

## **Evaluation of Scientific Journals at Stuttgart University – or is the assessment of scientific relevancy a sufficient criterion for canceling subscriptions?**

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**Abstract:** In this paper we describe the evaluation of all scientific journals received at Stuttgart University. The immediate reason for this was a cut in the library's budget but there were some strategic and conceptual reasons as well. The evaluation is intended to be a first step from a stock-oriented towards a more flexible demand-oriented acquisition strategy. In addition to that it is a first step towards a closer financial cooperation between central and departmental libraries in a traditional two-tier library system at Stuttgart University.

### **Initial situation**

Confronted with stagnating budgets and ever rising prices for scientific journals Stuttgart University Library had to cancel subscriptions to a considerable extent again and again. With the evaluation of all journals received the library tries to draw a realistic and up-to-date picture of its user's needs and requirements.

In the fiscal year 2002 Stuttgart University Library had to cope with a cut in budget of approximately 500.000,-€. This amounted to roughly 30% of the overall budget for journal acquisition. As the budget for monographs had been reduced to a minimum at the same time there was no way of filling this gap. The library had had to cancel subscriptions in 1994 and 1997 already. At that time it had been possible to identify the subscriptions that had to be cancelled in cooperation with the departments and faculties. Because of the dramatic cut this procedure was not feasible this time. Additionally the question whether the journals held meet the current demand of research and teaching at the University had to be answered in principle. Therefore the library decided to carry out an evaluation of all scientific journals received at Stuttgart University.

At the same time it was intended to give an immediate political signal. In agreement with the library board all subscriptions from Elsevier Publishing Group were cancelled. This step should prove that universities are neither willing nor able to follow an aggressive pricing policy by the global publishing houses. However the direct effect has been rather small, subscription prices are still rising (maybe somewhat slower) and only few other universities followed that step in a similar manner (one of the last was Stanford in November 2003).

### **Ideas and aims**

It is evident to consider the evaluation as a means of rationalisation and cutting of expenses. Considering the dramatic cuts and the disproportional development of budget and costs however it would be short-sighted to expect this from an assessment of the scientific relevancy of journal titles. The cancelling of subscriptions affects the efficiency of research and teaching directly. That is why issues and aims beyond a short term relief in spending should be discussed and pursued with such an evaluation.

The matrix showing relevancy and interest between institutes and journal titles can – at least in theory - be the basis for a portfolio tailored to the user's needs in the best possible way. Relevancy and interest have to be measured against the current use in order to be economical. In this field the library has still to do significant work as the usage of electronic and paper journals has to be measured against the usage of document delivery services. There are numerous problems here including the gathering of data and the comparing of statistics but this is not the issue of this paper. The evaluation however is intended to be a first step from a stock-oriented towards a more flexible demand-oriented acquisition strategy which is more strongly based on usage statistics.

The central library is not exclusively responsible for the supply with information. The two-tier library system at Stuttgart University consists of 129 departmental libraries in addition to the central library. In spite of the close co-operation prescribed and carried out the financial responsibility is scattered. The principle of a functional unity even for two-tier systems which has been formulated in the "Baden-Württemberg University Act"<sup>1</sup> has still to be put into practice. The analysis and assessment of the existing information resources is an important step towards a closer financial cooperation between central and departmental libraries in the traditional two-tier library system at Stuttgart University.

### **Planning and preparation**

In 2001 a revision of all serials received by the departmental libraries was carried out. Title and holding information from the national journal database (ZDB) were sent to each library with the request to revise and update this information. The answers showed that about one third of 3000 titles had to be revised, many of which had simply been cancelled. All updates were entered into the journal database (ZDB) which took some time and the union card catalogue for journals held by departmental libraries was abandoned.

During the winter of 2001/2002 the central library conducted a poll concerning the 20 most expensive journals and journal packages. These packages include several hundred titles amounting to a subscription price of 480.000,- €. In the accompanying letter it was already stated that the main users would have to share costs in the future. This has not been put into effect till now. Titles could be assessed as mandatory, important, dispensable or not relevant. It came as no surprise that each title was mandatory for at least one faculty. What was interesting however was the fact that there was a strong interdisciplinary demand – most titles were assessed as mandatory by several faculties. The leading title was declared mandatory by seven out of 14 faculties.

