

# REPORT ON EVALUATION OF SCIENTIFIC ACTIVITIES OF DEPARTMENT OF INFORMATICS AND MATHEMATICS IN THE PERIOD 2016 – 2020

**Department:** Department of Informatics and Mathematics

## EVALUATION COMMITTEE

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## Scope of the evaluation

The evaluation applies to: (1) the department's overall results in research activities covering period 2016 till 2020 and its conception of research activity in general and (2) the individual department's members which depend for the most part on funding from.

## GOAL OF THE EVALUTATION

The committee was asked to provide: (1) an overall assessment of the department's research activities and its conception, including specific recommendations towards conceptual or organizational changes for its further development and (2) assessment of the individual members of the department from the point of view of their contribution towards the excellence of the research activities of the department – publication productivity and quality, level of international collaboration, or their overall perspective for further development of the research activity of the department.

The envisaged outcome in part (2) was a ranking of the evaluated department members into several categories according to their performance, from the best to the worst. In order to grade

systematically the scientific quality of their research, faculty adopted the following scale for ranking the individuals:

**Grade A (excellent)** – researcher provides science activities at a high international level of international interest with broad impact within its field and with substantial ratio of high quality publications also in internationally leading journals. The researcher is internationally known as one of leading experts at least in a subfield of his/her interest. The researcher publishes with appropriate frequency. It is expected that the high quality and the frequency of outputs will be preserved in next years.

**Grade B (very good)** – researcher provides science activities at an international level with impact within its field and with a reasonable ratio of high quality publications in internationally well-known journals. The researcher has an international reputation within the field. The researcher publishes with good frequency. It is expected that the quality and the frequency of outputs will be preserved in the next years.

**Grade C (good)** – researcher provides outputs that are of good standard and impact and at least partially published in well-known journals. An adequate scientific contribution is required. There is a hope for improving the situation in near future.

**Grade D (acceptable)** – researcher provides infrequent research outputs of good standard during a longer period of time, the research activities contributes to effort of the department only to a limited extent.

**Grade E (insufficient)** – researcher provides very low number of publications during observed period. The research activities contributes to the effort of the department in the field of science only to a negligible extent.

## OVERALL ASSESSMENT OF THE DEPARTMENT

Scope of scientific activities of the department
<i>Evaluate, whether the scope of scientific activities of the department is in accordance with modern trends in the field of informatics and mathematics; evaluate a research vision and concept of the department for the period 2021–2025.</i>
By definition, the scope of a department of informatics and mathematics is extremely broad. Nevertheless, it is good to see that the department delivers courses in mathematics and informatics which can be of interest for economics and management students. This is even more remarkable if one considers the limited number of teaching positions within the department.

The choice of the three research areas is coherent with the scope of the department and the background of its members. In particular, none of the three research directions seems too narrow and thus it is reasonable that there may be fruitful collaborations and overlappings between them.

One suggestion would be that of better focusing the present research within current research trends. This would not necessarily mean that research should change the direction, but only that its connections with topics such as, e.g. Industry 4.0, machine learning, predictive maintenance, could be made more explicit.

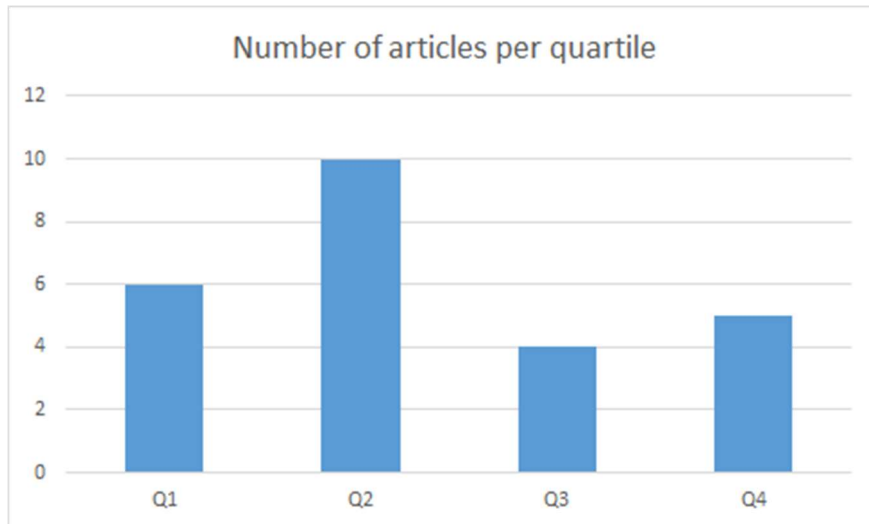
The evaluation committee strongly believes that one of the top priorities of the Department in the next period should be that of gaining international visibility. Attending national conferences and nurturing national cooperation is certainly good, but this shall not happen at the expense of international visibility.

