Science

Call for proposals

User Support Programme Space Research (GO)

Use of space infrastructure for earth and planetary sciences

2018

Inhoud

1 Introduction

1.1 Background

The aim of the User Support Programme Space Research is to provide support to researchers working in the Netherlands during the (preparation for) use of infrastructure in space for the purpose of high quality scientific research. The programme is open to excellent research in the areas of earth observation and planetary research. This document describes the programme and contains information on how to apply for a grant.

The NWO Domain Science (ENW) is responsible for this programme. The Netherlands Space Office (NSO) is responsible for the realisation and day-to-day management of the programme. All organisational and administrative issues are dealt with via the NSO (see 5.1).

The current call also offers the possibility to request an in-kind contribution from the [Netherlands eScience Center](#) (called here the eScience Center) for an optional eScience component in the research proposal.

1.2 Available budget

The User Support Programme Space Research is financed by the Ministry of Education, Culture and Science. For the period 2017-2019 a budget of 7.2 M€ is available for three calls.

For this 2018 call a maximum budget of 2.4 M€ is available. Only applications that qualify as excellent or very good are eligible for funding. This could mean that the available budget for this call is not completely used.

In this call, applicants may choose to apply for an *additional* in-kind contribution in the form of eScience Research Engineers employed by the eScience Center, whose time is allocated to the awarded projects. *A maximum of three applications* with an eScience component can be granted; each of these will receive the additional in-kind contribution of up to a maximum of 1.6 FTE[1] eScience Research Engineer support. Further details are provided in Section 3.2.

1.3 Validity of the call for proposals

This call for proposals is valid until the closing date **15 November 2018**, 14:00 hours CET.

Please note: The closing date for the compulsory pre-proposals is **30 August 2018**, 14:00 hours CEST.

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[1] FTE = Full Time Equivalent; 1.0 FTE represents 1680 hours for the duration of the project.

2 Aim

2.1 Objective

Various national and international space organisations and institutes have realised and maintain an advanced and diverse infrastructure in space. This space infrastructure, including the data obtained from it, is available for scientific and other users. The Netherlands also contributes to the construction and maintenance of this infrastructure. NWO, together with the Ministry of Education, Culture and Science, wants to encourage the use of this infrastructure by Dutch researchers for the benefit of science and society. Therefore, the aim of the User Support Programme Space Research is:

To provide support to researchers working in the Netherlands with the (preparation for) use of infrastructure in space for the purpose of high-quality scientific research.

Within this aim, the programme is open to excellent research in the areas of earth observation and planetary research.

An additional aim of this 2018 call is to further enhance the potential impact of space research projects, by combining and integrating the proposed research with the advanced capabilities of state-of-the-art eScience technologies.

2.2 Focus

In accordance with the aim of the programme, as stated above, the following conditions apply (in the given order):
1. The proposed research will make direct use of space infrastructure;
2. The proposed research fits within one of the priority areas: earth observation or planetary research.

1. Use of space infrastructure
The User Support Programme Space Research is part of the Dutch space policy. Encouraging the use of space infrastructure for the benefit of science and society is one of the priorities of this policy. The User Support Programme Space Research is therefore *only* open for scientific research that will make direct and substantial use of the space infrastructure and the primary data it produces (see also Section 4.2).

This space infrastructure includes scientific and operational satellites that are managed by national and international space agencies such as ESA, NASA, JAXA, CNES and DLR, satellites of international institutional organisations such as the EU and EUMETSAT, satellites of individual countries such as India and China, and satellites that are made available by commercial providers.

The space infrastructure stated is understood to include (a) existing space infrastructure, and (b) planned space infrastructure, which is being developed within a programmatic framework or is at least being considered in a peer-review process.

2. Thematic priorities
The User Support Programme Space Research is *only* open for scientific research in the areas of earth observation and planetary research, both of which are scientific priorities in the current Dutch space policy.

Earth observation
The observation of the Earth from space offers the possibility to obtain data about land surfaces and vegetation, oceans and icecaps, weather and climate, air quality, the inside of the Earth and more. Using this information, processes and changes in – parts of – the 'System Earth' can be studied, modelled and interpreted. This provides insight into the state and function of the system and can be used to provide evidence for future scenarios. The usefulness of satellite instruments for scientific research, specifically in earth sciences is undisputed and both data from satellites and the knowledge acquired via scientific research find their way into operational, societal and commercial applications (as elaborated in the Knowledge Utilisation section below).

