

SURF

Into the cloud with SURF

Cloud computing and cloud services in higher education and research



Contents

Introduction	2
1. Position paper.....	4
1.1 What is cloud computing?	4
1.2 Advantages of cloud services in higher education and research	5
1.3 The SURF cloud strategy.....	6
1.4 The challenges of cloud services.....	8
1.5 Why should action be taken now?.....	9
2. Action Plan – start-up phase.....	11
2.1 Activities.....	11
2.2 Governance.....	14
2.3 Budget	15
Appendices	16
I Cloud Services for Higher Education and Research.....	16
II Cloud services at the institutions and at SURF	17
III The challenges of cloud services.....	19

Introduction

Higher education and research institutions find themselves in a much-changing world. SURF's Strategic Plan for 2011–2014¹ has already noted that education is becoming "open": communication between students and instructors no longer takes place only within the walls of the institution and from 9 to 5. Both students and staff have a large number of personal devices such as a mobile phone, smartphone, laptop, e-reader, etc., and they expect to use these to access everything that they need for their studies or their work.

Online collaboration is becoming perfectly normal, not just within individual institutions but also between them. The need for far-reaching open and online collaboration is particularly pressing where research is concerned. The research field is undergoing a real "data explosion"; it is not only the hard sciences that generate enormous quantities of data but almost all fields of research, including the humanities. Research breakthroughs increasingly take place at the interface between disciplines and on the basis of joint efforts. And although institutions are spending a great deal on ICT facilities to meet all these demands and keep pace with developments, they are at the same time required to economise.

Against the background of all these developments, cloud computing has become an indispensable tool. To take account of this theme – which has a prominent place in SURF's Strategic Plan – almost all the members of the platform boards for Education and Business Management and representatives of SURFnet, SURFdiensten, and SURFFoundation visited suppliers and universities in San Francisco and Seattle in March 2011.² This successful study trip showed the enormous potential of cloud computing, but it also made clear the attendant risks. Three major players – Google, IBM, and Microsoft – provided a clear picture of their cloud strategy, their strengths, and their weaknesses. Important initiatives for decision models were also shown.

The study trip generated the following insights:

- The question is not *whether* we should "enter the cloud" but *when* and *how* that should be;
- Working together in the context of SURF has great added value, both for Dutch higher education and research overall and for the individual institutions.

As a result, the platform boards decided at the end of March on an energetic joint policy for cloud computing and the use of cloud services. SURF's Cloud Taskforce was set up for the purpose and is intended to transform that decision into an Action Plan. That will include incorporating this topic into the current and future annual plans for the SURF organisations and the provision of sufficient resources.

The task assigned to the Cloud Taskforce is to direct matters and ensure synergy as regards the use of cloud computing and cloud services by the institutions connected to SURF. The taskforce will do this, for example, by:

- formulating a cloud strategy;
- vendor management;
- developing and sharing expertise;
- initiating and supporting implementation programmes.

The Cloud Taskforce began its work by producing this position paper. The first part of the paper deals with the value and necessity of cloud computing and cloud services as well as the associated

¹ www.surf.nl/mjp, 3.3 Virtualisation and alternative types of sourcing

² Google, the University of California (Berkeley) and IBM in San Francisco, and Microsoft and the University of Washington in Seattle

opportunities and challenges, and makes initial proposals for a shared SURF cloud strategy. The second part comprises an Action Plan that the Cloud Taskforce has drawn up for the period from 2011 to 2014.⁶

This document has been discussed with the CIO Consultation Group,³ CvDUR,⁴ COMIT,⁵ KAAIWO,⁶ the boards and contact persons for the ICT & Education, ICT & Research, and ICT & Business Management platforms; the secretary to SURF's Scientific Technical Council (STC); and the Special Interest Groups for Green ICT, the Digital Learning and Working Environment, and Testing. The aim is finish drawing up a shared cloud strategy at SURF's Cloud Computing Symposium for managers on 8 November 2011. The strategy can then perhaps be formally adopted at SURF's General Board meeting later in November.

³ Made up of the Chief Information Officers (CIOs) of more than 40 higher education and research institutions.

⁴ Coordination Meeting of Directors of University Computer Centres [*Coördinatie Vergadering Directies Universitaire Rekencentra*].

⁵ COMIT is a platform made up of officials who are responsible for the provision of information, communication technology, and computerisation at universities of applied sciences (at institutional level).

⁶ KAAIWO is a consultative body made up of officials who are responsible at research universities for the provision of information for management and administration, the provision of administrative information, and administrative computerisation (at institution level).

1. Position paper

1.1 What is cloud computing?

Cloud computing means the provision or use of scalable and "elastic" services via the Internet.⁷ The user can arrange the services himself; payment is on the basis of usage, rather like the consumption of electricity from the mains. Cloud services of this kind allow a large number of functions and most of the data used by pupils, students, instructors, administrators, or even whole institutions to be provided via the Internet. This saves time and money because the institution no longer needs to have the necessary technology in house. The space that this frees up can then be used for the primary process, namely for high-quality education and research.

One definition⁸ of cloud computing reads as follows:

Cloud computing refers to on-demand network access to a shared pool of configurable computing resources that can be rapidly provisioned and released with minimal management effort or service provider interaction, with essential characteristics: on-demand self-service, broad network access, resource pooling, rapid elasticity, measured service.

It is useful to distinguish between three cloud environments from which services can be acquired, namely the public, community, and private clouds.