While these evaluation reports are “pictures” of the research results of the department within a period, it will be interesting to compare the evolution of research over longer periods of time. In the future, it will be useful to compare the results of this period with those of the previous period (at a departmental level) to try to discover trends. The committee believes that it is in the interest of the department to consider a tool to analyze research with respect to time to analyze trends, develop strategies and address the research actions.

### Quantity and quality of publication activities

*Evaluate quantity and quality of publication outputs, e.g. whether research results are published in international scientific journals listed in WoS or SCOPUS databases; evaluate proportion of papers published in journals with high influence in the relevant field of science (e.g. journals with a high AIS score)*

The evaluation of the research outcomes was done taking into account the proposed classification in terms of publications in journals indexed in Web of Science and Scopus, or none of them. In total, 25 articles were published in journals with impact factor. It is encouraging to see that the majority of the publications in journals with impact factor are in journals in the first two quartiles

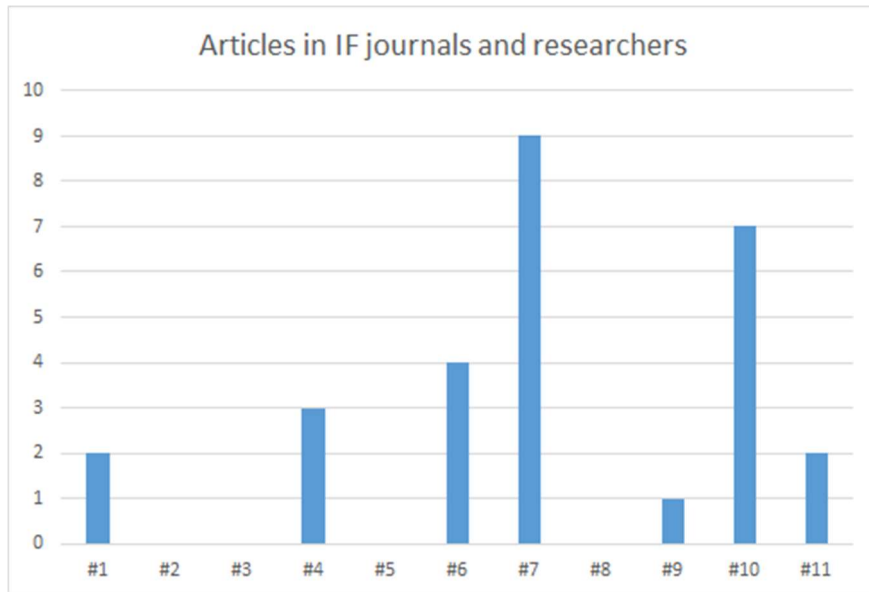


However, we also acknowledge that such a classification may be misleading as journals with different quality could both be indexed in the same databases. The same variety of impact and visibility can be found in conference proceedings: some are at a local/national level whereas some others are international with a very low acceptance rate (there are databases containing ranks of conferences according to their reputation)

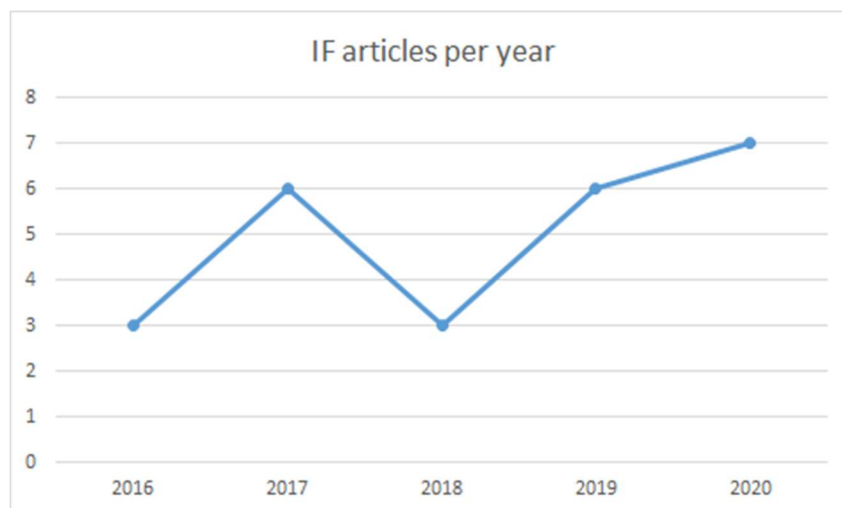
Even with these cautionary notes, it is safe to say that the department has a satisfying number of papers with sufficient visibility, but also a large number with low (or no) visibility. For the future, publications with low visibility should be considered as discussion papers for the community and starting points to develop full papers with higher visibility (and not as “final products”).