Within the theme Earth observation, the User Support Programme Space Research is open to subjects in the areas geosphere, hydrosphere, atmosphere, cryosphere, biosphere and anthroposphere, as well as research where these areas intersect.

Planetary research
Planetary research is a prime example of an interdisciplinary field. It shares common ground with spaceflight and astronomy (observations), geophysics (modelling), water and ice (hydrology and glaciology), atmosphere (composition and wind interaction with the surface) and geology. With the continuation of the User Support Programme Space Research in 2011, the Ministry of Education, Culture and Science established the theme planetary evolution and habitability. The research for this theme is limited to our solar system.

Within scientific research, a trend towards additional multidisciplinary and interdisciplinary efforts is noticeable, not only within the earth sciences under the heading Earth System Science, but also for the combination of Earth observation and planetary research. As both subjects are part of the User Support Programme Space Research, themes that combine these two areas are also possible.

Knowledge utilisation

General
Every year, NWO invests over 675 million euros of public funds in academic research. Such research may be anywhere on the scale from fundamental to applied and may be either curiosity-driven and response-mode or part of a thematic programme. Use of the results of scientific research by the public and private sector can increase the prosperity and well-being of the nation, as well as helping the Netherlands to achieve its ambition of becoming a knowledge society. For this reason, NWO asks all grant applicants to provide information on the potential for the wider utilisation of knowledge resulting from their proposed research. This information will be taken into account when assessing their proposals.

NWO defines knowledge utilisation as:

a process promoting the use of the outcomes of scientific research both outside academia and by other academic disciplines. This process frequently requires interaction between the researcher and the potential knowledge user and such interaction may occur at any stage of the research, from the formulation of the research question right through to the dissemination of the results.

Space Research
Ever since the start of the space age, the space infrastructure has not only been used for scientific research, but often also for applications that meet the information requirements of governments, national and international institutional organisations, companies, the commercial market and the general public. In that sense, the space

structure is available to society as a whole. Sometimes, this concerns operational space infrastructure especially developed for societal applications. However, specific scientific satellites can also be used to this end. Conversely, scientists not only make use of special scientific satellites, but also of operational space infrastructure, such as the GNSS systems, or monitoring satellites, such as the Sentinels of the European Copernicus programme. Consequently, there is a lot of synergy between science and societal applications with respect to the use of space infrastructure. Many societal applications of space infrastructure make use of scientific knowledge that was acquired in the past. In view of the strongly increasing availability of space infrastructure and the data that originates from it, it can also be expected that many new application possibilities will arise in the future for scientific knowledge that is acquired using the User Support Programme Space Research and that there will be an increasing demand for this knowledge from the perspective of societal use. This demand for knowledge from the User Support Programme Space Research could also emerge from the answering of questions within the Dutch National Research Agenda, for example those in the themes 'Fundamentals of existence' and 'Man, the environment, and the economy'. The themes of Earth observation and planetary research can tie in well with these themes within the Dutch National Research Agenda. The User Support Programme Space Research is therefore a good example of a research programme that is ideally suited for knowledge utilisation as defined by NWO.

2.3 eScience

The amount of space infrastructure available to science and society is rapidly growing. Nowadays space data are generally being regarded as a source of Big Data. At the same time, research and technologies from data science, eScience and Big Data developments are becoming widely available. Space-related research, as addressed in this programme, can in certain cases benefit from the use of such technologies, which in turn contributes to the aims of the Dutch space policy.

This call is a collaboration between the current User Support Programme Space Research and the eScience Center. The two partners have a joint interest in applying state-of-the-art digital technologies to address scientific questions in application domains, in this case the space research domain.

The Netherlands eScience Center

The Netherlands eScience Center is the Dutch national center of excellence for the application and development of research software to advance academic research. Together with a wide range of partner organisations, the eScience Center aims to advance not just the research projects it funds and collaborates in, but the state of academic research in general. The eScience Center contributes to projects by providing eScience Research Engineer support to effectively (re-)use and develop modern digital tools and methodologies. The eScience Center also provides an online platform, the Research Software Directory (RSD, see Annex C), to sustain the developed tools and methodologies beyond the lifetime of the project.

