data. Non-optical sectioning uses powerful computer algorithms so the image tends to take longer to be generated (typically minutes to hours for each image).
- 28 Many different techniques based upon different technologies are used, as follows.
- 28.1 The *optical* category includes confocal and multi-photon systems but includes other systems. Confocal systems use several different underlying technologies to generate the section including point-scanning laser scanning microscopes (LSM) (where a laser is pointed to certain points on the sample and the light reflected or fluorescence generated from that point is detected), Nipkow spinning disk scanners and multi-focal confocal systems. Multi-photon systems use more than one photon of light to trigger the fluorescence which creates the section.
- 28.2 *Non-optical* sectioning systems use a variety of technology including deconvolution, structured illumination and white light interferometry

- 29 Analysis of the Science article shows different techniques are considered to be better at different uses. In summary, as follows:
- 29.1 Multi-photon systems use incredibly brief bursts of light (photons) to trigger fluorescence from markers. It is the arrival of two such bursts at the point being analysed at the same time which triggers fluorescence. This limits the photo-toxicity of the microscope in living samples because the chemistry generating the fluorescence causes the toxicity. The technology also enables light to be absorbed approximately 10 times as deep into the sample as for single photon systems so sections can be thicker.
- 29.2 Nipkow disc systems allow up to 360 different images per second which is very good for examining fast biological processes.
- 29.3 Confocal laser scanning systems cannot go as fast Nipkow spinning disk systems but allow the use of multiple detectors more easily. They are good for multi-colour / multi-marker analysis.
- 29.4 Many experiments, particularly using live cells, may be better performed using wide-field with subsequent non-optical deconvolution of the data series. Wide-field microscopes do not exclude any light from any point of focus because they collect it all. This can be particularly advantageous in imaging weakly fluorescent structures.

Further details about different technologies

- 30 Further details are provided concerning certain technology below.

Confocal Microscopy (part of the optical category)

- 31 Conventional wide-field fluorescence microscopy is plagued by secondary fluorescence occurring away from the focal region of the microscope. This contributes to flare and a high background noise signal and often obscures important specimen details. Confocal microscopy circumvents this problem, to a large degree, by rejecting out-of-focus background fluorescence through the use of pinhole apertures, which produce thin (less than a micron) un-blurred optical sections.
- 32 By consecutively acquiring images at different focal positions, confocal microscopes are typically used to reconstruct high-resolution advanced images of reflective surfaces to show surface topographies (materials applications) or cellular and sub-cellular structures of biological material labelled using specific fluorescent markers.
- 33 Illumination is achieved by scanning one or more focused beams of light, usually from a laser, across the specimen. The sequences of points of light from the specimen (the segment) are detected by a photo-multiplier tube through a confocal aperture (pinhole) or a digital (CCD) camera, and the outputs from that detector are built into an image and displayed by the computer. Unstained biological and material specimens can be viewed using light reflected back from the specimen and biological species are usually labelled with one or more fluorescent markers.
- 34 Typical end uses are the analysis of surface textures of reflective materials in industrial research and quality control plus 3D analysis of sub-cellular structures (living or dead samples) in basic and applied biomedical research (Cell Biology, Neurobiology, Developmental Biology, Physiology, Molecular Genetics etc.)
- 35 Major Manufacturers are Bio-Rad, Leica, Nikon, Perkin Elmer, Olympus, CZ, Visitech and many others.

Multi-photon Microscopy (part of the optical category)

- 36 In contrast to confocal fluorescence microscopy, excitation in multi-photon microscopy occurs only at the focal point of a microscope, providing the ability to section optically thick biological specimens in order to obtain three-dimensional resolution without the need for

the confocal detector pinhole. Because the position of the focal point can be accurately determined and controlled, multi-photon fluorescence is useful for probing selected regions beneath the specimen surface. The highly localized excitation energy serves to minimize photo-bleaching of markers attached to the specimen and reduces photo-damage. This increases cell viability and increases the subsequent duration of experiments that investigate the properties of living cells. As a major benefit of the technology, the application of near-infrared excitation wavelengths permit deeper penetration into biological materials and reduces the high degree of light scattering that is observed at shorter wavelengths. This functionality is advantageous for imaging thick living tissue samples, such as brain slices and developing embryos.