In light of the current research evaluation trends, and the criteria used for the distribution of funding at national and European level, for the future, it is going to be important to improve the international visibility of the research outcome, even at the expense of publishing less in terms of quantity. In principle, everyone’s goal should be to reach international reputation and visibility, and having seen the number of papers in proceedings, some of them can certainly be sacrificed to make time to write full papers.

Given the breadth of its scope the department contains multiple research interests. Comparing researchers from different fields would be hard (and such a comparison would be pointless, in the first place). However, even so, there seems to be an imbalance between researchers. Some of them seem to be confronting themselves at an international level while others seldom reach a larger than national audience. Of course, our analysis is based on the assumption of an equally distributed teaching load among the 11 researchers, which may not be the case.



The evolution of the number of publications in the last five years presents a good outlook. While random fluctuations are unavoidable, there has been some consistency in the improvement in the last three years.



In this analysis we considered journals with impact factor but similar conclusions would have been reached by taking journals indexed in Scopus. According to the data presented at the Faculty level, in 2020 the total IF publications were 12. This said, 7 out of these 12 come from the Department of Informatics and Mathematics. So it seems that, research-wise, the Department holds a leading role within the Faculty and deserves praise.

## Correspondence between scientific activities and educational activities

*Evaluate whether the focus of the research activities of the department is in accordance with the educational activities of the department*

There is a clear fit between teaching and research activities of the members of the Department. This fit is even more evident if we consider that the Department is part of a Faculty of Economics and Business. If we had to use a term to put all the activities under the same umbrella we would say “management informatics”.

In the future, the Department may try to build some skill matrices to collect and analyze the competences of each researcher in teaching and in research. These can then be used to determine the coherence between teaching and research activities. The matrix for research will be particularly useful if it is given visibility outside the Department (perhaps to other departments or other private or public stakeholders).

## Department staff and its development

*Evaluate composition of the team, e.g. whether there is appropriate number of professors, associate professors, assistant professors with Ph.D., assistants without Ph.D. and internal Ph.D. students; evaluate the personnel development of the department in the covering period*

The department has a single full professor. A single full professor covering the fields of informatics and mathematics is from both a research and educational viewpoint questionable. It is most likely the result of the merger of two departments in 2014. A key task of a full professor is to foster the academic careers of the other members of a department. However, if the scope of a department is too broad and the number of people in the department is too high, it is almost impossible to fulfil this task. Furthermore, given the facts that mathematics is also a foundational subject in a business school and that informatics is becoming the “operating system” of any enterprise in the digitalization age, it would be wise to invest in these subjects by increasing the number of full professors.

The number of associate professors (2) is also rather low and the number of assistant professors is on first sight rather high, but given the scope of the department also the number of nine assistant professors is still low. The under-staffing becomes evident when

looking at the teaching load of the staff. Usually, the research output suffers from such a high teaching load. In the case of senior personnel (full and associate professors) this also has a cascading effect, since they do not only have limited time for their own research work, but also for advising the juniors, which also decreases the output of the latter.

Rather low is the number of PhD students. The table in the report shows only one full time and one part time PhD student. Given the importance of the fields there should be the potential to increase the number of PhD students. This is certainly a key challenge to be addressed in the future.

### Scientific and publication activities of Ph.D. students

*Evaluate the involvement of Ph.D. students in scientific activities (e.g. students grants, publications)*

Given the low number of students, this is rather hard to judge. However, the fact that only one full time and one part time PhD student are involved in the research work of the department provides a hint that PhDs do not yet play a significant role in the research activities of the department. The department was twice successful in the Student Grant Competition (internal funds), which at least shows that the ambition to integrate students into the research efforts of the department is recognized by the university management. Furthermore, it is evident that the existing PhD students play a critical role in the educational activities of the department. However, this is also due to the fact that Josef Botlík is not a typical PhD student.