The eScience Center has identified a series of core technologies that underpin the majority of research projects and that are likely to continue to be crucial in the foreseeable future. Maintaining at least operational expertise in these areas allows the eScience Center to serve as a valuable and even essential partner in a large variety of research projects dealing with data- and compute-intensive problems. The eScience Center's core technological competences include:

- **Optimized Data Handling**, including database optimization, real-time data analysis, data interoperability, combining structured and unstructured data;
- **Big Data Analytics**, including data exploration, analysis, data mining, machine learning, text analysis, structured and unstructured data, natural language processing, statistics and visualization, from data to information to insight;
- **Efficient Computing**, including high-performance and distributed computing (e.g. Grid, Cloud), heterogeneous computing, efficient algorithms, use of accelerator hardware (e.g. GPUs), and green computing.

A further description of the eScience Center's core technological competences is provided in Annex B.

eScience technologies are not to be regarded as mere external tools. Optimal results are achieved only when integrating such technologies in a synergistic approach with the scientific questions of the application domain. This call therefore offers the option to include an eScience component in the proposals. The decision whether or not to do so is left to the applicants. It is, however, recommended only for research projects which would significantly benefit from the use of any or all of the above eScience techniques.

A more in-depth presentation of the above will be provided at the information event organised by NSO and NWO together with the eScience Center (see also Section 4.1).

3 Guidelines for applicants

3.1 Who can apply

Researchers who are appointed at one of the research institutions stated below can submit proposals:

- Dutch universities;
- NWO and KNAW institutes;
- the Netherlands Cancer Institute;
- the Max Planck Institute for Psycholinguistics in Nijmegen;
- researchers from the DUBBLE Beamline at the ESRF in Grenoble;
- NCB Naturalis;
- Advanced Research Centre for NanoLithography (ARCNL);
- Princess Máxima Center for pediatric oncology;
- Royal Netherlands Meteorological Institute[2];
- UNESCO-IHE Institute for Water Education[2].

The NWO Grant Rules 2017 and the conditions below apply to all applicants:

a. Applicants must hold a doctorate and/or be a professor.

b. Applicants must have a paid appointment for at least the duration of the application process and the research for which the grant is requested.

c. Applicants with a temporary position which ends before the end of the proposed research project, can only apply in case the knowledge institution guarantees the position of the applicant for the entire research period.

d. Employees who have a 'zero-hours' contract (0-aanstelling) or a contract as an unpaid guest researcher cannot apply.

e. Applicants may not apply for a position for themselves.

f. Per applicant only one application can be submitted each year.

g. An application may be resubmitted once, provided that a substantial correction or addition was made in reaction to the previous assessment.

h. When applying for a PhD student (AIO), the research group must include a promotor. The promotor does not need to be the applicant.

i. A grant is always applied for by a single applicant, with whom correspondence will be maintained.

The main applicant is expected to take full responsibility for the scientific, organisational and financial aspects of the research for which funding is requested. This includes taking care of progress reports and a scientific report at the end of the project.

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[2] Researchers from these knowledge institutions can submit an application if they are collaborating with a university within the project, which should be clear from a personnel or material contribution to the project from this university.

3.2   What can be applied for

Within this call, applicants can request funding for a PhD student or a postdoc and up to a maximum of k€ 50 for material costs, directly related to expenses that are necessary for the realisation of the research described in the application.

In addition, applicants can opt to apply for an in-kind contribution in the form of eScience Research Engineers employed by the eScience Center. This means that there are two possible types of application within this present call:

i)   regular proposals, and
ii)   proposals with an eScience component.

Costs that are eligible for funding:

1. Personnel
Temporary scientific personnel (PhD students and postdocs) to be employed by a university or research institution recognised by NWO, which are part of the consortium applying for funding. Personnel costs are funded in accordance with the most recent version of the 'Agreement for Funding Scientific Research' at the time of the granting decision (see VSNU salary tables).

For every PhD or postdoc a personal bench fee of € 5000 should be included in the budget. It is intended to provide a stimulus for the scientific career of the PhD/postdoc working on the project and can for instance be used to pay the costs of thesis defense, travel to and attendance of conferences, and publication costs.

The duration of the appointment in the case of a full-time employment is 2 to 3 years for postdocs and four years for PhD students. Postdocs must be appointed to the project for at least 0.5 fte over a period of two years. Total duration of the entire project is at least two years and at most five years.

Not eligible for funding from NWO are the costs for permanent staff, student assistants, analysts or technicians.

2. Material costs
Costs directly related to expenses that are necessary for the realisation of the proposed research, e.g. equipment, consumables, satellite data, fieldwork and its associated travel costs. Each cost category should be justified by a brief explanation.