This poll had still been sent in print – which did not seem feasible for the assessment of all journal titles by all institutes. Therefore it was decided to do the general evaluation based on an online questionnaire as input to a database. Basis was the revised title and holding information from the national journal database (ZDB) which included all the subscriptions from Elsevier all titles at the central library and all titles held by departmental libraries. There was considerable delay in getting the data as the journal database was migrated to a PICA-system at that time. However in September 2002 the data could be produced and imported. After that the titles held

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<sup>1</sup> Baden-Württemberg University Act (Universitätsgesetz - UG) from Feb. 1<sup>st</sup>, 2000, §30 Par. 1. [http://www.mwk-bw.de/Online\\_Publikationen/Uni-Gesetz.pdf](http://www.mwk-bw.de/Online_Publikationen/Uni-Gesetz.pdf)

by the central library were again checked against the internal serial management and the prices from 2001 were added to the database. Prices for titles held by the departmental libraries had been asked during the first revision but answers were far from being complete. Therefore it was refrained from adding those prices as well. Titles received for free, newspapers or ephemeral titles like brochures, company or government serials were excluded from the evaluation database.

There was a broad discussion which metadata would be displayed for each title. Especially the question whether the price should be displayed was an issue. The library board even formed a committee to come to a decision. The concept of the library had been to base the assessment as much as possible on scientific relevancy and not based on strategic or tactical considerations. If the price had been displayed it would have been necessary to document how it came about (e.g. single subscription, as part of a package, as part of a consortium, as part of a membership, depending on the form of publication (print online)). Researchers and scholars have to trust in their library that it will acquire journals in the most economical way possible for the whole University. In the end this view was successful and the following metadata was displayed for each title: Main title, subtitle, publisher, ISSN. There was no indicator whether the title was held by the central or a departmental library or by more than one library.

### **The ranking algorithm**

The algorithm necessary for analyzing the data was designed by the Institute for Stochastics at Stuttgart University after intensive talks with the library. Institutes could vote on a scale from 1 (dispensable) up to 5 (mandatory) per title as input to the algorithm. Zero votes means the title is not relevant for the specific institute. The algorithm takes into account the size of each institute (expressed by the number of professors) as well as the fact that number of titles assessed per institute might differ considerably. Therefore the votes are renormalized during the iteration. The algorithm produces a ranking figure for each title. If two titles get the same figure there is a secondary criterion which is based on the number of cites out of this title by researches of Stuttgart University. The data for this criterion was ordered as a "Local Journal Utilization Report" from the "Institute of Scientific Information" (ISI) in fall 2002. If by any chance two titles would still get the same figure then the price would be compared as a third criterion but this had only been necessary in two or three cases.

### **Carrying out the evaluation**

With the help of the Computing Centre at Stuttgart University the online interactive questionnaire was designed and implemented. The application consisted of an ssl connection, authentication of institute and the person evaluating, the list of journal titles, input of the votes into the evaluation database and the documentation of the process.

User IDs and passwords were sent to the professors in charge of institutes. 2985 journal titles were to be assessed by 144 institutes and chairs which means each institute had the chance to evaluate all titles. In order to make this process as easy as possible titles were classified into 27 groups according to the Zeta classification scheme<sup>2</sup> used by the national journal database (ZDB). It was intended to vote for all titles relevant for an institute not only the core journals.

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<sup>2</sup> <http://support.ddb.de/iltis/katricht/zdb/FachgrNot.pdf>

The evaluation was carried out between January 8th and March 14th 2003. In order to achieve completeness of results it was prolonged for some institutes and came to a final close in Mai 2003. Out of 144 institutes and chairs 136 took part in the evaluation which is a percentage of 94.

### Analysis of results

The library very consciously did not suggest procedures or influence decisions at each institute. Therefore to our knowledge decision taking varied from the single assessment by the professor in charge to the democratic vote of all members of an institute.

