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36 QUESTIONS TO HELP COMMISSION NEUROSCIENCE RESEARCH

World Research Resource

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36 QUESTIONS TO HELP COMMISSION NEUROSCIENCE RESEARCH

Following the ESOMAR Neuroscience seminar in June of 2011, it became clear that ESOMAR has a role to play in helping the Neuroscience area of research to grow and flourish in the years to come. Alongside a team of experts we believe that this can best be achieved by producing a set of questions. In essence the "36 questions to help commission neuroscience research" is a set of questions which will help buyers ensure they are using the correct neuroscience tool for their research purpose while helping providers of neuroscience tools meet the needs of their clients.

COMPANY PROFILE

1. What experience does your company have with providing market research using neuroscience techniques?
The answer to this question might help you form an opinion about the relevant experience of the provider. How many years has the company been providing market research using neuroscience techniques? How many projects have they carried out? How many participants/respondents have been involved?

2. What experience/education does your team have with using neuroscience techniques in general? What is their experience with using these techniques for market research purposes?
Use this question to establish how many staff with the relevant academic qualifications this company has. What are their academic qualifications? Have they published any relevant papers/articles? What is their experience with neuroscience in general, and with neuroscience for market research in particular? What is their role within the company – are they

primarily involved with R&D, or do they participate in a hands-on way with market research? Do they have the support of qualified and experienced market research professionals on projects?

3. What types of industries does your company focus on (e.g. advertising, FMCG, etc.)?
Use this question to find out whether the provider has experience in a sector relevant to you. Ask whether any existing clients are willing to provide references/testimonials. Are there case histories that can be shared, or papers in the public domain?

4. What experience does your company have in providing market research in general?
Again, this question should be answered by number of years and/or number of projects. Note that if this company has been set up solely to provide market research using neuroscience techniques, then the answer will be the same as for Q1. If this is a general market research company which has moved into neuroscience, then the total experience of the company is relevant.

5. What experience/education does your team have with market research in general?
Here you should focus on the market research expertise within the company. What market research qualifications and experience do the key personnel working on projects have? How long have they been involved in market research? Have they presented any relevant papers or published articles? Are they members of ESOMAR or relevant local market research organisations? What market research codes of conduct do they adhere to?

TECHNIQUE PORTFOLIO

6. Which neuroscience techniques does your company use for market research? (*See annex for a list of techniques with an explanation of each technique.)
Advances in bio-/neurometrics provide a wide array of measurement tools which are evolving to focus on varying aspects of consumer response to marketing stimuli. Some of the techniques include EEG, GSR, facial coding, fMRI, eye tracking, etc.

Moreover, there are differing definitions, depending on the provider, of what is being measured. For example, two companies may offer EEG, but provide different metrics derived from EEG.

The answer to this question will clarify which techniques, technologies and methodologies the provider intends to use and why. The answer should address why the recommended techniques are best suited to meet a given study's research objectives.

It should also be noted that neuroscience and neuromarketing research are rapidly evolving. This means that additional techniques and methodologies may emerge over time. The list below is not exhaustive.

7. What other "traditional" market research techniques, if any, does your company provide?
Bio-/neurometrics are new tools that expand marketing insights, but do not necessarily replace all learning provided by traditional research methods such as survey, qualitative and behavioural response. Some companies offer only neuromarketing research, some provide a combination of traditional and neuromarketing research either directly, with partners or through third parties. The answer to this question will let you know what types of research are available

8. If you provide both neuroscience and traditional techniques, when do you recommend using which?
The answer to this question should explain when neuroscience would provide the answers a client is looking for, when traditional research would be a better option, and when a combination of neuroscience and traditional research is called for. The response should help clarify the philosophical perspective of the provider.

SPECIFIC TOOLS AND METRICS

9. Which specific neuroscience measures or metrics do you provide (e.g. emotional engagement, cognition, memory encoding/recall, comprehension, etc.)?
The answer should provide a full list of metrics offered by the provider, with a

clear definition and explanation of why each metric is important. *Please note:* Terms that are common in marketing parlance may have a specific meaning when used in neuromarketing research. In addition, the definitions of various terms may differ among neuromarketing research providers (e.g. engagement is a commonly used but not uniformly defined term, and different researchers measure it differently). The answer to this question will simplify the comparison of neuromarketing research providers in the market, help prevent misunderstandings, and reveal instances of differentiation that may inform the client's decision making. You should encourage a level of response that meets your interests and needs (e.g. highly technical vs. high level summary).