37 Typical end uses are deep tissue imaging in live biological specimen (tissues, organs, animals) in basic research (neuro-biology, developmental biology and physiology).

38 [].

Computer aided 3D Image Reconstruction (part of the non-optical category)

39 In thick specimens, light scattered from the areas above and below the focal plane blurs the image and obscures structures within the image. Computer aided 3D image reconstruction (3D-Deconvolution) mathematically removes this distortion. The result is a high-quality image with less noise and higher resolution in 3D. The basis for mathematical image deconvolution is a set of wide-field digital fluorescence micrographs taken from the same specimen at different positions of objective focus. Due to the sequential nature of the acquisition of these images, computer aided 3D image reconstruction is hardly applicable to any biological material which moves. In contrast to confocal and multi-photon microscopy, computer aided 3D image reconstruction uses processing software to provide additional image information but only *after* the image acquisition procedure (the experiment) has been completed. Thus, you cannot view the results online.

40 Typical end uses are basic biomedical research (cell biology, neuro-biology, developmental biology and anatomy); slow or non-moving objects (i.e. fixed biological material) and experiments that do not require online analysis;

41 Computer-aided 3D image reconstruction systems typically consist of (1) standard research microscope for biomedical applications, (2) digital camera, (3) computer for system control and image analysis and (4) system control and image reconstruction software. Microscopes and cameras for these systems are provided by every major provider of microscopes (Olympus, Nikon, Leica, CZ) and research-grade digital cameras by their major providers (Hamamatsu, Qimaging, Roper, CZ, etc.).

42 Major software providers are: Scientific Volume Imaging B.V. (Huygens); VayTek (HazeBlaster, VoxBlast, MicroTome); Applied Precision Instruments (Deltavision Spectris); AutoQuant Imaging Inc. (AutoDeblur); Intelligent Imaging Innovations Inc. (SlideBook); Improvision (OpenLab); Empix Imaging Inc. (Northern Eclipse); Universal Imaging Corp. (MetaMorph 3D Deconvolution); plus CZ offers a 3D image reconstruction module (3D Deconvolution) for its AxioVision digital imaging software.

Structured Illumination (part of the non-optical category)

43 In this technology, also referred to "grid projection", a grid of stripes of defined width is projected onto the focal plane of the microscope objective and sequentially shifted in defined steps relative to the sample. A CCD camera takes a picture in each grid position. The "raw" images are combined into a resultant image by on-line computation. The resultant image is an optical section through the sample, from which all image sections originate, with out-of-focus information removed. This image has an improved signal-to-noise ratio, and approximately doubles image resolution in the axial section (Z) depth direction.

44 Typical end uses are Basic biomedical research (cell biology, neuro-biology, developmental biology and anatomy); non or slowly moving objects (i.e. fixed biological material) and low cost optical sectioning tool for basic 3D imaging applications.

45 Major manufacturers are CZ (ApoTome), Optigrid (Thales).

Using confocal systems for materials

46 For surface analysis eg materials but also bio-medical applications, confocal microscope systems are used in the reflection mode to measure surface topographies. The system design is like a confocal microscope for biomedical research but with minor modifications (mainly less functionality and thus a lower list price). Thus, virtually any confocal microscope for biomedical research can be run in the reflection mode and can be applied to surface topography. Very many are used for materials applications or in departments where they will be used for materials as well as for Bio-medical applications. The only additional requirement to a confocal system for materials is adequate software for the analysis and for determining the parameters of surfaces. The parameters indicating the system performance in a particular field of material research can be described as height differences in the sample, roughness, slope angles, and maximum sample area to be imaged. Nonetheless, in this market the confocal systems also compete with technologically completely different systems that cannot be used for biomedical imaging because they cannot handle fluorescent markers of cellular or sub-cellular structures. These competing systems are white light interferometers and other opto-related systems.

