Uppsala University was founded in 1477. It is thus a more than 500 year-old institution of higher learning. For centuries, Uppsala did not have to measure itself against more than a few other places. There were simply not that many universities around. This is no longer the case.

As the European, and indeed global, market of higher education and research becomes manifested in the competition for new students and in the recruitment of faculty – not to mention the struggle for funding – we require forms of comparison. The most tangible expression of this need is of course rankings.

Sweden has a limited population, and a fairly small number of universities, which means that it is possible to establish the make up of the national field of research and higher education with reasonable accuracy. So, we are perhaps more interested in how Swedish research compares internationally. One way of doing this is of course to look at how we fare in different international rankings. In the following, I want to discuss the relative merits of rankings from a Swedish perspective.

I have chosen two recent surveys to illustrate the complexities of measuring scientific production. My first example is of course the annual ranking of world
universities carried out by our hosts here at Jiao Tong University. Let me make a few brief comments on methodology here. First, the quantitative method used puts a premium on medicine and natural sciences. It only partly includes the social sciences, and the arts and humanities to an even lesser extent. It focuses almost exclusively on research, and not on undergraduate education. This, I believe, partly explains the domination by U.S. universities. In the US, and on the whole, major institutions tend to be top-heavy on research. Again, as you know, of the 99 top-ranked universities, 51 are American. Of the European universities in the top 100, eleven are British, seven German, four Swedish, four French, three Swiss, two Dutch, and then scattered universities in Norway, Finland, Denmark, Russia and Italy. Scandinavia is represented by seven universities in all, the same number as Germany. I invite you to ponder the fact that Germany has almost four times the number of citizens as these Scandinavian countries combined. I believe that a great part of the explanation for this imbalance can be found in the fact that Germany uses the dual system of research institutions, namely both universities and research institutes. Interestingly, in Germany, there are now voices suggesting that research be transferred from the institutes to universities precisely because it would benefit their outcome in rankings.¹

Another factor may be that the ideals of Humboldt — meaning sizeable universities comprising all fields of study — tend to spread out resources, something which — again — becomes a limitation in ranking methods that reward the medical and natural sciences. It would perhaps be a fair method to compare complete universities amongst themselves, and specialized institutions like technical universities — comprising, say, a single or merely a few faculties — with each other.

¹ See http://www.zeit.de/2005/18/Krull-Interview
www.volkswagenstiftung.de/presse-news/presse05/29042005c.pdf
In all, these factors illustrate the complexities involved in ranking universities. That is, not only issues of different scientific disciplines, but also questions of bibliometrics and indeed also structural matters, such as the relative frequency of, for example, research institutes, affect the outcome of a ranking process. This is not news to you, of course.

Another recent survey concerns a more direct comparison between countries. It was published a year ago in *Nature* by David King, who is Chief Scientific Advisor to the British Government.² He uses citation frequency based on the Thomson ICI data base as his sole source, and applies the results to countries, not individual universities. Again Sweden does well, but the survey covering 31 nations, also shows that together with Iran, Brazil and Finland, Sweden is the only western country that shows a decrease in citation frequency in recent years, in relation to the other countries. German scientists are cited four times as often as Swedish scientists, which should be compared to the factor of ten in terms of difference in population.

We must thus establish that Swedish research is doing well, but with the important amendment that we are losing ground, unlike most other comparable countries. Here, I believe, lies one of the most important aspects of international rankings. In using different forms of rankings, that deploy different methods, we can start making comparisons between national, regional and local strategies of investing in research and higher education. In reading and interpreting rankings, we can at least start making comparisons, and begin to analyze how we can achieve excellence.

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I want to move on to a few observations on the current state of ranking methodology, and make special note of the Swedish case.

It is of course tempting to try to find a single standard or measurement to comprehend the results and ends within a complex institution, and especially within a comprehensive research university. Ideally, we would like to find a single measure with which we could compare our own university with other universities around the world. Simplicity is indeed tempting. After all, on the global scale and locally, not only university leaders, but also politicians, students and the general public, want to find out how one seat of learning compares to another.

Representing a large and complex university, I’m often forced to use simplified measures in order to decide what works and what does not work. In other words, I have to face making decisions and form my opinion based on limited knowledge. This is one reason universities try to develop a series of so-called “indicators,” that is, quantitative measures, that suggest how our operations and activities work.

The conclusion that forms the starting point of the discussion on ranking must therefore be that it is vital to develop relevant measurements for these assessments, even if we always must remain sceptical to — and critically evaluate — any real significance such measurements might hold.

It must indeed be told that we all seek attention in order to remain attractive to students, researchers, teachers and funding institutions. Surely, we who participate in today’s conference all want to belong to the exclusive club of “World Class Universities,” even if we all understand that membership depends on what is measured and where the threshold is set.
Possibly because of my background in the natural sciences, I place great merit on well-defined measures of academic success, as in scientific production and quality, rather than on judgements on what defines a university’s success and prestige among colleagues around the world. At best, such judgements are anecdotal or based on individual appreciations of how to weigh various measurements. The attempts at measuring and comparing scientific production is always a matter of discussion, but it is possible to make calculations based on different models of weighing and to understand the most deciding factors.