- The public cloud is the location where generic services can be acquired. These services are therefore not intended specifically for higher education and research, and are provided by major suppliers such as Google (Google Apps) and Microsoft (Live@Edu, now Office365). There are also various niche players, for example Dropbox or Evernote.
- The community cloud provides shared, specific cloud services for higher education and research.
- In a private cloud, an organisation's data centre is made virtual and/or contracted out locally, i.e. within the organisation. Private cloud services are not really part of the cloud, strictly speaking.

Besides this division into three types of cloud – which can be seen as a delivery model – one can also distinguish three different types of services: Software as a Service (SaaS), Platform as a Service (PaaS), and Infrastructure as a Service (IaaS).

As of mid-2011, the strength of the cloud is clearest in the form of SaaS: the services provided by large-scale organisations such as Google and Microsoft, which offer their productivity software as ready-made services within the public cloud. SaaS offers a low threshold entry to the cloud. The focus from the point of view of higher education institutions has so far been on these generic public cloud facilities ("commodity services"). Where these office applications are concerned, the requirements of higher education and research institutions differ little – if at all – from those of

⁷ Source: "Cloud computing in het onderwijs, minder zorg om techniek, meer profijt van ICT", published by the SURFnet/Kennisnet Innovation Programme (www.surfnetkennisnetproject.nl/innovatie/cloudcomputing).

⁸ Source: National Institute of Standards and Technology (an agency of the U.S. Department of Commerce)

organisations in other sectors. Institutions can benefit fairly easily from the scale advantages of these cloud services and can consume them "as is".

In the case of PaaS and IaaS, on the other hand, the institutions remain responsible (or partly so) for the production of cloud services. PaaS involves applications being provided from a shared platform or infrastructure components being acquired from the cloud, for example storage or computing capacity as building blocks.

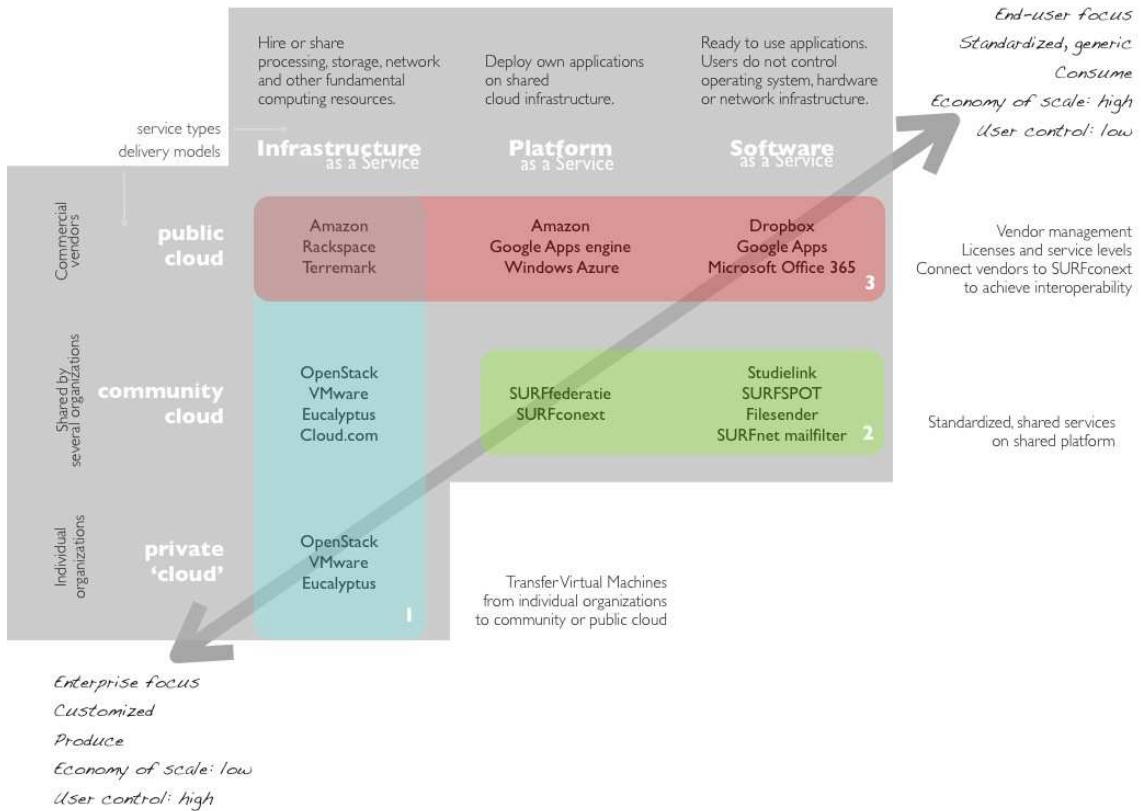


Figure 1. The relationship between the various different cloud delivery models (private, community, and public) and types of services (Infrastructure, Platform, and Software as a Service).

Delivery models and types of services are elaborated and explained in Figure 2 in Appendix I (Cloud Services for Higher Education and Research).

1.2 Advantages of cloud services in higher education and research

Utilising cloud services has the following advantages for higher education and research institutions:

- Utilising cloud services makes it possible to provide high-quality ICT services that meet the requirements of students, instructors, researchers, and other staff. The institutions can also keep pace – more than is currently the case – with those requirements and make use of the range available: rapid adoption and availability of new facilities.
- The cloud makes it possible to provide services "at any time", "at any place", and – increasingly important – "on any device";

- Cloud services produced a significant increase in flexibility, accompanied by cost reduction/control;
- If applied effectively, cloud services can make a significant contribution to reducing energy consumption and therefore to achieving the sustainability goals that the institutions have set for themselves.