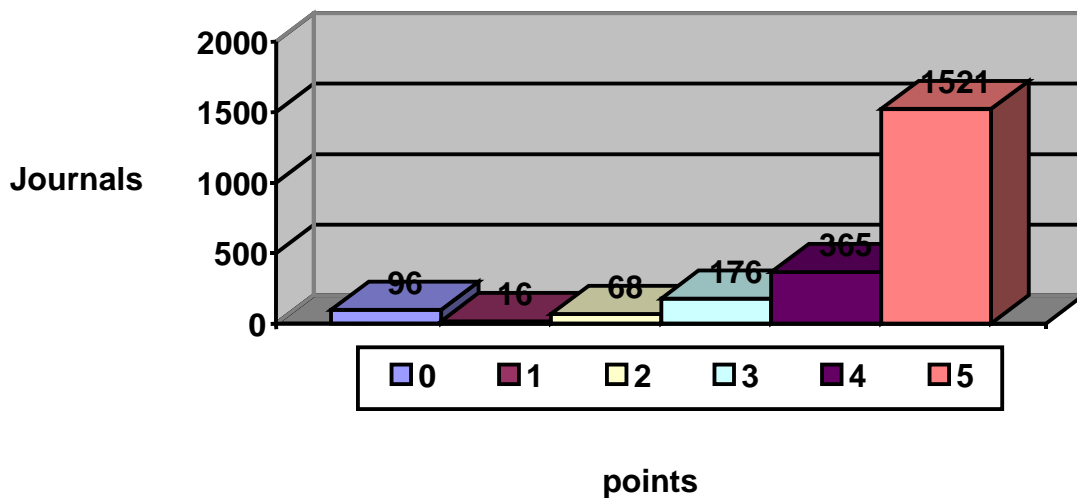


Fig 1: Maximum number of votes per title

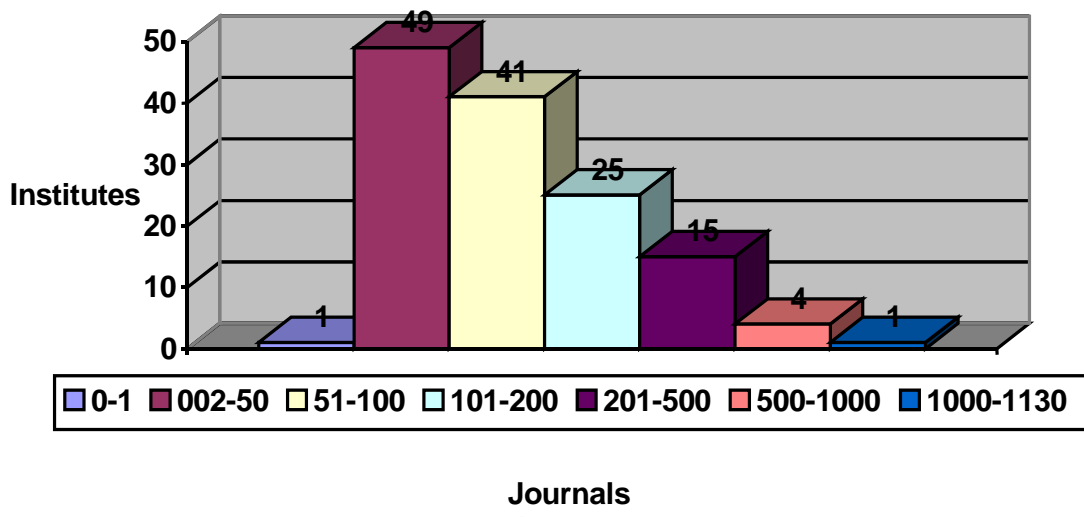


Fig. 2: Number of titles assessed by an institute

Figure 1 shows a number of 112 titles which were assessed as dispensable or not relevant. This number amounts to a subscription price of about 35.000,-€ This relatively small sum, compared to the overall budget, shows that subscriptions were already strongly oriented towards current user's needs. As titles by Elsevier were

included in the evaluation it was based on a budget no longer existing. One of the first results is that the current cuts in budget touch the very basis of information needs for research and teaching and cannot be carried out without losses in competitive power.

Figure 2 shows the different number of titles assessed. This fact had been taken into consideration in the algorithm which means that a single vote of an institute that has assessed a great number of titles has comparably lesser weight than the vote of an institute that has assessed only a small number of titles.

The ranking lists produced are an effective instrument to see and compare the subject specific relevancy of journal titles. They are not suitable as a means for collection development however as they do not include economical aspects. In addition to that titles from different subject areas can not be compared as it would not make sense to compare the scientific relevancy of a journal in art history with one in mechanical engineering or to rank them against each other. In order to decide about the whole portfolio of titles their relevancy has to be measured against a common criterion – the subscription price.