The costs for basic facilities (accommodation, standard office ICT equipment, standard laboratory equipment et cetera), maintenance and insurance costs, as well as other overheads, are not eligible for funding. Calculation time on the LISA and Cartesius supercomputers are not eligible for funding. This can be applied for via the NWO programme Access to the National Computer Facilities.

3.   eScience Research Engineer support

In addition, proposals can choose to apply for eScience Research Engineer support (in-kind). Each project will receive up to a maximum of 1.6 FTE[3]. If possible, inclusion in the Research Software Directory (see Annex C) will also be pursued. Proposals with clear e-Infrastructure needs (see also Annex D) may also obtain additional support from SURFsara and SURFnet.

eScience Research Engineers are scientists employed at the eScience Center who work at the interface of various scientific disciplines and advanced ICT. They will become an integral part of the projected research team focusing on the development and implementation of eScience technologies and software. Primarily, they will ensure that the research team will be able to make easy and effective use of the envisioned technological solutions. They will help to interpret the results of the research and to make the delivered eScience tools useable for a broad range of users. Where applicable, they will also co-author research publications together with the research team. The eScience Research Engineers perform their project activities both at the eScience Center in Amsterdam and at the project locations (typically at the institute of the main applicant). In this way, they contribute directly to the project team whilst also providing a direct link to the expertise available throughout the eScience Center and its wider networks.

The eScience Center also assigns a coordinator to each project. The eScience Center Coordinator is an experienced project manager who will be part of the project team. The coordinator is responsible for the daily supervision of the Engineer(s) assigned to the project, and – together with the main applicant – in charge of monitoring progress and the delivery of project results.

3.3   When can applications be submitted

The proposal submission consists of two steps:

1. **Submission of compulsory pre-proposals** consisting of a proposal abstract, describing the main research ideas and the project plan. The closing date for the submission of abstracts is **30 August 2018, 14:00 hours CEST**.

2. The deadline for submitting **full proposals** is **15 November 2018, 14:00 hours CET.**

When you submit your application to ISAAC you will also need to enter additional details online. You should therefore start submitting your application at least one day before the deadline of this call for proposals. Applications submitted after the deadline will not be taken into consideration.

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[3] Of the total requested FTE, 85% covers all activities performed directly on behalf of the project by one or more eScience Research Engineers, and by the assigned eScience Coordinator who oversees the project at the eScience Center. The remaining 15% comprises activities to the benefit of academic research in general (incl. internal communication, knowledge transfer, and training). On top of this 1.6 FTE per project, 0.4 FTE in terms of eScience Research Engineer support will be made available to pursue sustainable and re-usable software solutions to ensure impact of the developments beyond the lifetime of the project and, preferably, beyond the discipline area considered (see Section 2.3). This 0.4 FTE does not need to be included in the requested project budget.

3.4   Preparing an application

The following procedure applies to both the pre-proposal phase and the full proposal phase:
- Your grant application consists of two parts: a fact sheet and the application form.
- You complete the fact sheet directly in NWO's electronic application system (ISAAC).
- The application form can be found on the grant page for this programme on the NWO, NSO and eScience Center websites. As soon as you have completed it you can add this form to the fact sheet as a PDF file.
- The application should be written in English in a standard font (references may be in a smaller font). References to external documents (with the exception of references to literature) should be avoided. Do not place any bookmarks in the PDF as these will hinder the processing of your application. To ensure a good processing of your application, the PDF documents may not in any way be protected.

Please note that submission of **a pre-proposal is compulsory**. Proposals without a corresponding pre-proposal will not be accepted. Incomplete application forms or exceeding page limits may lead to your application being declared inadmissible. When writing your full proposal please bear in mind that it will be read by expert referees as well as a more broadly composed international assessment panel.

Pre-proposals with an eScience component may be advised to be changed into a regular full proposal without an eScience component. It is not possible to switch from a regular pre-proposal to a full proposal with an eScience component.

See Annex A for an explanation of the items on the application form.

3.5   Conditions on granting

The NWO Grant Rules 2017 and the Agreement on the Payment of Costs for Scientific Research apply to all applications. For projects with an in-kind eScience Center contribution further conditions apply. These "Bijzondere Voorwaarden GO call" can be obtained from the eScience Center website on https://www.esciencecenter.nl/Bijzondere_voorwaarden_NLeSC_GO_2018.pdf.