A number of institutions are already utilising public cloud facilities; as of mid-2011, for example, two are using Google apps and six are experimenting with them. Four institutions are using Microsoft Live@Edu and about a dozen are testing the program. These institutions share their experience and are already benefiting from the advantages offered by the public cloud.

But SURF is active itself too. A study has been carried out within the context of the SURFnet/Kennisnet Innovation Programme of the opportunities and possibilities of cloud computing in education. SURFdiensten is concluding contracts with public cloud providers so that students, researchers, instructors, and other staff can make use of relevant cloud software at a low price or even free of charge. SURFfederatie enables users to log in with just a single identity – that of their institution – to all the cloud providers connected to SURFfederatie. In collaboration with the institutions and partners (Dutch and foreign) SURFnet is currently developing the "SURFconext" collaboration infrastructure, which makes it possible to use the services offered by various different providers alongside one another and to combine them, thus simplifying collaboration across institutional boundaries and national borders. SURFnet is also carrying out a number of pilot studies in the area of cloud computing.

More examples are given in Appendix II.

SURFconext as the connecting infrastructure for the cloud

SURFconext is a connection infrastructure – almost invisible for users – that links up internal and external cloud services, thus making the exchange of data between these facilities possible that goes beyond the level of individual institutions and products.

To be connected to one another, providers and institutions need only make a single connection, namely with the SURFconext infrastructure. Users can log in to all the linked services with their own trusted institutional account ("single sign-on") and collaborate there in the same team set-up. They decide for themselves what services they will utilise, and can combine these "gadgets" within an environment. The institutions are in control of the available services (conditions for use) and identity management. (www.surfconext.nl)

1.3 The SURF cloud strategy

For higher education and research, cloud services have become unavoidable. And although some individual institutions are already reaping the benefits of using such services, they could be used on a much larger scale if the institutions acted in the context of SURF. Multi-institutional collaboration can increase scale and combine the institutions' purchasing power, thus benefiting the end user. Collaboration is also the best possible way of sharing knowledge and experience and letting providers know the specific needs and requirements of the Dutch higher education and research sector.

In other words, a shared SURF cloud strategy makes it possible to develop joint, cost-efficient activities within the community and the public cloud, thus actually profiting on a large scale from

the advantages that the cloud has to offer. Nevertheless, the cloud is not a panacea. We need to realise that it cannot solve all our problems, and where it can in fact solve problems it only works if we tackle things together and in the right manner.

The SURF cloud strategy focuses on making maximum use of cloud services and consists of the following beliefs:

Important: These beliefs have been formulated in clear and decisive terms and serve as a basis for a discussion that will need to be conducted by all the institutions together. The results of that discussion will provide the basis for finalising the way the beliefs are formulated, which will in turn be the basis for the cloud strategy for the Dutch higher education and research sector.

- The aim of the cloud strategy is to reduce the burden on the institutions so that they can focus on the primary processes of education and research.
- The basic principle for decisions on new applications is "cloud first" because using commodity services from the cloud has major advantages. It offers greater functionality for less money.
- It is worthwhile for higher education institutions to act jointly when acquiring services from the cloud. Doing so is advantageous as regards purchasing power, contract management, quality assurance, imposing standards, security/privacy, and knowledge sharing.
- When no public cloud services are available, it is beneficial to create and work within a community cloud. Knowledge and resources are combined so as to collaborate on the joint provision of support processes and operational processes (for example staff, student, and financial administration). In doing so, however, institutions must still be able to promote their own "brand". The community cloud can also be utilised for services that are suitable for the cloud but not for the public cloud. The community cloud can function, for example, as a virtual private cloud located outside the walls of the institution, or as a fall-back option.
- Institutions would only need to develop private solutions if no suitable public or community cloud services were available or could be developed.
- Existing private solutions, platforms, and infrastructures will be located as far as possible within a shared platform, in the form of SaaS, PaaS, and IaaS.
- The cloud strategy demands a different ICT infrastructure. Within the community cloud, standardisation of processes is a condition for benefiting from shared cloud services.
- The end user – whether a student, instructor, or researcher – can choose what devices and applications he/she wishes to use.
- Give end users the freedom to choose between public cloud providers. Ensure that the presence of a good infrastructure means that it does not matter what they in fact choose.

Figure 1 (page 6) shows three work areas, in blue, green, and red. The Cloud Taskforce expects action to be necessary and possible in these areas within the short term.

1. Blue: support for the institutions connected with SURF in their migration from virtualised, institution-specific systems at the local data centre to a community cloud (a technical infrastructure outside the institution where these virtual institutional systems can be located: a virtual private cloud) or the public cloud.

2. Green: development of shared, standardised online services, offered jointly and managed by means of a community cloud (with attention being paid to opportunities for multi-institutional facilities and open collaboration).
3. Red: ensure a joint approach to public cloud providers and appropriate arrangements regarding the services they provide by means of licences, conditions for use, and interoperability (with attention being paid to end users' "pull" and to the right speed of adoption of cloud services).

1.4 The challenges of cloud services

The introduction of cloud services in higher education and research is a large-scale, far-reaching operation. Not only is innovation in ICT involved; changes will also be necessary in how work processes are organised. A culture shift may well also be necessary, namely to a culture of producing less oneself but directing and consuming more (in other word: utilising what is available).