To achieve this aim the normalized votes were divided by the price. The resulting quotient is at least within certain limits an economical indicator which allows comparisons of titles from different subject areas. As has been mentioned before reliable prices were only available for the subscriptions by the central library. Therefore the relevancy/price quotient was not calculated for titles held by departmental libraries.

| Title   | Subject | Price   | Votes | Quotient  |
|---|---------|---------|-------|-----------|
| Deutsche Bauzeitung   | 28      | 19,17 € | 5732  | 299,00887 |
| Aero-revue : internationale Fachzeitschrift für alle Zweige der Luftfahrt   | 20      | 49,93 € | 10746 | 215,22131 |
| Wksb : Zeitschrift für Wärmeschutz, Kälteschutz, Schallschutz, Brandschutz  | 19      | 12,78 € | 2566  | 200,78247 |
| Arch + : Zeitschrift für Architektur und Städtebau  | 28      | 42,44 € | 6414  | 151,13101 |
| Mitteilungen der Deutschen Mathematiker-Vereinigung   | 12      | 8,95 €  | 820   | 91,62011  |
| Archäologische Ausgrabungen in Baden-Württemberg / hrsg. im Auftr. d. Landesdenkmalamtes Baden-Württemberg, d. Förderkreises für die Ur- und Frühgeschichtliche Forschung in Baden u. d. Gesellschaft für Vor- und Frühgeschichte in Württemberg und Hohenzollern | 39      | 20,40 € | 1825  | 89,46078  |
| Geotechnik : Organ d. Deutschen Gesellschaft für Erd- und Grundbau ; Zeitschrift für Bodenmechanik, Felsmechanik, Grundbau, Ingenieurgeologie   | 22      | 34,26 € | 3025  | 88,29539  |
| Jahresbericht der Deutschen Mathematiker-Vereinigung  | 12      | 17,90 € | 1541  | 86,08939  |
| Beiträge zur Landeskunde von Baden-Württemberg / Hrsg.: Staatsanzeiger für Baden-Württemberg GmbH im Auftr. der Landesregierung   | 39      | 9,66 €  | 829   | 85,81781  |
| Jahrbuch Dritte Welt : Daten, Übersichten, Analysen / hrsg. vom Deutschen Übersee-Institut Hamburg  | 8       | 11,76 € | 967   | 82,22789  |

Tab. 1: The ten titles with the highest relevancy/price quotient

| Title  | Subject | Price       | Votes | Quotient |
|--|---------|-------------|-------|----------|
| Measurement techniques : the Soviet journal Izmeritel'naya tekhnika in Engl. transl / Instrument Society of America                          | 19      | 2.931,74 €  | 70    | 0,02388  |
| Fontane-Blätter : Halbjahreschrift / im Auftr. d. Theodor-Fontane-Archivs u. d. Theodor-Fontane-Gesellschaft e.V. hrsg.                      | 33      | 1.748,00 €  | 37    | 0,02117  |
| Aquatic sciences : a multidisciplinary journal for theoretical and applied limnology, fisheries science and water technology                 | 16      | 355,88 €    | 7     | 0,01967  |
| Nuovo cimento della Società Italiana di Fisica : rivista internazionale di fisica  | 14      | 361,06 €    | 7     | 0,01939  |
| Erzmetall : Rohstoffgewinnung, Verarbeitung, Recycling, Umwelttechnik  | 22      | 263,06 €    | 5     | 0,01901  |
| Materials science : a translation of Fiziko-khimicheskaya mekhanika materialov ; an international journal                                    | 20      | 2.127,48 €  | 28    | 0,01316  |
| Heavy vehicle systems : the journal of the International Association for Vehicle Design  | 20      | 426,93 €    | 5     | 0,01171  |
| Stochastic environmental research and risk assessment  | 22      | 644,23 €    | 7     | 0,01087  |
| Nuclear physics : journal devoted to the experimental and theoretical study of the fundamental constituents of matter and their interactions | 14      | 22.421,68 € | 180   | 0,00803  |
| Earthquake engineering & structural dynamics   | 22      | 2.950,33 €  | 7     | 0,00237  |

Tab. 2: The ten titles with the lowest relevancy/price quotient

The average of the relevancy/price quotient of all titles was 2,922495 compared to 0,46737 of the titles from Elsevier. This clearly indicates that regarding those titles as a group the price-performance ratio is lower. The picture becomes obviously more differentiated if single titles are regarded. The Local Journal Utilization Report however underlines this result related to the titles from Elsevier as a group. The relation of cites by researches from Stuttgart University to subscription price is much better for other publishers than for Elsevier.

