swissuniversities

swissuniversities
Effingerstrasse 15, P.O.Box
3001 Bern
www.swissuniversities.ch

Program 2017 – 2020 P-5
"Scientific information:
Access, processing and safeguarding"

Cost analysis scientific information

Results of the inquiry

January 2018

swissuniversities

Imprint

Client	Steering Committee “Scientific information”
Project manager	Roland Dietlicher
Report version	1.0 (1/18/2018)
Report authors	Roland Dietlicher, Marco Balocco

Table of contents

swissuniversities

Introduction and executive summary

The “Scientific information: Access, processing and safeguarding” (P-5) program sponsored by swissuniversities aims to combine and further develop the currently separate efforts to provide and process scientific information. It intends to establish a shared service network that will provide researchers, teachers and students with a wide range of science-related digital content and the optimum tools to process it.

In 2017, the functions, structure and implementation of this network were laid out in a concept paper which was acknowledged by the Board of swissuniversities.[1] The program management needs statistical material on the expenses related to the scope of the network to be able to define financial goals and to evaluate the effectiveness of the future service network. As this material is very limited, seven representative Swiss higher education institutions (HEIs) were invited to participate in a survey on scientific IT. Three HEIs (UniGE, FHNW and ETH) returned the questionnaires, which were then verified and analyzed in a workshop. The three HEIs represent 27% of the total HEI budgets in Switzerland, thus laying the base for extrapolation to the entire Swiss higher education system. The results were validated based on the 2016 BencHEIT survey on IT costs of HEIs.[2]

The key findings of this study are:

- Costs for scientific IT represent an average of **1.4% of the total institutional budgets** of the participating HEIs.
- Applying this number to the whole Swiss HEI system suggests that the total amount spent by Swiss HEIs for scientific IT **is more than CHF 100 million** and could be even **as high as CHF 150 million**.
- These expenses are expected to **grow at a significantly higher rate** than the total IT costs of HEIs over the next 5 years. The experts participating in this study estimate that the growth rate will be **around 10%**.

These numbers do not include library expenses. Swiss HEIs also spend a total of **CHF 308 million on their libraries and library networks**; the expenses for the national library and other scientific libraries are not part of this sum.

Furthermore, certain scientific IT services have been successfully pooled and assigned to suppliers outside the HEIs with independent budgets, such as CSCS, SWITCH, etc. These providers are also potential participants in the service network of the planned coordination office.

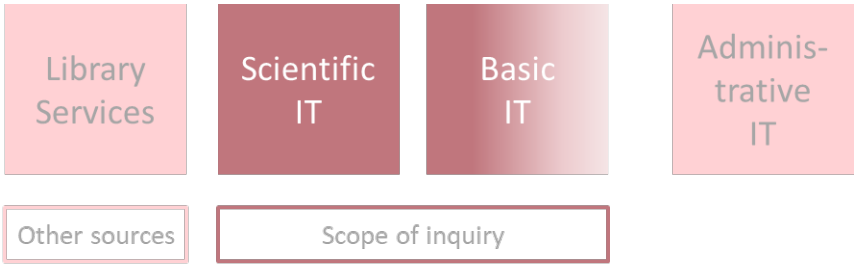
Roland Dietlicher
January 2018

1 Program «Scientific information» (P-5): Koordinationsstelle “Wissenschaftliche Information”: Aufgaben, Steuerung und Verankerung. Entscheidungsgrundlage zum Aufbau einer Koordinationsstelle der Schweizer Hochschulen für gemeinsame Dienste im Bereich Digitale Wissenschaften, 26.09.2017 (available in German and French).
2 Cf. European University Information Systems EUNIS: http://www.eunis.org/task-forces/benchmarking/.

1. Scope of the inquiry and methodology

The ”Scientific information” program and the planned shared service network focus on library services, on scientific IT (IT for research and education) and partially on basic IT (e.g. services in the infrastructure area).

Administrative IT, including business applications for administrative purposes (i.e. financial management, campus management, etc.), is not part of the future service network. Therefore, it is excluded from the present inquiry.