This innovation therefore has significant consequences and will certainly take several years. It will first be necessary to determine which applications/services can be acquired from the public cloud, which can be shared with other institutions within a community cloud, and which are specific to the particular institution.

It will then be necessary to think hard about a large number of matters if the institutions are to benefit to the full from the flexible and economical provision of high-quality ICT services, i.e. "any time, any place, and on any device".

The most important factors determining the success or failure of cloud services are probably the privacy and ownership of data. It is necessary to weigh up the risks and in that light to decide on measures to control them. A joint approach has recently already been successful: both Google and Microsoft have joined up with SURFfederatie, meaning that students and staff can log in securely to the cloud services they provide with just a single identity, i.e. that of their institution. This is one of the first occasions anywhere in the world when these providers have created such a federative authentication link. The link means that identity and access management remain the responsibility of the institution.

Almost as important as privacy and ownership is the standardisation of generic processes. Interoperability is necessary to make co-operation possible between services and people. Standardisation means that customers can also remain independent of providers: they do not all need to choose the same provider, and it becomes simpler to switch from one provider to another. Standardisation does not therefore mean the same provider for everybody but it does mean technical standardisation and the significant standardisation of work processes.

If institutions really wish to benefit from shared services within the community cloud, then standardisation is essential. Standardisation is necessary in order to differentiate and to increase flexibility. It is rather like Lego bricks: having a standardised brick means that one can cheaply and reliably produce a multitude of different shapes. It is only with standardisation that one can give end users genuine freedom of choice. The problems of standardisation in the short term are entirely compensated for by the benefits in the long term.

Besides these major challenges, consideration also needs to be given to such matters as accountability, governance and responsibility, accessibility, integration (i.e. the linking together of the large number of services involved), monitoring, and dependence.

Each institution will also need to ask itself a number of specific questions when introducing cloud services, for example:

- How will it draw up a selection strategy (i.e. a sourcing policy) for utilising services from the cloud and for providers? What cloud services will the institution need to produce (or continue to produce) itself and offer at its own responsibility? What services (or types of services) can institutions acquire from within the cloud? What services will users arrange for at their own responsibility?
- Who within the organisation (i.e. which department) will determine the selection strategy?
- How do you ensure adoption of cloud services within the institution?
- Will the institution migrate its current systems to SaaS, PaaS and IaaS and if so how?
- What will the consequences be for the institution's ICT personnel?
- How do you organise cloud services within the institution?

Appendix II deals with these matters and questions in greater detail.

1.5 Why should action be taken now?

To jointly gain the maximum benefit offered by cloud services, it is necessary to take action jointly and to do so now.

Public cloud

A large range of public cloud services are available. Students and staff are already using them but in a fragmented and non-cohesive manner. And although only a few institutions have drawn up their own strategy for cloud services, they are nevertheless all on the verge of making the relevant choices. It is by no means inconceivable that the lack of a strategy will lead to those choices being hasty and insufficiently well thought-out.

Providers are also actively exploring the cloud. New services are being developed in rapid succession, and all indications are that this will continue. At the moment, it is still possible to exert an influence on such things as the providers' choice of architecture and Service Level Agreements. Doing so does require taking joint action, however. That is the only way of curbing the cost of cloud services and increasing their flexibility and reliability.

Community cloud

Institutions will deal with one another more than with other parties within the community cloud. It is here that they will develop shared services (or have them developed) that are not available within the public cloud. The financial and operational importance of community cloud services is increasing by the day because it is far too expensive for higher education and research institutions to continue to develop and maintain their own systems for all kinds of operational functions (for example staff, student, and financial administration). Technology makes possible a "revolution" in this regard, namely the development and utilisation of shared services on a substantial scale. In order for this to be done, it is necessary to standardise the processes and to have a shared infrastructure and an effective governance structure. This "revolution" must be allowed for when replacing or updating existing systems.

Private cloud

The private cloud should only be selected in the case of isolated, non-multi-institutional systems. Although private cloud services do not strictly speaking form part of the cloud, they are nevertheless part of SURF's cloud strategy and of the work of the Cloud Taskforce. The SURF organisation wishes to provide support for virtualising and contracting out existing on-premises

applications and for the indispensable “orchestration” of private, community, and public cloud services.

Now or never!

It's now or never! Taking action on the basis of a coherent SURF cloud strategy offers a unique opportunity to benefit to the full from the advantages of cloud services, while at the same time responding to the challenges confronting the higher education and research sector. Although it will require patience, together we can ensure that cloud services have an impact comparable to that of the highly successful SURFnet network since its introduction twenty years ago.

2. Action Plan – start-up phase

Important: This plan describes the activities and necessary resources during the start-up phase of the programme. A new version of the Action Plan will be presented about the end of 2011 or the beginning of 2012 – after a joint cloud services strategy has been adopted.

The Cloud programme pursues the sourcing aims as set out in SURF's Strategic Plan for 2011–2014. The initial activities have the following objectives:

- Together with the institutions, to develop a properly substantiated vision and joint strategy for cloud services;
- To clarify what activities are necessary in order to implement the joint cloud strategy and to assist the higher education institutions in doing so.

The descriptions of the various activities given below focus on the start-up phase, which generally means 2011. Some activities, however, are explicitly part of the start-up phase but will continue into 2012. Where that is expected to be the case, it has been noted (including in terms of the estimated budget necessary). An overall outline of activities and the necessary budget for 2012 and later will be provided in an updated version of the Action Plan (to be presented at the end of 2011 or the beginning of 2012).