### Scientific projects

*Evaluate research projects, consider particularly results achieved, internalisation and the share of projects funded from external resources*

The department was successful in acquiring external funds. The staff members working on the main research topic of "Decision support and optimization of systems using mathematical-statistical methods" successfully conducted two projects sponsored by the Czech Science foundation. Given the fact that competition in these calls is high and as a result - as mentioned in the report - only 20% of the project proposals are funded, the acceptance of two project proposals during the report period must be considered as a success.

Furthermore, the department has conducted three internal projects – two student grant competitions and one Institutional Support of Long-term Research Development project. These internal projects also help the staff assigned to other research topics to conduct project work. In general, the relationship between external and internal funding seems to be fine.

The department is not involved in any international projects listed. Even if EU projects may be seen as a prestigious asset and will certainly foster international projects, it is evident that they come with a lot of administrative overhead and the acceptance rate is very low. It follows that working on EU project proposals is not so attractive for smaller universities

### National and international cooperation

*Evaluate national and international co-operation of the department – e.g. whether department members are involved in international research teams; incoming and outgoing research mobilities*

The Department is involved in international cooperation with recognized intl. institutions such as the University of Waterloo (Canada) and University of Napoli (Italy) in research. However, it is mostly limited to a couple of areas (mathematical) and to individuals rather than larger research teams. Also, involvement in international communities in addition to bilateral actions could be extended. A general question is how many (what proportion) of the research staff is involved in which form in the intl. cooperation and whether they work together or rather “individuals to individuals”.

The international collaboration in the region of Upper Silesia is conducted mainly with Bielsko-Biala and Katowice. It is oriented to modelling and simulation of business processes such as production or logistics. Since the regional economic and societal problems are similar across the CZ-PL border, more orientation towards mutual sharing and common applied research helping to mitigate the undesired impact of traditional mining- and heavy industry-based economy in transition towards a more innovative and more diverse environment is recommended. More attention can be put to tough issues of negative environmental impact of the local industry and business activities. Broad spectrum of ERASMUS+ supported visits can be used to strengthen longer-term collaboration once the personal contacts are established.

National cooperation seems to be quite adequate, e.g. organization of a national conference is appreciated and increases the national visibility. At a local level, the membership in the large IT4Innovation HPC-based project (again mostly around research in mathematical methods) is significant as well as with the Academy of Sciences. It certainly provides a field for mutual fruitful research collaboration in fundamental research. However, it can be advised to explore its potential in applied research, too.



## Social significance of scientific activities

*Evaluate scientific activities and their impact on society in the covering period 2016 – 2020 – e.g. whether there is a positive impact of the department's research activities on society*

No major social significant activities are explicitly mentioned in the report though in a general presentation of the Faculty, it has been noted the Faculty as a whole *does* have societally significant relevant outputs. We see opportunities in connecting the Department with other ones at the Faculty to provide more complex views, attitudes, and solutions for the society.

Maybe external financing from municipalities or foundations can be a good motivator for joining forces. Cross-border activities with neighboring regions of Upper-Silesia in PL and Mid-Slovakia (Žilina Region) within the ERDF Cross-border Programme or V4 funds.

IT Cluster, IT4Innovations, and Moravian-Silesian Innovation Centre (MSIC) are currently striving to obtain funding as a European Innovation Hub which (a part of the competitiveness of SMEs and industry) should play a socially significant role. So, deepening the collaboration within the Cluster, IT4I, and Centre may help.

## Cooperation of the department with the application sphere

*Evaluate the most significant interactions with the non-academic application/corporate sphere. Take into consideration how the evaluated department looks up for and cooperate with application partners.*

Contacts on a regional level have rather low to moderate intensity and are described generically, no applied research nor contractual research projects are mentioned. The project with municipalities is a very good starting point. Altogether, the entire Faculty does have a nontrivial contractual research collaboration. Thus, more inclusion of the Department members into the activities at other departments would help to direct applied research at the Department and motivate researchers.

Specifically, the Department declares participation in IT Cluster as a regional cluster of R&D institutions and industry, but it is no clear what the real content of the collaboration is – it could be sharing of research topics, contractual research, publications, third party grant financing – eg. Technology Agency projects.

General remark - research at the Department is rather solution- than *problem-driven*. If the scientific problem specifications come from closer contacts with practice, they might be

more relevant. Moreover, active industrial collaboration is a prerequisite to apply for applied research grants (eg. from Technology Agency).

