Specific Bases of Assessment in the Field of Microdata Analysis for Qualification as Professor (including Adjunct Professor and Visiting Professor), Associate Professor, Senior Lecturer, Associate Senior Lecturer and Postdoc

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This document specifies the bases of assessment with respect to scientific competence as given in the document entitled *Recruitment Procedures for Teachers at Dalarna University* (DUC 2005/169/10) for the subject field Microdata Analysis.

The subject field Microdata Analysis can schematically be illustrated as a data-collection and analysis chain, which provides a basis on which decisions can be made.

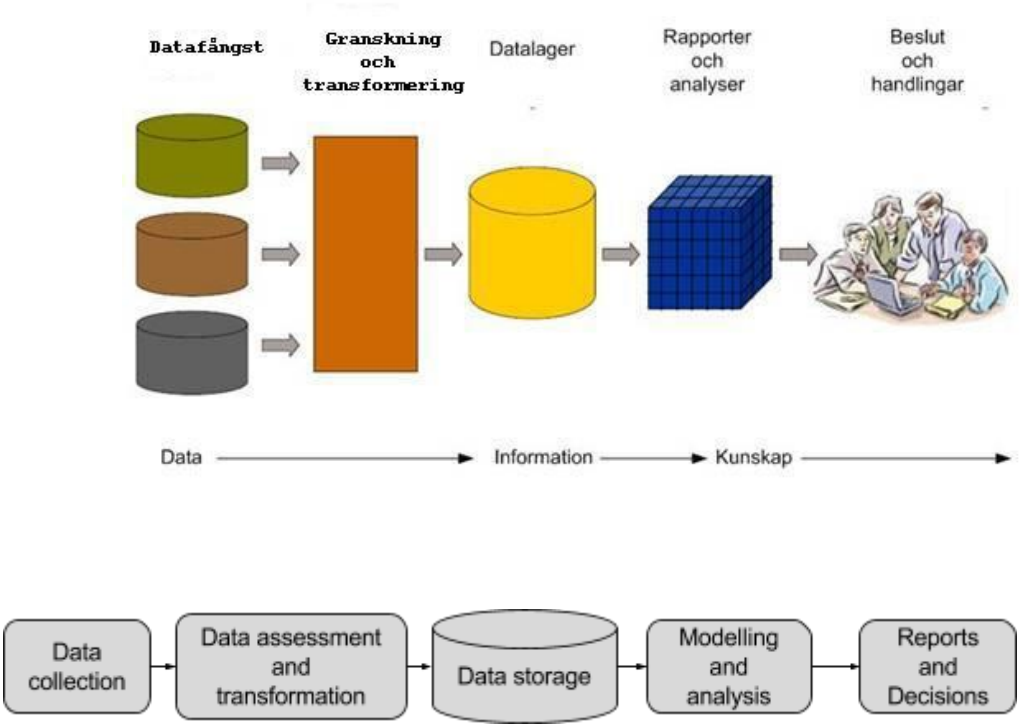

Figure 1. The microdata analysis process

The first component is the choice of data-collection method and measurement method followed by the collection of microdata, where microdata refers to all forms of data at the atomic level or the greatest possible degree of detail. This requires the ability both to evaluate different data-collection and measurement methods and to apply them in specific cases.

The second component is data processing, which requires the ability to evaluate data quality and to evaluate and apply data-transformation methods.

The third component is data storage which requires knowledge and understanding of database methods as well as the ability to deliberate in terms of ethics and weigh up strategies for data security and the generation of metadata.

The fourth component is analysis often in the form of modelling of data based on relevant scientific theory, which requires competence and understanding in, for example, statistical methods, data and text mining and simulation techniques, as well as a familiarity with different scientific theories.

The fifth component is decision-making and action, which requires understanding of techniques such as benchmarking, counterfactual analysis and sensitivity analysis, as well as economic decision-making and information-sharing within organisations and society at large.

Microdata Analysis is a normative science and its specialisation is data-based decision-making in complex environments. This means that there are three general aspects when it comes to the evaluation of qualifications in terms of a teacher of Microdata Analysis:

1. That the candidate demonstrates a sound ability in the area of normative research that contributes towards the goal of better decision-making in current, complex environments.
2. That the candidate demonstrates familiarity and knowledge of methodology in terms of the components 1-4 of the microdata chain.
3. That the candidate has demonstrated his/her deep methodological understanding and knowledge in at least one component of the microdata analysis chain.

As guidance when it comes to the breadth and depth that are required for the evaluation aspects 2 and 3, three profiles of candidates with the resulting evaluations are provided below: the first is for a candidate to the position of Professor, Adjunct Professor or Visiting Professor; the second is for a candidate to the position of Associate Professor; and the third is for the position of Senior Lecturer, Associate Senior Lecturer or Postdoc.