The present inquiry does not focus on every part of the service network:

- Library services are part of the service network, but the expenses for these services will be determined on the basis of separate statistical material. For this reason, they are not part of the present inquiry.
- All expenses related to scientific IT (including e-learning) are covered in this inquiry.
- Expenses for basic IT are only targeted if they can clearly be attributed to the support of teaching, research, continuing education or to the provision of related services to third parties. (All network services are explicitly out of scope since they are not the focus of the program and no further potential for bundling is expected.)
- Only expenses occurring in HEIs are targeted by this study.

The following framework was developed based on the three service categories of support, applications and infrastructure. It explains which expenses were targeted:

	In Scope	Out of Scope
Support	**Support, consultancy and advisory services related to research data and scientific IT,** such as services offered to researchers, students teaching staff etc. Possible subjects could be: how to move to the cloud, how to digitalize processes, etc.	Support, consultancy and advisory services related to administrative and basic IT, such as e-mail, basic network, basis client etc. and support / consultancy performed by library personnel.
Applications	**Collaborative and supporting applications for research data and scientific IT** includes standard applications (research information management, file sharing, dropbox, e-learning) as well as highly specialized data-/project-related technical support and / or developments.	Student and teaching administration applications are out of scope as well as any other administrative applications (finance, personnel etc.). Activities performed by library personnel in this realm are also out of scope.
Infrastructure	**Research data and scientific IT infrastructure**, i.e., high performance computing, storage, servers , multi-media equipment and their maintenance / management.	Basic infrastructure, i.e., networks, clients etc. and infrastructure related to administrative IT. Any infrastructure facilitated and financed by libraries.

In addition to allocating costs to the service categories, the participants were asked to distinguish between personnel and non-personnel costs and between costs arising centrally or

in decentral units. For further information on the methodology, please consult the addendum at the end of this document.

2. Current expenses for scientific IT for three sample Swiss HEIs (2016)

The questionnaire was sent to seven HEIs considered to be representative and returned by three of them. Four institutions did not participate because of the time and effort necessary to complete the questionnaire. Currently, the institutions' accounting does not allow the analysis of expenses related to scientific IT. Therefore, the expenses had to be identified and calculated manually.

swissuniversities

The following numbers were returned by the University of Geneva (UGE), the University of Applied Sciences and Arts Northwestern Switzerland (FHNW) and the ETH Zürich (ETH). The numbers relating to decentralized expenses are partially based on estimations. The results of the inquiry were verified and analysed in a workshop with the participants and an expert in scientific IT respectively via e-mail after the workshop.

2016		UGE	FHNW	ETH	TOTAL
Total expenses for scientific IT	kCHF	14'800	4'520	19'195	**38'515**
Total institutional budget	kCHF	831'021	295'174	1'676'300	**2'802'495**
Percentage of institutional budget	%	1.8%	1.5%	1.1%	**1.4%**
Total IT expenses	kCHF	45'000	22'000	106'033	**173'033**
Percentage of total IT expenses	%	33%	21%	18%	**22%**

In 2016, the total expenses for scientific IT amount to CHF 38.5 million for these three institutions. This corresponds to an average of 1.4% of their entire institutional budget.[3] The total IT expenses for the three institutions amount to CHF 173 million. Therefore, the percentage of the total IT budget spent on scientific IT averages out to 22%.

3. Extrapolation to the whole Swiss HEI system, by two estimations

Total cost budget per HEI type in kCHF	
7'943'065	Universities, including ETH
2'304'920	Universities of applied sciences
665'254	Universities of teacher education
10'913'239	Total cost budget for all Swiss HEIs
152'785	**Estimation of 1.4% for scientific IT**

In the workshop, it was determined that the ratio of scientific IT expenses to the overall budget of the institutions is the most reasonable way to expand the results of the inquiry to the whole Swiss HEI system. The table above shows the 2016 statistical material on the total cost budget for all Swiss HEIs, amounting to CHF 10.9 billion.[4] Application of the survey average of 1.4% results in an estimation of CHF 152.8 million spent yearly on scientific IT in Switzerland.