2.1 Activities

No. 1 Position paper, cloud vision

In order to arrive at a shared vision, SURF's Cloud Taskforce will draw up a position paper. This will then be discussed (June–October) with all the relevant groupings within the sector. The Cloud Taskforce will also arrange one or more meetings at which providers of cloud services and integration support can present their own vision and their proposed contribution. The position paper will be discussed during SURF's Cloud Computing Symposium for managers (8 November 2011) and if possible adopted at the meeting of SURF's General Board later in November.

Timeframe: April 2011–November 2011

Implementation: SURF Cloud Taskforce, managements, relevant bodies

Material budget: EUR 10,000

No. 2 Elaboration and substantiation of main components

When the draft position paper is ready for wider discussion, work will be done to elaborate and substantiate some of the main components of the joint strategy. The position paper refers in any case to three components (in addition to the I strategy and architecture referred to in No. 4). This involves:

- a. Identity management, privacy, and ownership details (in collaboration with the BIS! programme);
- b. Business case (in collaboration with the ICT & Business Management platform and SURFnet);
- c. Lessons learned Governance (in collaboration with the CIO Consultation Group). Efforts will in all cases be made to collaborate with and acquire input from the groups/bodies mentioned.

Timeframe: July 2011–December 2011

Implementation: SURF Cloud Taskforce, SURFnet, SURFFoundation platforms, relevant

Material budget:	groups and bodies EUR 60,000 (of which about EUR 30,000 in 2011 and EUR 30,000 in 2012)
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No. 3 Ensure optimum collaboration with market

A number of activities will be organised in order to ensure optimum collaboration between the higher education and research sector and the market:

- a. Survey of "what the market can – and is prepared – to provide": Two vendor sessions will be held at which providers of cloud services and integration support will be invited to respond to the draft position paper and to outline the contribution they believe they can make to the cloud objectives for higher education and research.
- b. Survey of existing and desired ICT services: What ICT services are currently produced by the institutions themselves and what are the most important generic ICT services that the institutions desire (the range of public cloud services is of interest precisely where generic services are concerned such as e-mail, calendars, and collaboration tools. This study is already being carried out as part of the current Digital Learning and Working Environment programme (DLWE));
- c. Survey of available cloud services: What higher education-relevant services are currently available or will become available in the near future? (Important: this is naturally no more than a snapshot, but it can help to determine the course to be taken).

Timeframe:	September–December 2011
Implementation:	SURF Cloud Taskforce, SURFnet, ICT & Business Management platform (DLWE programme)
Material budget:	EUR 50,000 (of which about EUR 30,000 in 2011 and EUR 20,000 in 2012)

No. 4 I strategy and reference architecture for higher education and research

A shared cloud strategy will be strong, sustainable, and impactful if it is based on a shared vision of how information management should be organised. This will require developing a shared I strategy and reference architecture for higher education and research. That strategy will comprise the higher education institutions' shared strategic principles and objectives regarding ICT facilities, with these then forming the basis for the applicable preconditions for organising work processes and technology. The CIO Consultation Group will collaborate.

Timeframe:	October 2011–December 2012
Implementation:	ICT & Business Management platform and CIO Consultation Group
Material budget:	EUR 145,000 (of which about EUR 35,000 in 2011 and EUR 110,000 in 2012)

No. 5 Vendor management and pilot projects with cloud services

It is necessary for the institutions to act jointly within the context of SURF vis-à-vis the providers of cloud services so as to conclude the necessary agreements with them. This will involve licences and conditions for use, with the aim being to ensure interoperability that goes beyond the level of individual institutions and products. The Cloud Taskforce will be the intermediary between the providers and the institutions.

Contacts will be made – partly in the light of requirements identified during other activities – with relevant vendors, and pilot projects will be initiated to try out the services they provide. This will be a way of actually entering the domain of the cloud. Providers and institutions will receive support in coordinating supply and demand. The link to SURFconext will also be considered.

Timeframe:	May 2011–December 2011
Implementation:	SURFnet (SURFworks) and SURFdiensten.
Material budget:	(already provided for in current programme)

No. 6 Guidelines and toolkit

Development of guidelines and a decision tree for sourcing (not only from the cloud!) for the institutions, including such aspects as costs, privacy, legal considerations, etc. (Important: This activity is already at an advanced stage; it was initiated by the CIO Consultation Group)

Timeframe:

January 2011–October 2011

Implementation:

CIO Consultation Group expert group, SURFnet (SURFworks), and
SURFdiensten

Material budget:

(already provided for in current programme)

No. 7 Communication regarding the cloud

Information regarding cloud computing will be made available in a clear and well organised manner via www.surf.nl/cloud. Attention will also be paid to cloud services in the regular SURF newsletters and where necessary in specific publications. A number of meetings are also planned (vendor days, SURF's Cloud Computing Symposium on 8 November 2011). The taskforce will also actively seek contact with all the relevant groups (platform boards and consultation groups such as the CIO Consultation Group, CvDUR, KAAIWO, COMIT, BIK, etc.). As far as possible, there will be a positive response to requests from institutions to present and/or discuss the cloud strategy (at the institutions' premises).

Timeframe:

from May 2011.