10. What is the scientific background for the validity of your technology, methods and metrics?
The answer to this question should provide an explanation of the scientific basis for the provider's research technology, methodology and metrics. For example have their methods been peer reviewed and published? In doing so, it should provide the client with confidence for the legitimate application of all three to marketing research.

11. Which, if any, of your techniques deal with the measurement of emotion, and to what degree?
The answer to this question will tell you how a provider defines and measures emotions in their research, and what you can expect in terms of deliverables/insights in this area. For example, does one metric serve as an umbrella for the others or do they all have equal magnitude? Will the techniques show the intensity of emotional response? Will the metrics show an overall level of emotions or do they distinguish between positive and negative emotions? Will the techniques provide you with detailed emotions (e.g. distinguish between angry and scared, happy and excited)? Will the metrics show which specific element(s) of advertising/product elicited an emotional response? What other insights regarding emotional response will be provided?

12. Which, if any, of your techniques deal with memory, and to what degree?
The answer to this question will tell you if/how a provider measures memory and what type of deliverables/insights should be expected: Will the provider measure how memorable (i.e. likely to be remembered by consumers) your advertising/product is? Will the metrics show which elements are likely to be remembered and which are likely to be forgotten? What other insights regarding generating recall will be provided?

13. Which, if any, of your techniques deal with attention, and to what degree?
The answer to this question will show if/how a provider measures attention and what can be expected in terms of deliverables/insights. Will the provider show how much attention consumers pay to an advertisement/product? Which elements drive attention and which are unnoticed? Will the techniques show the reasons why consumers think about the advertisement/product (e.g. are they curious about it or are they confused by it)? What other insights regarding attention will be provided?

14. Are metrics available on a moment-to-moment/element-by-element basis, or as one static measurement, or both?
The answer to this question will clarify whether metrics are available as one number for a complete test, or whether metrics are available per moment and/or per element. Depending on what is being looked at by the client, this is particularly important for TV advertising, where it helps to understand a complete reaction to a whole advertisememnt, but it is also important to measure the reaction to each second of it. Can this technique provide one static measurement for comparison across a range of ads? Does the company have a database of ads in different stages for comparison? Does the company offer moment-to-moment measurement for diagnostics? How does the company know that the responses collected are in line with the audience's experience of the creative (e.g. is there lag in the output)?

PORTABILITY

15. Can your technique be used in a laboratory setting only? Can it also be used at a respondent's home, or in cinemas, shops, etc.?
Portability of equipment varies for different methodologies. There can be trade-offs between measuring response in natural environments, in a focus group facility or in a laboratory. In natural environments (such as in-store, at home, etc.), consumers are more realistically exposed to marketing stimuli. In other testing locations, researchers can better control the quality of the response data (controlling for distractions/noise, signal strength, etc.).

There are choices to be made between the realism of the consumer experience and control over measurement conditions. Study objectives should influence this decision, in conjunction with discussions with prospective providers.

16. Can your technique be fully integrated into online research data collection using the same respondents?
This is important to help understand how data that is already available through other market research channels can be integrated with neuroscience techniques. Some techniques require the use of trained technicians and specialised hardware in a dedicated location. Other approaches can be conducted in-home with the use of a webcam, delivered equipment or online programs. Online bio-sensory research techniques (e.g. eye tracking, facial coding and EEG) are relatively new.

SAMPLE SIZE

17. What sample size do you recommend for clients? What is the rationale behind it? Has it been validated?
The answer to this question will show whether a provider uses the same sample size as traditional market research, or a smaller size (for both qualitative and quantitative research projects). It will

demonstrate whether a provider has sufficient evidence that, despite a smaller sample size, results are reliable and, in the case of quantitative projects, representative of a total target. *Please note:* Most neuroscience market research agencies recommend much smaller sample sizes for quantitative research than normally used in traditional market research (+/- 15-30 vs. 100+ in traditional research). Various rationales are provided by different agencies for this, and the extent of smaller sample size validation differs. It is important to understand whether the sample size is chosen arbitrarily, based on general knowledge, or through a rigorous validation process (e.g. multiple test/re-tests for the same research project, comparison of results obtained among smaller and bigger samples for the same research project).