A second estimation was performed based on the 2016 BencHEIT Benchmark of IT expenses to validate this result.[5] The institutional budgets were determined based on Federal Statistical Office data (cf. footnotes).

3 Federal Statistical Office "Finances and costs of higher education institutions".
4 Federal Statistical Office "Finances and costs of higher education institutions".
5 BencHEIT is a survey on IT costs and volumes of higher education institutes by European University Information Systems EUNIS (cf. http://www.eunis.org/task-forces/benchmarking/).

Total IT expenses based on BencHEIT in kCHF		Institutional budget in kCHF
ETH	115'580	1'676'301
UBAS	36'719	834'575
USG	17'691	225'787
UZH	67'116	1'352'643
Total for 4 participating HEIs	237'106	4'089'306
Extrapolation to all Swiss HEIs	632'771	10'913'239
Estimation of 22% for scientific IT	**139'210**	

swissuniversities

BencHEIT revealed total IT costs of CHF 237.1 million for the four Swiss participants for 2016. The extrapolation of this sum based on institutional budgets results in an estimated IT cost of CHF 632.8 million for all Swiss HEIs in 2016. Application of 22% as an average share of the IT budget spent on scientific IT results in an amount of CHF 139.2 million for this period, which roughly confirms the results obtained using the first method (CHF 152.8 million).

4. Growth of scientific IT costs

The questionnaire contained four qualitative questions related to project spending and expected growth rates of IT and scientific IT expenses, which are provided in the addendum. The answers were discussed in the workshop.

In future, the participants expect that scientific IT costs will grow at a significantly higher rate than general IT budgets. They expect a yearly growth rate of 10% for these expenses over the next 5 years. The reason is the growing need for standard e-science solutions and research data management, with the latter being driven by the requirements of funding agencies. These expenses must be financed mainly through research or through the regular university budget. In certain instances, the rising financial need is covered by extraordinary cantonal funding of “digital initiatives”.

5. Scope of the statistical material

26%	2'802'495	Total institutional budget for sample of **our survey (3 HEIs)**
37%	4'089'306	Total institutional budget for sample of **BencHEIT survey (4 HEIs)**
100%	10'913'239	Total institutional budget for **all Swiss HEIs**

The table above shows the scope of the statistical material used:

- The three institutions which returned our questionnaire account for 26% of the institutional budget for all Swiss HEIs in 2016.
- The four Swiss participants in BencHEIT add up to 37% of the total budget for all Swiss HEIs in 2016.

6. Conclusions

The results of the inquiry suggest that the total amount spent by Swiss HEIs for scientific IT exceeds CHF 100 million and could amount to CHF 150 million. These expenses are expected to grow at a significantly higher rate than the total IT costs over the next 5 years. The participants in this study estimate that this rate will be around 10%.

These numbers do not include library expenses. Swiss HEIs also spent a total of CHF 308 million on their libraries and library networks according to the 2016 library statistics (cf. addendum).[6]

Furthermore, certain scientific IT and library services have already been successfully pooled and assigned to suppliers outside the HEIs with independent budgets, such as CSCS, SWITCH, etc. These providers are also potential participants in the service network of the planned coordination office.

[6] The expenses for the national library and other scientific libraries (e.g. cantonal libraries) are not part of this sum.

7. Addendum

7.1. Technical definitions

The following technical definitions were sent to the survey participants:

- Please allocate all relevant expenses to one of the service categories defined in the framework (support, applications, infrastructure).
- Within these service categories, the survey participants are asked to distinguish between personnel costs (total costs) and non-personnel costs (including equipment, outsourcing expenses, write-off, maintenance, etc.).
- The scope covers expenses for running a service as well as project-related expenses, e.g. development of new features of a service.
- Only direct expenses are targeted in this inquiry. Therefore, please eliminate any expenses related to the general administration and management of the unit providing the service as well as any overhead expenses charged from other parts of your institution.
- Please include all expenses, regardless of the source of funds (covered by own funds as well as by third party funds/grants).
- Please enter gross expenses (do not deduct any reduction in expenses due to cost sharing with other units or income, e.g. due to provision of services to third parties).