Implementation:

SURF's Cloud Taskforce

Material budget:

EUR 10,000 in 2011 and EUR 10,000 in 2012

No. 8 New version of cloud Action Plan

After the symposium for managers on 8 November 2011, the Cloud Taskforce will draw up an updated version of the cloud Action Plan; this will appear at the end of 2011 or the beginning of 2012. Based on the insights generated, it will provide an update or new version of the approach to be taken and the associated activities.

Timeframe:

November–December 2011

Implementation:

SURF's Cloud Taskforce

Material budget:

(to be determined)

2.2 Governance

The Cloud programme will:

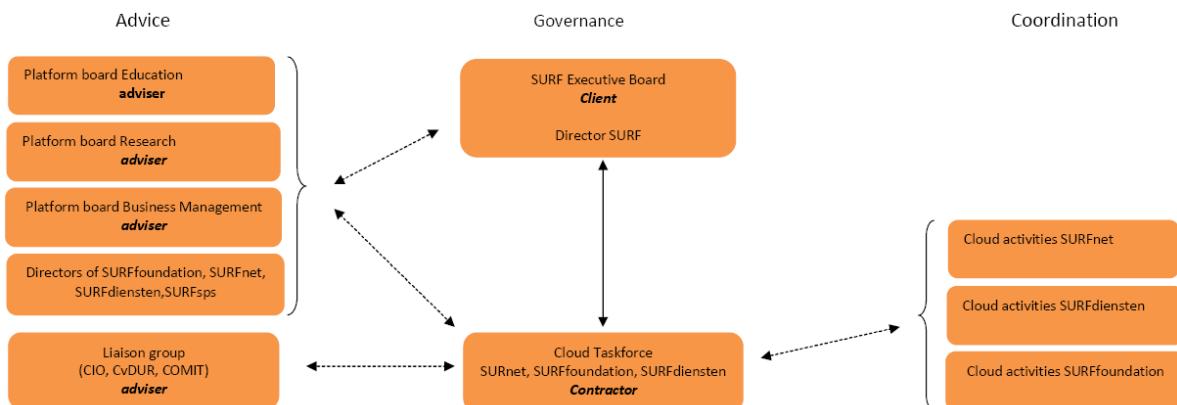
- develop and communicate the vision for higher education and research regarding the cloud;
- coordinate the activities of the various subsidiaries and platforms regarding the cloud.

SURF's Executive Board is the client for the Cloud programme. SURF's director acts as the liaison vis-à-vis the Cloud Taskforce.

The Cloud Taskforce works with its own budget to develop the vision, to communicate it, and to coordinate activities. The actual cloud activities take place at the platforms and subsidiaries, and form part of their normal planning and control cycle. The platforms' and subsidiaries' cloud activities are coordinated within the taskforce in the course of planning and implementation.

The following are represented on the Cloud Taskforce: SURFnet, SURFdiensten, and SURFfoundation's ICT & Education, ICT & Research, and ICT & Business Management platforms. The representatives have a good idea of the cloud activities within their organisation.

The Cloud Taskforce reports every two months to the Executive Board via the boards (in any case their chairs) of the ICT & Education, ICT & Research, and ICT & Business Management platforms, and also via the managements of the various SURF organisations. A liaison group made up of representatives of the CIO Consultation Group, CvDUR, and COMIT⁹ acts as an adviser to the Cloud Taskforce. There is also consultation with these bodies as to how to comply with their wish to be more closely involved in the taskforce.



⁹ Relevant consultation groups such as KAAIWO, BIK, PCPs, etc. can also be involved in the discussions.