18. Does the sample size depend on a target consumer definition?
The answer to this question will determine whether you should expect the same sample size for each research project or whether/how it will vary depending on how homogenous/diverse, broad/narrow, etc. your target consumer definition is (e.g. will it be the same for a research project that targets consumers aged 18-25 vs. consumers aged 18-65? One gender or both genders?, etc.).

19. What do you recommend as a minimum sample size for sub-group analysis?
The answer to this question will explain whether there is a need to use a bigger sample size for projects that require separate analysis of sub-groups (e.g. analysing results among total teenagers, but also looking at only male teenagers vs. only female teenagers, etc.).

SAMPLE SOURCE AND COMPOSITION

20. Can you confirm the source of the sample that you use for neuroscience market research. What is the primary advantage of your sample?
The answer to this question will explain whether a provider uses their own dedi-

cated panel, third party panels (including their size, composition, etc.) or another approach for sourcing respondents. In the case of online 3rd party suppliers the ESOMAR 26 Questions can also be a guide to sampling. Understanding this answer will help in evaluating the sample and determining how easy it will be to reach specific or narrow consumer targets and various geographies. This should make comparing agencies easier.

21. Are there any specific health, demographic or other related restrictions on your sample due to the technique or technology used?
By listing all restrictions, this answer will clarify (i) if target consumers can be interviewed using a given technique (ii) how representative of the general population the sample used by a given technique is. *Please note:* Certain neuroscience techniques cannot be used on specific groups of respondents due to ethical concerns, health restrictions and/or technical limitations. For example, certain techniques are not used on pregnant women, left-handed people etc. It is crucial to understand upfront which respondent groups will be excluded from the sample to determine if/how it might impact a particular research project's quality.

22. What are the drop-out rates and/or co-operation rates?
While a certain level of drop-out is expected when recruiting for any research project, very low co-operation rates will limit how representative of the general population a sample is. The answer to this question will allow you to understand if/how much higher, or lower, drop-out rates are compared to traditional market research.

23. What are people told when they are recruited?
The type of reward offered, level of detail provided on what the measurement process looks like (including any health related questions), as well as the wording of any confidentiality agreements, etc. can influence the type of people who agree to participate in a research project. Understanding this will help evaluate sample quality. The response should also

explain whether amendments can be made to suit any specific client requirements.

24. How do you validate the sample (e.g. back checking)?
The answer to this question will show if a provider conducts any back checks of respondents' identities, demographic profiles, whether the interview actually took place, etc. This will help in the evaluation of sample quality, and can boost confidence in the reliability of answers.

STATISTICAL ANALYSIS AND DATABASE COMPARISONS

25. What significance testing, if any, do you use?
The answer to this question will clarify a provider's philosophy on significance testing: whether, when, how, at what confidence level, and why it should be used in results analysis. It is important to understand whether a provider's point of view matches your company's approach to using significance testing in quantitative research.

26. Do you use database norms? What are the sizes of the databases? Which geographies, products and consumer targets do they include? How do you ensure comparability of data between studies for various clients?
Is a provider able to illustrate the magnitude of obtained scores (are they weak, average, strong) by comparing them to previously tested cases? Can this be done in any location or product category, or for any target consumers? *Please note:* Raw scores are useful when comparing between two alternative solutions, as they allow you to identify which is stronger. However, without comparison to previous projects, it is difficult to understand how strong the results really are. To address this, some agencies maintain robust databases of previously obtained scores and have processes for ensuring their comparability between projects. Such databases will increase their diagnostic capability. However, since typical scores can differ dramatically between different geographies, target consumers or product categories, it is important to

understand not only the size, but also the composition of available databases in order to judge whether they will be relevant for a specific research project.

27. Do you provide additional modelling analytics?
The answer to this question will show if a provider can model/predict any consumer behaviour/business metrics (e.g. purchase intent, equity strength, ROI, etc.) using neuroscience metrics. The answer will also help clarify whether a provider will be able to assist with more complex modelling or statistical analysis, if necessary.

DATA QUALITY AND VALIDITY

28. What is your data quality control process?
The answer to this question will clarify whether a provider has data control processes in place, and what these controls are. For example, what procedures are in place to remove corrupt data or unsuitable respondents? Does the company have processes in place to identify sources of error? If providers offer more than one technique, are there different procedures in place for different techniques, etc.?