swissuniversities

7.2. Further analysis of the results of the inquiry

Institution	Centralized	Decentralized	**Total in kCHF**
UGE	6'100	8'700	**14'800**
FHNW	3'940	580	**4'520**
ETH	10'245	8'950	**19'195**
Total in kCHF	**20'285**	**18'230**	**38'515**
%	**53%**	**47%**	**100%**

As an average, the distribution between central and decentral costs is balanced: 53% of the expenses occur centrally and 47% occur in decentral units of the HEIs. However, the costs for scientific IT are far more centralized for FHNW.

Service type		**Cost in kCHF (2016)**	UGE	FHNW	ETH	Total	**%**
Support	Support, consultancy and advisory services related to research data and scientific IT	Personnel	6'900	390	7'300	14'590	
		Nonpersonnel	100	230	100	430	
		SUM	7'000	620	7'400	15'020	**39%**
Applications	Collaborative and supporting applications for research data and scientific IT	Personnel	1'800	1'100	2'250	5'150	
		Nonpersonnel	600	780	145	1'525	
		SUM	2'400	1'880	2'395	6'675	**17%**
Infrastructure	Research data and scientific IT infrastructure	Personnel	500	740	1'200	2'440	
		Nonpersonnel	4'900	1'280	8'200	14'380	
		SUM	5'400	2'020	9'400	16'820	**44%**
TOTAL		**Personnel**	**9'200**	**2'230**	**10'750**	**22'180**	**58%**
		Nonpersonnel	**5'600**	**2'290**	**8'445**	**16'335**	**42%**
		SUM	**14'800**	**4'520**	**19'195**	**38'515**	**100%**

All the HEIs spend more on personnel (average: 58%) than on non-personnel (average: 42%). The expenses for infrastructure (44%) and support (39%) are significantly higher than for applications (17%).

7.3. Qualitative questions

1	What percentage of the total expenses for scientific information do you estimate is spent on projects (such as development of new services or adaption of existing services)?		
	UGE	FHNW	ETH
Centralized:	10%	30%	30%
Decentralized:	difficult to estimate	30%	10%
2	**What has the average growth rate of total IT expenses (including administrative IT and basic IT) been in your institution over the past 5 years? (Please state if this is an estimate)**		
	UGE	FHNW	ETH
Centralized IT expenses:	2% (including projects)	10%	1.50%
Decentralized IT expenses:	difficult to estimate	0%	1%
3	**What average growth rate of total IT expenses (including administrative IT and basic IT) do you estimate / expect to see in your institution over the next 5 years?**		
	UGE	FHNW	ETH
Centralized IT expenses:	2%	5%	0.50%
Decentralized IT expenses:	difficult to estimate	0%	0%
4	**How do you think scientific IT expenses, as defined in this questionnaire, will develop over the next 5 years? Please give an estimate of the expected average growth rate.**		
	UGE	FHNW	ETH
Centralized scientific IT expenses:	10%	10%	10%
Decentralized scientific IT expenses:	difficult to estimate	0%	10%

The table above contains additional questions and answers related to project spending and expected growth rates of IT and scientific IT expenses.

7.4. Library expenses 2016

Swiss Library Statistic 2016	Total FTE		Total recurring cost 2016	
Universities including univ. networks	1'426.7	82%	273'520'003	89%
Universities of applied sciences	223.3	13%	25'712'695	8%
Universities of teacher education	87.4	5%	8'676'556	3%
TOTAL	1'737		307'909'254	

The table above shows the library expenses for 2016 occurring at Swiss HEIs according to the Federal Statistical Office.[7] The total expenses amount to almost CHF 308 million. 89% of HEI library spending occurs at universities (including university networks), 8% at universities of applied sciences and 3% at universities of teacher education.

[7] Source: Federal Statistical Office "Bibliothekenstatistik", currently available for 2016.