2.3 Budget

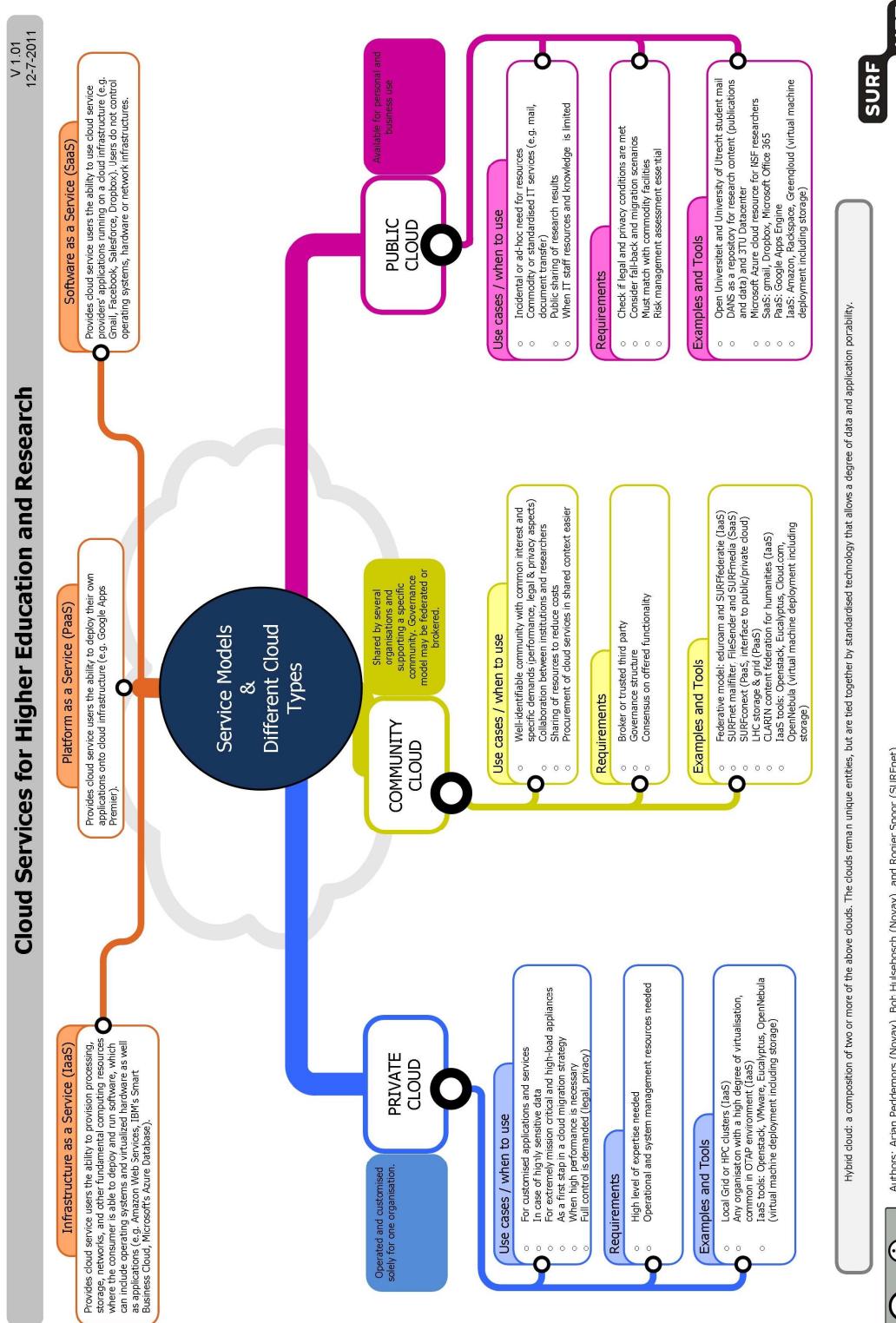
This budget sets out the additional funds (i.e. the funds not yet provided for in the plans/budgets for the various SURF units involved) required for the activities (see Section 2.1) for 2011. A budget for 2012 will be presented in an updated version of the Action Plan around the end of 2011. However, because the Annual Plans for 2012 need to be drawn up within the next few weeks, we give an overall indication of what additional funds are currently expected to be necessary in 2012 (on top of the personnel requirement for the taskforce and activities already allowed for in previous plans).

		2011	2012 (indication)
No. 0	Programme management	EUR 50,000	EUR 125,000
No. 1	Position paper	- 10,000	-
No. 2	Elaboration and substantiation of main components of cloud strategy	- 30,000	- 30,000
No. 3	Ensure optimum collaboration with market	- 30,000	- 20,000
No. 4	I strategy and reference architecture	- 35,000	- 110,000
No. 5	Vendor management and pilot projects with cloud services	(to be determined)	(to be determined)
No. 6	Guidelines and toolkit for sourcing for institutions	(to be determined)	-
No. 7	Communication	- 10,000	- 10,000
No. 8	New version of cloud Action Plan	(to be determined)	-
Total		EUR 165,000	EUR 295,000

Important: Programme management personnel (taskforce) will be paid for from the regular budgets of the SURF units that provide them. The budget also allows for a project management assistant (0.5 FTE) and an external contribution to the taskforce (0.4 FTE). For 2011, this has only been budgeted for the latter part of the year.

Appendices

I Cloud Services for Higher Education and Research



Hybrid cloud: a composition of two or more of the above clouds. The clouds remain unique entities, but are tied together by standardised technology that allows a degree of data and application portability.



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II Cloud services at the institutions and at SURF

Various cloud services activities are already taking place at the institutions and at SURFnet, SURFdiensten, and SURFfoundation.

- A study was carried out in 2010, for example, within the context of the SURFnet/Kennisnet Innovation Programme of the opportunities and possibilities of cloud computing in education. That study led to the publication *Cloud computing in het onderwijs, minder zorg om techniek, meer profijt van ICT* [Cloud Computing in Education: Less Concern with Technology, Greater Benefits from ICT]. Further research was then conducted and reports were produced on specific issues, for example privacy, data portability, and security.
- SURFdiensten concludes contracts with providers of public cloud services. The range of services offered is closely coordinated with the target group so that students, researchers, instructors, and other staff can make use of relevant cloud services at a low price.
- SURFfederatie enables users in the Dutch education and research sector to log in to all the service and content providers that are connected to it with just a single identity, namely that of their own institution. This allows secure, efficient, low-threshold access management for web-based services.
- SURFnet is working with the institutions and other partners – both in the Netherlands and elsewhere – to develop a new collaboration infrastructure, “SURFconext”. SURFconext makes it possible to use the services offered by various different providers alongside one another and to combine them, thus simplifying collaboration across institutional boundaries and national borders. A feature of SURFconext – besides the ability to work with services from various different providers – is the way it makes possible simple and secure access and freedom of choice regarding online applications and groups management. Ten pilot projects have been initiated and planned with institutions so as to investigate the possibilities of SURFconext.
- One of the five themes in SURFdiensten’s Innovation Plan is the provision via SaaS of educational and research applications. Institutions still put a great deal of effort into local (“on the premises”) installations. Considerable savings are possible if such applications are provided via SaaS. SURFdiensten is considering developing and setting up its own cloud platform if studies show that the market is not moving fast enough – i.e. that certain providers have only long-term plans (if they have any plans at all) for implementation via SaaS – and the institutions have a clear need for this.
- The GigaPort3 innovation project is upgrading the existing SURFnet network infrastructure and integrating it seamlessly with other ICT infrastructure facilities such as cloud services, grids, data storage, and research tools. One of the results of GigaPort3 is that users and applications will soon have transparent access to all this functionality.
- The Digital Learning and Working Environment Special Interest Group (SIG DLWE)¹⁰ concerns itself primarily with public cloud services.
- SURF supports the Sourcing Toolbox working party (see below).
- Cloud computing is one of the seven themes in SURF’s Strategic Plan for 2011–2014.¹¹ It is provided for as follows: by supporting strategic choices for services from the cloud; by setting up a “testing ground” where interested institutions can experiment with a specific application; and by developing an assessment framework to assess the privacy policy of external service providers and the options for controlling them.