29. What processes are in place to ensure that scientific standards are adhered to during the measurement process? Who oversees these processes?
In answering this question, providers should describe standards validation and policies, and identify the key science staff.

30. What are your processes for interpretation of results, and who oversees these processes?
Do providers have qualified and experienced staff to interpret the results? Are they using standard academic practices and, if so, can they reference or point you to peer-reviewed papers that describe the appropriate method for interpretation?

31. Are you considering new approaches?
Ask about parallel testing versus control validating between online and offline methodologies.

32. If you provide any business measures (e.g. predicting purchase intent, viewership rates, etc.), are they validated with in-market results?
Provider metrics predicting market behaviour should be validated using market data. Is such validation available for scrutiny or has it been tested against sales uplift? If the latter, providers should supply the client with testimonials.

POLICIES AND COMPLIANCES

33. How do you ensure your techniques are safe for respondents?
Neuromarketing research providers should be able to describe their safety standards, protocols, consent procedures and any other certifications, and explain how these safety measures are reflected in their testing process.

34. Is there a privacy policy in place? Is it compliant with all national and regional laws, and market research industry standards?
The answer to this question ensures that neuromarketing research providers are transparent in holding themselves to high standards on participant privacy. This may make it easier to compare between neuromarketing research providers in the market.

35. What, if any, other ethical considerations do you take into account?
Neuromarketing research providers should be able to describe the origins and basis of any other ethical standards, protocols and consent procedures they use beyond those outlined in the questions above.

36. What is the age range for conducting research and what are your procedures for gaining permission to research minors?
The answer to this question may simplify the process of comparing providers across the market and clarify aspects of their standard sampling process and point of view on conducting research with children.

*ANNEX
LIST OF NEUROMARKETING TECHNIQUES WITH SHORT EXPLANATION

Technique	Acronym	Physical Measure
Electroencephalography	EEG/SST	Electric fields from the surface of the brain/ Changes in steady state visually evoked potentials
Eye Tracking	ET	Corneal reflectivity
Facial Coding	FACS	Action units of facial muscle activity
Functional Magnetic Resonance Imaging	fMRI	Blood oxygenation level
Heart Rate	HR	Electrical pulse transduction emanating from the heart
Implicit Association Tests	IAT	Behavioural response
Magnetic Resonance Imaging	MRI	Change in energy state of hydrogen molecules in the brain
Motion		Accelerometers applied to central or peripheral points on the body
Respiratory Rate	RR	Changes in breathing patterns
Skin Conductance Response/Galvanic Skin Response	EDA - SCR/ GSR	Electrical conductance of the skin controlled by autonomic nervous system
Voice Pitch Analysis	VPA	Vocal cord vibration
Magnetoencephalography	MEG	Changes in magnetic fields associated with neuronal activity

Source: TRONCHIN, E.; MASEKO, D; De Villiers, L.; De Balanzó, C. Neuromarketing report. South Africa: TNS Global Brand Equity Centre, 2010. Table adapted from Perrachione & Perrachione (2008)

Applied Measure	Temporal Resolution	Spatial Resolution
Population neural activity	Milliseconds	Centimeters
Spatial attention	Milliseconds	NA
Expressions of emotional response and engagement on the face	Fractional seconds	NA
Changes in metabolic activity related to neural activity across the whole brain	Seconds	1-5mm
Orientation, relevance, work load/effort	Fractional seconds	NA
Response time and error rate	Milliseconds	NA
Grey and white matter structures	Days	<1-3mm
Movement	Seconds	NA
Laughter, surprise, tension	Seconds	NA
Arousal, orientation, novelty, relevance	Fractional seconds	NA
Arousal	Fractional seconds	NA
Population neural activity	Milliseconds	Centimeters

FUNCTIONAL MAGNETIC RESONANCE IMAGING (FMRI)

Technology

• Functional magnetic resonance imaging, or fMRI, is a technique for measuring brain activity across the entire brain simultaneously.
• It works by detecting the changes in blood oxygenation and flow that occur in response to neural activity. When a brain area is more active it consumes additional oxygen. To meet this demand, blood flow increases to the active area.
• Extension of MRI to identify which brain areas are activated and modulated during specific tasks, hence the term 'functional' MRI.
• Portable fMRI technology is currently available in the form of scanners (in trucks). The scanners are installed with the fMRI acquisition sequence and have the ability to show visual stimuli, play auditory stimuli, etc. Even more portable fMRI technology is currently being developed at the U.S. Department of Energy's Lawrence Berkeley National Laboratory (Mo, 2006).