## Overall assessment and recommendations

*Summarize here the key findings of your assessment in the context of the whole evaluation and suggest concrete recommendations for improvement and progress.*

### **Recommendations:**

- A critical point for the scientific success of a department is the promotion of junior staff members. Evidently, the senior people of the department should help the juniors in progressing their academic career. However, due to the heavy teaching load and administrative task this is certainly a challenge for this department. In particular, in such a case it is important that a clear strategic plan for each assistant professor and PhD student is made explicit as well as checked and adjusted on a regular basis. In other words, the career plan should represent a Deming Cycle with a cycle time of one year.
- The above mentioned rather formal career plan should be accompanied by complementary mentoring. Mentoring is a process for the informal transmission of knowledge. Thus, it should not follow a rigid plan, but should be rather spontaneous. It is important that the mentor and the protege(e) develop a high level of trust. So the department management should not define mentor-protege(e) relationships, however have a look that each junior has a mentor.
- The department profits a lot from the excellent scientific reputation of Prof. Ramik. Given his academic record, it is possible to acquire external funded research projects and build academic networks. Replacing him is most likely the greatest challenge of the department for the future. Therefore, it is most important to work already today for a successful continuation of the scientific performance in the times after Prof. Ramik has retired. The key person in corresponding activities is Prof. Ramik himself. It would be desirable, if he can spend enough time guiding his “successors” and let them replace him in his academic networks. Maybe he is also able to convince well-known researchers or rising stars to join the university in Karvina.
- Any research institution profits a lot when new talented researchers are joining them. They bring in fresh blood by contributing new ideas, different technical and technological skills, different ways of problem solving, etc. This means that the availability of PhD positions are vital for any department. Currently, the number of tenured positions compared to the number of PhD students is somewhat imbalanced. Accordingly, one should develop a corresponding HR strategy that reserves some positions for “newcomers”.

- More emphasis shall be put on the choice of the right outlets for publications. This choice can be determinant at individual and departmental levels. While journal rankings shall not be the only guiding principle, they are undeniably important. Besides rankings for journals there are some rankings for conferences too. Hence, it is important that optimal publication strategies be thought through in order to maximize visibility of the research activities.
- It is unclear whether there is a sufficient level of “external contamination”. It is reasonable to assume that more events involving visits of international colleagues could be inspiring for the entire department. While there is a sufficient number of outgoing research visits, it is unclear if there is a similar number of visits to Karvina of researchers who can bring new ideas.
- In general, there is a lack of international visibility of the department. Visibility of the activities of the members of the department could be enhanced by populating the webpages of the department. At the moment, the webpages are simple lists of the members of the department. The committee is sure that there is much more to show to the world.
- Taking into account the broad spectrum of quite narrow research topics where the department members are active and competent, it seems to be mutually beneficial to encourage researchers (namely who are working alone) to seek collaboration inside as well outside of the department.
- Having research proposals accepted is great, and submitting them is extremely important. Of course, you need to submit proposals if you want to hope to get them accepted. However, the point here is another one. Namely, the committee believes that the activity of writing (good) proposals is beneficial, regardless of their acceptance, as the activities of brainstorming and writing are fundamental moments to elaborate ideas and generate visions. Writing project proposals should be somehow rewarded or, at the very least, praised at departmental and faculty levels.
- Since Czech universities have generally a good reputation in the region (eg. V4 countries), this potential may be exploited by investigating the opportunities to promote undergraduate- as well as PhD- studies in Slovakia. If there is a stronger brain-drain to Poland rather than the opposite, then check the opportunities to attract graduates from Polish schools back for PhD studies or academic careers in Karviná.
- There seems to be a generation gap among the staff at the department. On the other hand, the department could be able to attract academic staff from other institutions in the region where the demand on personnel might be lower.
- There are numerous ERASMUS+ related academic stays/exchanges. They have the potential to produce more persistent outcomes, such as common research, project proposals, cross-border initiatives, encouragement of students to go abroad, or publish their theses and papers in English. Accordingly, expectations on the short and longer term output should be defined prior to each ERASMUS+ exchange.

## ASSESSMENT OF THE INDIVIDUAL DEPARTMENT MEMBERS

The committee provided assessment of the individual members of the department from the point of view of their contribution towards the excellence of the research activities of the department and the ranking of the individual department member. For reasons of the personal data protection the individual assessment is not presented. The following table summarized the numbers of individual grades of all department members.

### Overview of the individual grades

A	B	C	D	E
3	3	3	2	0



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Christian Huemer



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Matteo Brunelli



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Tomas Pitner