Start project

If the proposal is awarded funding, the main applicant will be designated as project manager. The project manager will receive the administrative guidelines regarding funding of scientific research projects.

Within six months of the project being awarded funding, the research must start with the appointment of the PhD or postdoc. If this cannot be realised on time then the funding awarded can be withdrawn.

Funding can also be withdrawn in case any components (such as data sets, specialized hardware, etcetera) necessary for starting or continuing the proposed research are not available at the start of the project or at the date specified in the project workplan.

Annual progress

In case the annual progress report and/or annual project review shows that the activities for which the grant was awarded have not been or will not be carried out,

or have not been or will not be carried out in full, NWO and NLeSC may decide to withdraw the awarded funding.

Open Access

All scientific publications resulting from research that is funded by grants derived from this call for proposals are to be immediately (at the time of publication) freely accessible worldwide (Open Access). There are several ways for researchers to publish Open Access. A detailed explanation regarding Open Access can be found on www.nwo.nl/openscience-en.

Data management / Software Sustainability

Responsible data management and high-quality software are part of good research. NWO wants research data and software that emerge from publicly funded research to become freely and sustainably available, as much as possible, for reuse by other researchers. Furthermore, NWO wants to raise awareness among researchers about the importance of responsible data management and software sustainability, to enhance correctness and reproducibility of scientific results. Proposals should therefore satisfy the data management protocol of NWO and the software sustainability protocol of the eScience Center (if applicable). Both these protocols consist of two steps:

1. *Data management section (all proposals)*
   The data management section is part of the research proposal. Researchers should answer four questions about data management within their intended research project. Therefore, before the research starts the researcher will be asked to think about how the data collected must be ordered and categorised so that it can be made freely available. Measures will often need to be taken during the production and analysis of the data to make their later storage and dissemination possible. Researchers can state which research data they consider to be relevant for storage and reuse.

2. *Data management plan (all proposals)*
   After a proposal has been awarded funding the researcher should elaborate the data management section into a data management plan. The data management plan is a concrete elaboration of the data management section. In the plan the researcher describes whether use will be made of existing data or a new data collection and how the data collection will be made FAIR: Findable, Accessible, Interoperable, Reusable. The plan should be submitted to NWO via ISAAC within a maximum of 4 months after the proposal has been awarded funding. NWO will approve the plan as quickly as possible. Approval of the data management plan by NWO is a condition for disbursement of the funding. The plan can be adjusted during the research.

   Further information about the data management protocol of NWO can be found at www.nwo.nl/datamanagement.

The steps with respect to the software sustainability protocol are:

1. *Software sustainability section (proposals with an eScience component only)*
   The software sustainability section is part of the research proposal. Researchers should answer several questions about software sustainability within their intended research project. The questions should refer to how the research software created will be licensed and published so that it will be freely available. Often measures will be needed during the production of software to make long-term reuse possible, also after the project is finished. Researchers can state which research software they consider to be relevant for publication and reuse.

2. *Software sustainability plan (proposals with an eScience component only)*
   After a proposal has been awarded funding, the researcher should elaborate the software sustainability section into a software sustainability plan. The plan should be submitted to NWO via ISAAC within a maximum of four months after the project has been awarded funding. The eScience Center will approve the plan as quickly as possible. Approval of the software sustainability plan by the eScience Center is a condition for disbursement of the funding. The plan can be adjusted during the project. Further information on software sustainability plans will be made available on the eScience Center website.

Nagoya Protocol

The Nagoya Protocol became effective on 12 October 2014 and ensures an honest and reasonable distribution of benefits emerging from the use of genetic resources (Access and Benefit Sharing; ABS). Researchers who make use of genetic sources from the Netherlands or abroad for their research should familiarise themselves with the Nagoya Protocol (www.absfocalpoint.nl). NWO assumes that researchers will take all necessary actions with respect to the Nagoya Protocol.

3.6   Submitting an application

An application for both the pre-proposal phase and the full proposal phase can only be submitted to NWO via the online application system ISAAC. Applications not submitted via ISAAC will not be taken into consideration. The submission of **a pre-proposal is compulsory**. Full proposals without a corresponding pre-proposal will not be accepted.

A main applicant must submit his/her application via his/her own ISAAC account. If the main applicant does not have an ISAAC account yet, then this should be created at least one day before the application is submitted to ensure that any registration problems can be resolved on time. If the main applicant already has an NWO-account, then he/she does not need to create a new account to submit an application.