Procedure

• It's like a series of 3D 'X-rays' of the whole brain taken every 2-3 seconds inside a giant doughnut-shaped magnet.

Aims

• fMRI is used to produce brain activation maps showing which parts of the brain are involved in a particular mental process and, more importantly for commercial studies, how these different brain networks are modulated (e.g. the extent to which different marketing messages or new products stimulate pleasure areas).
• fMRI has been used to identify and study a large range of human emotional and cognitive functions including pleasure, liking, disgust, memory encoding, attention, decision making, multi-sensory integration, craving and trust.
• Within a commercial context, brain areas involved in brand loyalty, liking, relevance, emotional engagement, empathy and recognition have been used extensively to compare and evaluate new products, brands and marketing communications.

• The technique offers the most in-depth and extensive (in terms of the range of cognitive/emotional processes) assessment of human brain function of any tool currently available.

ELECTROENCEPHALOGRAM (EEG)

Technology
• Very similar to MEG (but measuring electrical activity instead of magnetic activity).
• EEG is a non-invasive method of recording electrical activity along the scalp produced by the firing of neurons within the brain.

Procedure
• EEG refers to the recording of the brain's spontaneous electrical activity over a short period of time – usually 20-40 minutes.
• Is recorded from multiple electrodes placed on the scalp.
• It can measure ERP (event related potentials); the time of reaction shows which part of the brain was claimed.

Aims
• Direct information about the dynamics of evoked and spontaneous neural activity and the location of their sources in the brain (source location is inexact and very inexact for sources distant from the surface).

There is also a sub group of EEG called SST (Steady State Topography) which utilises goggles and measures changes in steady-state visually evoked potentials.

Technology
• SST, a variant that combines EEG with a continuous peripheral visual flicker designed to enhance the signal output from EEG.

Procedure
• SST requires the addition of goggles to present the visual flicker in combination with scalp electrodes to measure visual evoked potentials.

Aims
• SST aims to improve the signal-to-noise ratios and measure brand relevance and engagement.

EYE TRACKING

Technology

• It uses camera technology that does not require headsets, glasses or head constraints of any kind.
• Eye tracking monitors movements of the eye, recording in detail what catches the viewer's attention and how long he or she looks at each focus point.
• It does this in milliseconds.

Procedure

• A visual image is projected digitally onto an LCD screen.
• Very low levels of infrared light are projected into the eye of the respondents, monitoring their eye movements as they are exposed to the stimulus.
• Technology records each person's focal point at 60 readings per second.
• Electronic data is recorded and reported in aggregate across the sample (Colmar Brunton, 2009).
• Standard measures: starting point, viewing pattern, % noting, average time spent, etc.
• Could be combined with other techniques (e.g. SCR).

Aims

• Eye-tracking measures visual attention in space (Perrachione & Perrachione, 2008), the ability of labels, advertisements, catalogues and web pages to hold attention and lead readers to key marketing messages (Colmar Brunton, 2009).

FACIAL EMG

Technology

• Measures voluntary and involuntary facial muscle movements which may reflect conscious or unconscious expression of emotion.
• In facial EMG, two different muscles are important: the corrugator (involuntary) and the zygomatic (voluntary) muscles. The electrodes are place on these two muscles. This measure is susceptible to noise like that evoked, for example, by a sudden movement of the subject; this reduces its reliability.

FACIAL CODING

Technology

• Based on Facial Action Coding System (FACS), a taxonomy of facial expressions developed in the 70s by Swedish anatomists (Wikipedia: Facial Coding).
• FACS identifies 32 Action Units (AU), or patterns of facial muscle activity – practitioners of facial coding in the industry measure a subset of these.
• This taxonomy of facial expressions has been built into facial recognition software.

Aims

• Using facial expressions to identify what emotional responses consumers have and correlate them with specific parts of an offer.
• Facial coding answers questions about the response rates of expressions, the percentage and even the type of positive and negative emotions being expressed, and gauges impact and appeal (intensity and valence) (Tobii, 2009).