47 Major manufacturers are as follows:

47.1 Confocal systems for material sciences e.g. Leica (Germany), CZ (Germany), Lasertec (Japan), Olympus (Japan), Keyence (USA), Nanofocus (Germany), ATOS (Spain) and many more.

47.2 White light interferometers e.g. Zygo (USA), WYKO (USA), ATOS (USA).

47.3 Other opto-related systems for the materials market: (1) opto tactile systems e.g. Werth (Germany), Tropel (USA), (2) laser autofocus systems e.g. Nanofocus (Germany), BMT (Germany), (3) stereographics based 3D optical systems e.g. Alicona (Austria)

Systems made to order

48 CZ AIM believes that virtually no advanced 3D microscope sold by any manufacturer is the same as any other because there are a very wide range of possible permutations.

49 CZ AIM is effectively making each microscope to order. This is driven by customer demand for precisely the specification they desire. Approximately [] months ago, it was taking CZ AIM about [] months to deliver, install and activate the precise microscope ordered by the customer. As a response to this, CZ AIM identified certain specifications and offered to make them operational at the customers site within [] weeks so long as no changes to the specification were made. CZ AIM has now reduced its lead-time down to approximately [] months.

50 [].

51 For both companies, the number of major permutations is very great.

52 CZ AIM offers a single confocal laser scanning microscope platform. This covers the LSM 5 PASCAL, the LSM 510, the LSM 510 NLO and the LSM 510 META and can be both single and multi-photon systems.

53 The platform comprises 7 different core elements – the microscope stand (meaning the underlying wide-field microscope), the laser module, laser delivery system, the scanning

detection unit, the control computer, control and analysis software and accessories. The main permutations are as follows:

- 53.1 There are 7 different microscope stands (all from the CZ Group's wide-field range). There are also a plethora of different objective lenses and accessories for those stands.
- 53.2 There are 31 different standard configurations of the 3 core elements together - laser modules, laser delivery systems and scanning detection unit - although more are possible.
- 53.3 CZ tends to propose a Siemens computer but alternatives are possible.
- 53.4 Every system comes with certain standard software but there is a choice of 7 extra software packages which may be acquired.
- 53.5 There are approximately 6 different microscope tables which can be utilised.
- 53.6 Then there are a wide range of accessories;
 - 53.6.1 different external detectors (of two main classes but many different items) and multiple detectors are possible;
 - 53.6.2 external couplings (like a user port on a computer) so that other external detectors can be added later; and
 - 53.6.3 other accessories.
- 54 This gives well over 7,500 significant permutations and provides a very wide spectrum of substitution whereby each technology can compete with every other. CZ's price list for the LSM 510 has 57 pages.
- 55 CZ stresses that the process of customer selection of specification is a highly competitive process. Typically several companies will be asked tender. Some buyers will want the best specifications that their grant money can afford. Other customers study the technology or go on courses held by researchers in scientific institutes where the full range of techniques are demonstrated. Customers apply different technologies and set up permutations to the same core samples to identify empirically which generates the best images for their research.

Pricing levels

CZ's advanced systems

- 56 Although there are no standard systems, the following descriptions can be used as a guide but only as very approximate guide.
- 57 The earliest part of the CZ confocal laser scanning platform still on the market is the LSM 510 which was first commercialised in 1997. A fairly standard UK price would be []. The LSM 510 NLO [] was commercialised in 1998 and costs []. The LSM PASCAL was first commercialised in 1999 and a typical bio-medical configuration would cost from [] and a typical materials configuration about []. The LSM 510 META was commercialised in 2001. It [] ordinarily would cost from []. In describing when these were first commercialised, it is important to remember that they are continuations of the platform.
- 58 CZ sells a structured illumination microscope, comprising at its core a microscope stand, a digital camera, a grid projection system, a computer and control and analysis software. This typically sells for between [] in the UK and again very many permutations are available.

- 59 CZ sells a 3D deconvolution system based upon 3D aided image reconstruction. This has a microscope stand, a digital camera, a computer and analysis software at its core. Many permutations are available. It sells for approximately [].