Institutions (see boxes):

¹⁰ www.surfgroepen.nl/sites/SPSIG

¹¹ www.surf.nl/mjp

As of mid-2011, two institutions are using Google apps and six are experimenting with them. Four institutions are currently using Microsoft Live@Edu/Office365 and about a dozen are testing the program. A pilot project in collaboration with Zeeland University of Applied Sciences is taking place for SURFconext. The aim is to increase the number of institutions taking part in pilot projects to ten in the course of 2011.

At the request of the CIO Consultation Group (made up of the Chief Information Officers of 40 institutions), a working party has been set up to create a Sourcing Toolbox. This will enable institutions to draw up their own sourcing policy. The working party is part of the Sourcing expert group and consists of representatives of SURFnet, the University of Amsterdam, Tilburg University, the Dutch Open University, and the Amsterdam, Saxion and Windesheim universities of applied sciences.

Utrecht University: Google Apps¹²

Utrecht University has switched from its own e-mail system to "mail in the cloud" via Google Apps. The university had already contracted out various ICT services, including e-mail, to a third party, meaning that the switch did not really represent a major change. The main reason for the switch – which is new for the education sector – was to cut costs. According to Kees van Eijden, an ICT policy specialist at the university, "For a University, keeping up with developments in basic ICT services like e-mail is not core business. You need to get the necessary know-how in house and maintain it. It costs a lot of money."

Tilburg University: Live@Edu¹³

Tilburg University (UvT) has been using Microsoft Live@Edu since the end of 2010 with the aid of a link to SURFfederatie. The advantages for students are an attractive package of online applications, large e-mail capacity (10 GB), a lot of capacity for files (25 GB), and regular innovative updates. IT manager Corno Vromans explains: "As a relatively small organisation, we can never equal the functionality, innovativeness, and extra features – for example version management and document sharing – that are offered by parties like Microsoft."

Zeeland University of Applied Sciences: SURFconext pilot¹⁴

Zeeland University of Applied Sciences is carrying out a pilot project to familiarise itself with SURFconext. The university wishes to investigate, for example, whether students and instructors can make use of individualised, non-platform-dependent services, either within a dedicated portal or that of the university. Project coordinator Ronald Verhage explains: "Zeeland University of Applied Sciences has made all data available centrally, but students can decide for themselves how they wish to access that data. Personal results can also be made available on the student's smartphone, for example, or via an OpenSocial gadget in iGoogle."

¹² www.surfnet.nl/Documents/bestpractice_UU_beheersorganisatiebespaartopkostengoogleapps.pdf

¹³ www.surfnet.nl/Documents/bestpractice_UU_beheersorganisatiebespaartopkostengoogleapps.pdf

¹⁴ www.surfnet.nl/nieuws/Pages/HogeschoolZeelandstartpilotmetSURFconext.aspx

III The challenges of cloud services

The introduction of cloud services is not without various consequences. To benefit, institutions will need to consider a large number of topics. These can be divided into general themes and matters specific to a given institution.

General

When selecting cloud solutions, consideration needs to be given to the following issues (as a minimum). Some of them will require the institution to negotiate with providers at a later stage.

- Privacy: How is user privacy guaranteed?
- Ownership of data: Where will the data be physically stored that the institution makes available in the cloud? Who will have access to that data? How can integrity and security be guaranteed?
- Links: How can we ensure data exchange and interoperability between different systems?
- Accessibility: What is the best way for users to collaborate, both with one another and with their collaboration partners? How can we make that new flexibility easily available?
- Control: What legislation and regulations apply to data storage and data traffic when various different systems of different providers are involved?
- Dependence: How dependent will end users and institutions become on cloud services and the relevant providers? How are those enterprises developing? How can we avoid being tied down to particular providers ("vendor lock-in")? Can data that has once been stored be exported or migrated to a different provider (data portability)?

Specific

Besides these general questions, there are also specific matters that each institution will need to consider when introducing cloud services:

- How do you decide what you do within the public cloud, the community cloud, and the private cloud? What types of services and data are suitable to be acquired externally? What cloud services will an institution want to provide itself at its own responsibility ("must haves")? What services are "nice to have" and what services will users need to organise/acquire and utilise at their own responsibility?
- Who within the organisation (i.e. which department) will determine the selection strategy? How do you ensure adoption of cloud services within the institution?
- Will the institution migrate its current systems to SaaS, PaaS and IaaS and if so how?
- What will the consequences be for the institution's ICT personnel? Their tasks and the associated competencies will change, and large-scale use of cloud services will certainly lead to the slimming down of local ICT organisations.
- How do you organise cloud services within the institution: support, account management (identity and group management) and management of specialised software?