Another interesting result is the comparison of institutes assessing and titles being assessed grouped by subject areas. Two questions can be answered by that comparison:

- Out of which subject areas have titles been assessed by the institutes of one faculty? This is an indicator for how interdisciplinary research is in that faculty.
- How interdisciplinary is the usage of titles from a certain subject area at Stuttgart University?

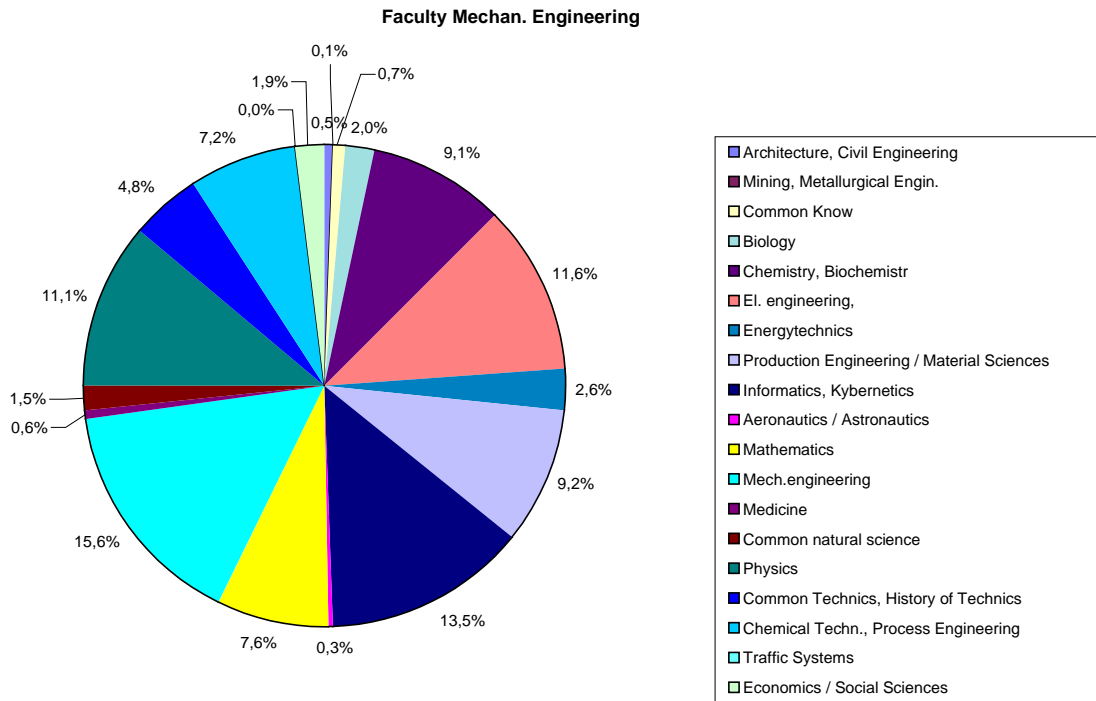


Fig. 3: Distribution of titles assessed by the institutes within the faculty of mechanical engineering arranged by subject areas.