In a small country like Sweden it is of course very important for a university to ensure that it is nationally competitive, but it is equally important to measure one’s own institution against international competition. In this presentation, I have therefore tried to chart how Swedish seats of learning compare, using various measures. One major problem shared by virtually all methods of measuring scientific production is that they exclude some disciplines within the social sciences and the humanities because of patterns and cultures of publication. This means that comprehensive universities with a large proportion of arts and social sciences in various ways suffer from devaluation in some of the present methods of global ranking. By studying how Swedish universities and colleges have fared in international rankings so far, I will suggest how these international rankings can be improved in the future.

The Thomson ISI database lists publications in international journals over a long period of time, including articles, conference papers and to some extent books. This means that some disciplines and areas are better covered than others, and that material published in English is overrepresented. Compilations of data from the Thomson ISI database will therefore always put a premium on biomedical research published in English compared with, for example, mathematical research published in French. Such databases will also accentuate medical
research, the natural sciences and technology compared with the social sciences, and above all, the humanities. Another piece of data in the database relates to citations. Depending on various traditions of citation, these measures vary between disciplines and to some extent countries. Anyone engaged in science can testify that some of the most cited articles often concern mistakes or issues of nomenclature.

In Sweden, moreover, almost all research is carried out within our universities. To a lesser degree, industrial laboratories and national institutes contribute to the Swedish articles and reviews one can find in the Thomson ISI database.

Figures 1a and 1b show the respective percentage of articles contributed by Swedish seats of learning since the early 1980s. The articles have been fractionalized to the universities where several seats of learning are represented. The charts show the results for the major universities, that is Uppsala University, Karolinska Institutet, Linköping University, Lund University, Gothenburg University, Umeå University, Stockholm University, The Swedish University of Agricultural Sciences, Chalmers University of Technology, and The Royal Institute of Technology.³

³ In the charts, the following abbreviations will be used: Uppsala University (UU), Karolinska Institutet (KI), Linköping University (LiU), Lund University (LU), Gothenburg University (GU), Umeå University (UmU), Swedish University of Agricultural Sciences (SLU), Stockholm University (SU), Chalmers University of Technology (CTH), Royal Institute of Technology (KTH)
Fig. 1a

Fractionalized Number of Articles per University compared with the total number of Swedish articles

Fig. 1b

Fractionalized Number of Articles per University compared with the total number of Swedish articles
Figure 2, more specifically, shows how the contributions from the six University Hospitals — and in an academic sense these university hospitals belong to some of the universities mentioned.

Fig. 2

In Figure 3, these hospitals are included in the production of their universities, respectively. The conclusion must be that since the organizational forms of university hospitals vary from country to country, hospitals must most likely be included in order to make international comparisons between universities with a faculty of medicine.
The charts also show that the relation between various universities change over time. An important measure of the success of a university is an indicator of how far the university has reached in terms of its development, that is, if it shows progress or decline.

As Figure 3 illustrates, Lund University and Karolinska Institutet publish roughly the same number of articles, but while Lund University is a comprehensive research university with all (or nearly all) faculties and disciplinary domains — in other words, a university with extensive research carried out within the social sciences and the humanities — Karolinska is primarily a medical school. This means that the data for Lund University only contains an small amount of information on the scholarly contribution from the social sciences and the humanities, and, moreover, that a significant number of scholars that indeed are included in the data of the total size of the university
would then seem to not contribute to the total scientific output included in the Thomson ISI database.

This further means that Lund University is undervalued in relation to Karolinska Institutet if the Thomson database remains the only source, and — as if in the Shanghai Jiao Tong Academic ranking of world universities — the size of the university is included and the “production” is related to the number of active scientists and scholars.

In countries like Sweden, with a geographically contained language (in other words, we speak Swedish, but not many other countries do) but where the natural and medical sciences have a tradition of publishing in English, there is a significant number of publications in Swedish, for example in disciplines like Swedish history and comparative literature, that will remain invisible, so to speak. Most likely, the patterns of publication will change within these disciplines in the future, as we will see an increase in international comparisons between nations and universities. In all probability, scholars within these disciplines will publish both in Swedish and English. Today, Swedish universities are working to establish countrywide databases, harmonized to meet national standards. These databases will contain scientific production in all disciplines. In a few years from now, we will be able to include these databases in national evaluations.

It would be most valuable to include scholarly production and other achievements in the social sciences and the humanities in the Shanghai Jiao Tong ranking. The great advantage with the Shanghai ranking, however, is that it is based on internationally accessible data. A possible and simple modification would be to include the literary and Peace Nobel prizes in the data containing “Nobel prize” and “Alumni.” Another, perhaps more demanding task, would be
to modify the data for the size of a university, that is, the number of faculty, and not include faculty within the humanities, and, partly, the social sciences.

Another possibility to come to terms with the problematic category of the make up of disciplines would be to not compare universities with specialized research and education, for example medicine and technology, with comprehensive universities, and instead create separate categories of university rankings.

As my examples illustrate, one can discuss the relative merits of the Shanghai ranking, but its simplicity (and I mean that in a good sense) and the clear measurements it uses make it an interesting case for development. It can help us facilitate further international evaluations and comparisons of universities in terms of — above all — how successful our research is. In its present form, the Shanghai ranking has already stimulated many strategic discussions at universities around the world.