Customers

- 60 CZ has a range of buyers. They come mostly from universities but a significant proportion are from research institutes and industry with a small proportion in the healthcare sector. The figures provided to the OFT are repeated here (although the precise number of sales will be confirmed in CZ AIM's response to the questionnaire) but the percentages give a fair reflection which is broadly the same between both parties. [].

61 []

62 Buyers will have different characteristics and demands.

62.1 Healthcare buyers may be undertaking the same few tests hundreds of times per week. They will wish to buy the perfect systems within their budget for those few tests.

62.2 Pure research buyers historically used to obtain one advanced 3D microscope for their professional life and would buy for the maximum flexibility within their particular specialty that they could afford. Increasingly, researchers factor a new machine into their grant applications and thus are able to specify exactly what they want for particular narrow research. This will mean precisely the best technology for their research which they have probably empirically researched at a course or on the machines of friends. Buyers will be keenly aware of the differences between technologies (see above) and the flexibility which different detectors / software / set up tables etc. provide to them.

62.3 Laboratory buyers will cater for shared users. They may look to complete their laboratory's flexibility by adding to their portfolio of systems. [] recently did just this. Alternatively, a laboratory may wish to capture the maximum flexibility available in one machine within their price range. Such buyers may specify a confocal system so that handles bio-materials and materials easily - reflection mode for materials whilst still handling marking fluorescence. They may consider a multi-photon ready system in the form of a higher end confocal LSM system so that grant funding permitting in the future it can be upgraded. []. Some may buy a joint multi-photon / single photon CLSM system as offered by [].

63 [].

Buyer / supplier power

64 CZ does not sell to the same core buyers but in such a small market and where the buyer runs tenders and will make such detailed specification choices for a tailor made product, there is an element of buyer power in that the existence of buyers cannot be assumed and competition is felt to be tough. There is also not significant supplier power. CZ sees the advanced 3D microscope area as highly competitive between suppliers throughout the full range of systems in the advanced 3D microscope market.

65 []

Barriers to entry

66 The barriers to entry depend upon the business model used by the manufacturer.

67 CZ AIM submits that different business models operate amongst the larger manufacturers of advanced 3D microscopes. Different market players compete with different approaches.

67.1 [] compete primarily through innovation and have a highly technically and application skilled sales force. The sales force needs to be highly specialised to communicate to scientists the exact benefits of the type of system under consideration and then the advantages of the manufacturer's system over the competitors'. Furthermore, there is a

strong bond of trust between customer and manufacturer the more sophisticated is the system (and thus this is particularly true for high end confocal systems, multi-photon ready or full multi-photon systems). The user relies on the long-term presence of the supplier both to support his maintenance needs but also to develop onward the technology and software.

- 67.2 [] are experts in efficient low costs production (with production facilities in Asia) which means that they tend to focus on the higher volume market. [] they [] operate efficient low cost distribution through non-specialist distributors and dealers. Distributors cannot maintain the level of technical sophistication on sale as must be achieved by [] sales force. Historically, [] have not innovated noticeably in the market but have followed technological developments by other players [].
- 68 One potential barrier can be dismissed. It is true that customers will not buy a system where they are not comfortable that their servicing and maintenance needs can be met within their locality (UK-wide and normally country-wide elsewhere). Such facilities, however, are not considered too difficult or costly to establish and maintain. CZ estimated to the OFT that it would cost [] to set up a service site in the UK if only one service engineer was required and approximately [] with 3 engineers. [] estimates were slightly larger. [] estimate that a UK three engineer operation would cost about [] based upon []. Clearly, there is some element here about the sophistication of the support staff particularly for high end systems.
- 69 CZ AIM feel that the advanced 3D microscope market is characterised by high levels of innovation and new product releases which can quickly gain market share if all the elements (innovation, skilled sales force etc) are in place. The questionnaire will provide examples of this, CZ AIM consequently believes that there are really only two barriers to entry – technology and the orientation and quality of the sales force.