Profile: Professor

The candidate has attained financing for research that will lead to better policies or decision-making. He/she has about 15 publications in predominantly international journals, of which ten contribute to the development of methodology or knowledge in at least one component in the microdata analysis chain. The candidate has been the primary or sole author[1] for half the number of publications. In some of the publications, the candidate discusses his/her thoughts regarding data-collection methods and has used a couple of data-collection methods such as field experiments, the acquisition of process data from a company that he/she has collaborated with and finally longitudinal data from a focus group. He/she has published an article on the use of established methodology to clean process data from outliers. Within the framework of the project, the candidate has – together with other researchers – developed data storage for the company's decision-making support system, for which the architecture is presented in several of his/her publications. Within the framework of the

[1] The convention that the primary author has had the main responsibility and made the greatest efforts in terms of research does not generally hold. The evaluator must keep in mind that another common convention is to list authors in alphabetical order in those cases where they have contributed in equal measure so as not to evaluate incorrectly the efforts of candidates whose surname appears alphabetically late in the list.

project, the candidate was the principal supervisor for two doctoral students. He/she has in-depth methodological knowledge in component 4 of the microdata analysis chain, specifically simulation and visualisation. The candidate has several publications in the highly reputable journal *Mathematical Models and Methods in Applied Sciences* and other similar journals.

Evaluation: The candidate is qualified, be it not by a large margin. The first criterion can be considered met when the candidate successfully manages to secure financing for decision-oriented research, which would not be possible without a normative scientific approach. The candidate has demonstrated applied skills in components 1-4 in their publications and the other criterion is met by way of this. In the fourth component, the candidate has also demonstrated in-depth competence in a number of publications in quality journals in the specialist field of the candidate and as a result meets the third criterion. The breadth and depth of the candidate's knowledge base in terms of Microdata Analysis give reason for us to believe that he/she is capable of supervising doctoral students – which he/she has also demonstrated – and can contribute to future research funding with a specialization in Microdata Analysis, which are the two most important work duties for a professor in the subject.

Profile: Associate Professor

The candidate has been involved in, but has not been the main applicant in, various externally financed research projects that were about the everyday movement of children, where the objectives of the project were to develop methods for measuring their movements. He/she has eight publications in mainly international journals, of which most of them contribute in some way to methodological development of the first component in the microdata analysis chain. He/she has him-/herself constructed a low cost image-processing system that collects three-dimensional data on the movements of children in playgrounds and transforms the data to an estimated activity level per individual. The candidate has been an Assistant Supervisor for a doctoral student whose thesis was in the field of Public Health. The candidate's most prominent piece of work is a series of publications in *IEEE Transactions on Pattern Analysis and Machine Intelligence,* where the image-processing system is presented. A number of somewhat smaller publications describe data-cleaning algorithms that tie with the image-processing system and one further article is about ethical considerations when it comes to the video-taping of children and the way in which schools that want to install an image-processing system in their grounds can justify that installation in order to have the children's guardians agree to the idea. In recent years, this question of justification has been the main interest of the candidate after he/she discovered that the measures taken by the schools for increased physical activities had been conducted on other bases than those that are data-based. He/she has written and submitted several draft articles for evaluation and has recently established collaboration with the national association "Hem och Skola" for the purpose of information sharing.

Evaluation: The candidate meets with the criteria with regards to components 1-4. The relative lack of publications in general is outweighed by the large amount of publishing in the IEEE series with work that is central to the candidate's research. Further, the candidate has demonstrated in-depth knowledge and understanding in the first component that is required to qualify as an Associate Professor. The candidate's previous research work that can be characterized as being of significant technical interest for the first components in the microdata analysis chain is, however, insufficient to qualify him/her, since a normative-scientific approach has not been demonstrated. However, more recent research work demonstrates that the candidate has adopted a scientific approach and is

working actively towards improving decision-making in the field of application that interests him/her and as such qualifies as an Associate Professor since even the first criterion can be regarded as being met. As Associate Professor, the candidate is expected to take greater responsibility for the funding of research, to take on the role of principal supervisor for doctoral students and, compared with the present profile, to broaden him-/herself in the context of applied science.

Profile: Senior Lecturer

The candidate has successfully completed a thesis in the field of Business Studies and defended his/her thesis successfully three years prior. The thesis was completed with the company CarRunner. CarRunner's business plan is to lead customers searching on the Internet to the cheapest car-leasing companies that match the preferences of the customer. However, the company received a great deal of criticism on social media because those using the site got worse deals with the car-hiring company than CarRunner had reported. The candidate's thesis discussed how CarRunner's estimation of costs could be improved and how important the accuracy was for CarRunner's reputation. The candidate has published three articles from the thesis in *Journal of Small Business and Enterprise Development* and *Applied Stochastic Models in Business and Industry*. He/she had estimated the costs from CarRunner for all of its users over the course of a year and matched their IP-address with the IP address of three selected leasing companies. A couple of the chapters in the thesis were about how access to this web data and company data was obtained and how the matching of the data sources was conducted. After the thesis defence, he/she worked half-time for CarRunner to improve customer satisfaction. During that time, the candidate wrote the article on measurement of customer satisfaction through text mining of a car purchasing internet discussion forum, which was published in *Applied Stochastic Models in Business and Industry*.

Evaluation: The candidate's research demonstrates a normative-scientific approach and meets the third criterion by way of an account that is quite in-depth in the fifth component, where his/her research at CarRunner is of particular merit. The candidate's choice of method for data collection and data processing demonstrates a knowledgeable familiarity with components 1-3, despite the methodological part being modest. Similarly, the candidate demonstrated knowledge and familiarity with component 4 through his/her appropriate choice to use text mining for measuring customer satisfaction for an organisation whose contact with customers is principally digital. The candidate consequently qualifies as Senior Lecturer, with a certain margin.