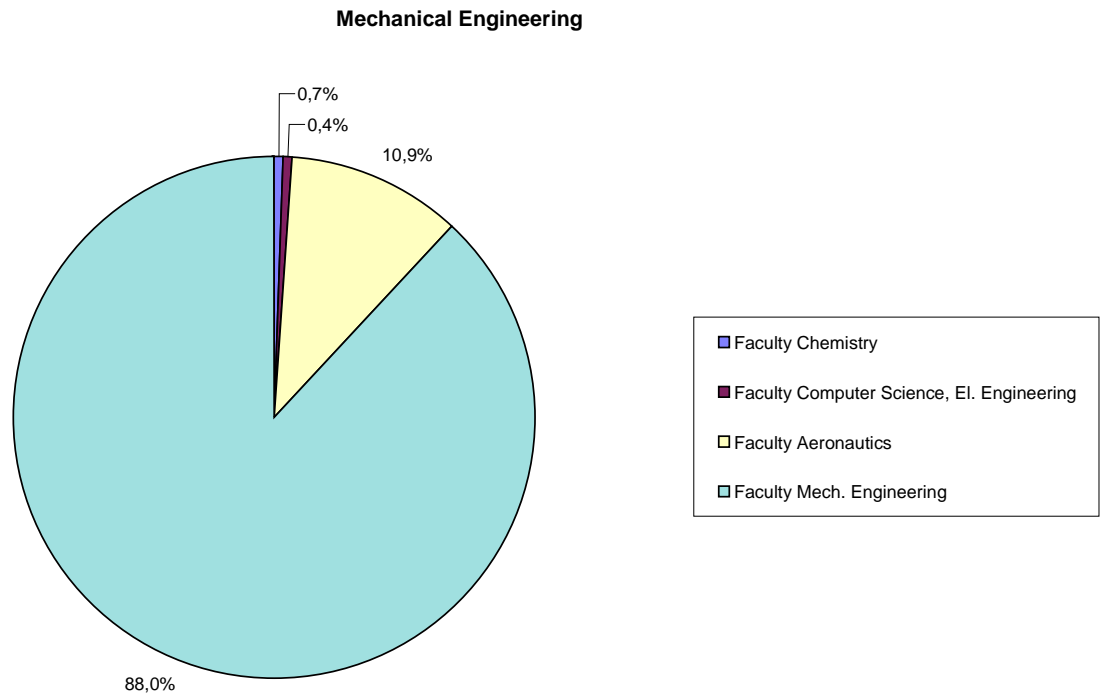


Fig. 4: Distribution of faculties assessing titles from mechanical engineering

The faculty of mechanical engineering at Stuttgart University shows a clear distribution. While the faculty is very interdisciplinary using or regarding titles from various other subject areas as relevant (74,6% of the votes were dedicated to journals from other disciplines), the journal titles dealing with mechanical engineering are only deemed relevant to a slightly bigger extent by one other faculty (Aeronautics with 10,9%) which means 88% of the votes came from the faculty of mechanical engineering.

Titles in basic subjects like physics or chemistry show the distribution that can be expected at Stuttgart University which has its main emphasis on engineering and natural sciences, i.e. they are relevant for a broad number of other faculties as well. An interesting result was the relatively small percentage of relevancy assessments by other faculties in mathematics. It amounted only to 20% compared to 47% in physics and 55% in chemistry.

### **Conclusions**

The evaluation resulted in the assessment of scientific relevancy of all journal titles held at Stuttgart University. In relationship to the subscription price this relevancy is a feasible measure for an economical supply with information. The initial decision to cancel subscriptions from Elsevier was only partly revised as the relevancy/price quotient was significantly lower for most titles from this publisher. The Local Journal Utilization Report underlines this result. The evaluation is intended to be a first step from a stock-oriented towards a more flexible demand-oriented acquisition strategy. In order to pursue this strategy continuous usage statistics of journals in print and electronic form have to be compared with usage statistics of document delivery services. This data can only be collected and analyzed centrally if there is a budget for such a service at the university.

The evaluation has shown that subscription prices will remain high in most sectors of STM as the relevancy of those titles for research and teaching is high. This development can only be opposed by scientists who will focus more on non-profit publishing (like PLoS or BioMedCentral) or who will foster self-archiving, open preprint initiatives or institutional repositories (like OPUS<sup>3</sup> at Stuttgart).

In addition to that the evaluation is a first step towards a closer financial cooperation between central and departmental libraries in a traditional two-tier library system at Stuttgart University. Demand-oriented acquisition is much easier when central library and institutes contribute to subject specific budgets. This however needs a fundamental decision by the management of the University about the question how much the faculties and institutes can contribute. This can not be negotiated between the central library and all 140 institutes and chairs. The central library however wants to introduce a new model for subject specific budget quotas which can easily be adapted to changing conditions. To achieve this there still has to be done some preliminary conceptual work.

The final vision is one single budget for acquisition within the University. Financial advantages are obvious as there is a better position in consortia, memberships and packages. A board for acquisition formed by the library and the faculties could take fundamental decisions concerning new subscriptions or the distribution of costs. The

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<sup>3</sup> [www.elib.uni-stuttgart.de/opus](http://www.elib.uni-stuttgart.de/opus)



library could put these decisions into action and organise acquisitions and distribution throughout the University.

To sum it up the evaluation shows that there are interesting perspectives for cooperation and organisation of information resources even or maybe just in times of severe financial cuts. It is up to the foresight and courage especially of the University's management to seize these opportunities.