Product market definition

- 70 Market definition is in CZ AIM's view quite difficult [].
- 71 CZ AIM proposes a single advanced 3D microscope market is present whilst accepting that there are core groups who will see each of the technologies as must have in certain situations. Each of the advanced 3D microscope technologies ultimately achieves the same result in that the images can rarely be separated according to the technology used. CZ AIM sees a chain of partial substitution through the market and believes that the test of an increase in prices of a hypothetical monopolist would show a response of differing specification eg across the LSM platform and consideration of different technology. There are clear links between multi-photon prepared systems and other confocal systems. Similarly, between non-optical technologies and lower-end confocal systems [].
- 72 Even on a contrary view, CZ AIM sees the different categories of advanced microscopes as very significantly linked.
- 73 Each technology has advantages and disadvantages (outlined above) and consequently a sub-group of must-have users eg Nipkow spinning disk systems for fast moving living samples; non-optical systems for weak fluorescence; a confocal LSM for a flexible mix of materials / bio-matter research or mix of users which can then be specified according to budget; Multi-photon for maximum penetration into the sample and the least photo-toxicity of living samples.
- 74 Sales are often achieved by tender particularly for higher end systems and this will be outlined further in the response to questionnaires.

Geographical market definition

- 75 Customers will not buy nationally unless they are sure that there are sufficient maintenance and servicing facilities. For this reason, buyers operate in a UK market (and national

markets elsewhere). On the other hand, suppliers operate in world-wide markets [] and the battle for innovation and technology takes place on a world-wide stage.

De minimis market size(s)

76 CZ wishes to stress the small nature of this transaction. The OFT's estimates for the entire UK market size was £3 million on its multi-photon market definition and £14 million for its confocal laser scanning market (a majority sub-set of the confocal area). CZ is working on confirming its figures for the questionnaires but believes that £3 million is an over-estimate []. It is submitted that in any event the transaction is de minimis.

(C) THE ACQUISITION: A STATEMENT OF THE CIRCUMSTANCES LEADING UP TO THE PROPOSED ACQUISITION, THE ACQUISITION ITSELF AND COPIES OF ANY RELEVANT AGREEMENTS, TOGETHER WITH THE HISTORY OF THE PREVIOUS RELATIONSHIPS BETWEEN THE COMPANIES (IF ANY) INCLUDING RELEVANT LEGAL OR FINANCIAL ISSUES.

77 []

The Acquisition

78 The target business within the Bio-Rad Group is the Cell Science Division which is a separate reporting unit within the Bio-Rad, Inc. Group. []

79 The transaction would, from the business perspective, be the acquisition of the Bio-Rad Cell Science Division by CZ's AIM business. From a legal perspective, it will be an asset sale with accompanying business of most of the assets within the Cell Science Division from out of the Bio-Rad Group (mostly but not exclusively out of Bio-Rad Microscience Limited) by a dormant subsidiary of Carl Zeiss GmbH.

Jurisdiction

80 CZ AIM is of the view that there are enterprises ceasing to be distinct because the Bio-Rad Cell Science Division, previously under the sole control of Bio-Rad, will be mostly transferred through an asset sale so that it is under the control of the CZ AIM business.

81 [] It is for the Competition Commission to consider what it sees as the appropriate characteristics for the share of supply test. [].

Copy of the Agreement

82 A copy of the transaction agreement and schedules has already been provided.

Relationships

83 There are no relevant previous relevant relationships between CZ AIM and Bio-Rad Cell Science Division.

(D) YOUR VIEWS ON THE PURPOSE AND EFFECT OF THE ACQUISITION: A STATEMENT OF THE PURPOSE AND EXPECTED CONSEQUENCES OF THE ACQUISITION ON COMPETITION.

84 []

85 [] CZ and Leica will compete aggressively in the multi-photon arena just as they do in all other areas. There are synergies to the transaction which are outlined below.

86 The transaction does not reduce competition but in contrast increases the available competition in a small, high risk and high technology market.

87 []

Yours sincerely

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