SKIN CONDUCTIVITY (SC)/SKIN CONDUCTANCE RESPONSE (SCR)/GALVANIC SKIN RESPONSE (GSR)

(also known as electrodermal response (EDR), psychogalvanic reflex (PGR))

Technology

• Method of measuring the electrical resistance of the skin (Perrachione & Perrachione, 2008) reflecting brain arousal, orientation, relevance of stimuli and novelty.
• Physically, GSR is a change in the electrical properties of the skin in response to different kinds of stimuli (University of Kuopio, 2004). GSR is the result of activity in the autonomic nervous system following informational, sensory or ideational stimulation. Its intensity can be measured by the degree of skin conductivity created by varying perspiration rates.
• Temporal resolution: fractional seconds (Perrachione & Perrachione, 2008).

Procedure

• Attaching one or two leads to the skin, usually hand-held electrodes.
• Because the hands have a particularly large representation of nerve endings on the sensory-motor strip of the cortex, hand-held electrodes are ideal.
• As arousal increases, the "fight or flight" stress response of the autonomic nervous system comes into action and adrenaline causes increased sweating, which is instantly measured (Sheperd, 2009).

Aims

• Possible indicator of people's emotional response to advertisement.
• GSR can be used in advertising research to determine the arousal potential and emotional quality of advertising.

ELECTROCARDIOGRAPHY (ECG)/HEARTBEAT/HEART RATE (HR)

Technology

• Method of measuring the beat-to-beat variability in heart rate response, often used in medicine to determine the health of the heart.
• ECG has been used as a measure of health for over 100 years.

Procedure

• Sensors are attached to the surface of the skin, typically in the chest area with disposable gel electrodes.

Aims

• The variability of HR can be an indicator of various psychological phenomena, including attention, arousal, relevance and cognitive or physical effort.
• HR can give an indication of the valence of an emotional respons. (approach and withdrawal behaviours).
• In any case one needs to be careful in the interpretation of heart rate results.

IMPLICIT ASSOCIATION TESTS (IAT)

Technology

Implicit Association Tests developed out of the field of cognitive psychology and are used to capture respondents' (often) unconscious responses to a range of stimuli.

• There are a large range of paradigms that come under the broader umbrella of implicit tests, including semantic priming, go-no-go association tests and visual search preference testing. Most of these have been validated and published in the psychological literature.

• The IAT typically measures implicit attitudes and beliefs that people are either unwilling or unable to report, following the presentation of a stimulus or set of stimuli under controlled conditions and within a timeframe that does not allow the conscious brain to influence the response (typically considerably less than 1 second).

• The IAT itself was originally developed to explore the unconscious roots of thinking and feeling (IAT Corp., 2009a).

• Introduced in 1998 by Anthony Greenwald, Debbie McGhee and Jordan Schwartz.

Procedure

• There are a number of ways in which such tests can be administered.

• Example: A programmed IAT is administered offline or online. The program asks respondents to pair two concepts (e.g. *male* and *science* or *female* and *science*). The more strongly associated in memory the two concepts are, the easier it is for the respondent to agree that they are closely associated. So if *male* and *science* are strongly associated, the respondent will pair them faster (i.e. will have a faster response rate) than when they are asked to pair *female* and *science* (people in general associate *male* more than *female* with *science*). This gives a measure of how closely associated the two concepts are, regardless of what the respondent might explicitly say (IAT Corp., 2009b).

Aims

• IAT is used to measure implicit attitudes to brands, products, fragrances and marketing communications within the commercial sector.

PROJECT TEAM

- Sue Nosworthy, Director, TNS Europe, UK
- Dr Carl Marci, CEO and Chief Scientist, Innerscope, USA
- Rachel Sockut, Manager of Marketing & Public Relations, Innerscope
- Dr Cristina de Balanzó, Global Head of Neuroscience, TNS, UK
- Professor Gemma Calvert, Managing Director, Neurosense
- Elissa Moses, Executive Vice President, Neuroscience and Emotion, IPSOS, USA
- Duncan Smith, Managing Director, Mindlab International, UK
- Wioletta Maron, Consultant, UK

ESOMAR
Eurocenter 2
Barbara Strozzilaan 384
1083 HN Amsterdam
The Netherlands
Tel +31 20 664 2141
Fax +31 20 664 2922
E-mail customerservice@esomar.org
www.esomar.org

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