When you submit your application to ISAAC you will also need to enter additional details online. You should therefore start submitting your application at least one day before the deadline of this call for proposals. Applications submitted after the deadline will not be taken into consideration.

For technical questions please contact the ISAAC helpdesk, see Section 5.1.2.

4 Assessment procedure

4.1 Procedure

The [NWO Code of Conduct on Conflicts of Interest](#) applies to all persons involved in the assessment and/or decision-making process.

NWO gives all full proposals a qualification. The applicant is informed of this qualification when the decision about whether or not to award funding is announced. Only proposals that receive at least the qualification excellent/very good will be eligible for funding. For further information about the qualifications see the [NWO website](#).

4.1.1 Information event

To allow interested applicants to get acquainted with the aim and conditions of this call for proposals, an information event will be organised. At this meeting special attention will also be given to the possibility of applying for additional (in-kind) funding from the Netherlands eScience Center. Further information will be given on the eScience Center's strategy and approach, the role of the eScience Research Engineers, the capabilities of the Dutch National e-Infrastructure, the software technologies implemented and applied by the eScience Center. The information event will take place at NSO (Prinses Beatrixlaan 2, 2595 AL, The Hague) on **20 June 2018**. Registration is required via go@spaceoffice.nl.

4.1.2 Pre-proposal

The first eligibility check of all submitted pre-proposals is carried out by NSO and concerns the admissibility of the application. This is done using the conditions stated in Chapter 3 of this call for proposals. NSO may contact applicants in case of questions.

Pre-proposals with an eScience component
Proposals with an eScience component are then forwarded to the eScience Center for analysis and advice. The analysis covers specifically the eScience components (eScience state-of-the-art, sustainability, re-use potential and lateral impact). The eScience Center analysis is intended to provide applicants with expert advice on how to best combine and integrate the proposed research with state-of-the-art eScience technologies, in conformance with the role and scope of the eScience Center.

Consultation meeting at the eScience Center
All applicants of a pre-proposal with an eScience component are invited for a personal meeting at the eScience Center. In the meeting, applicants are given advice on how to exploit eScience Center's competences in full, and how to best cover all review criteria. If appropriate, the eScience Center may give a non-binding advice to aim for a regular full proposal (without eScience component) instead. After the meeting, a written summary of the eScience Center advice will be shared with the applicant. This advice will also be forwarded to the assessment committee in support of the evaluation of the full proposals in the final phase.

eScience Center employees are not allowed to write any part of the proposal, or to serve as co-applicant.

Pre-proposals with an eScience component may be changed to a regular full proposal without an eScience component. It is not possible to switch from a regular pre-proposal to a full proposal with an eScience component.

4.1.3 Eligibility of the full proposals

The first step in the assessment procedure is to determine the eligibility of the full proposals. The conditions stated in this brochure and on the application form will be applied and if it is determined that an application is not administratively complete, the applicant will be given the opportunity to rectify this shortcoming within a period of 48 hours so that the application can still be admitted to the assessment process.

NWO will not consider any applications to which at least one of the following aspects applies:
- the application has not been completed or has been completed incorrectly and the applicant has not or has not on time satisfied the request to submit a corrected application;
- the application is not in English;
- the main applicant does not satisfy the conditions provided in Section 3.1;
- the application does not concur with the themes of this call;
- the application was not submitted via ISAAC;
- the application was submitted after the deadline;
- there is no corresponding pre-proposal for the application;
- the requested budget does not satisfy the conditions stated in Section 3.2.

4.1.4 Assessment of the full proposals

The assessment of the full proposals consists of two phases.

Phase 1: Advice from referees and rebuttal.
For each full proposal at least two international referees will issue an advice based on the applicable criteria (see Section 4.2). For each proposal with an eScience component at least one additional referee with relevant expertise will issue an advice. The applicant will be given the opportunity to respond to the anonymized advice from the referees in writing. The rebuttal must be written in English, addressed to the assessment committee and cannot exceed the maximum of two pages A4. Applicants will be given five working days to submit their rebuttal.

Phase 2: Assessment by the assessment committee.
The NWO Domain Science Board will appoint an independent assessment committee that will consider all eligible proposals. The assessment committee will consist of renowned scientists with expertise within the scope of GO and sufficient experience to act as generalist for the assessment of all proposals. Two additional scientists with expertise in the area of eScience will be included in the committee for the evaluation of the proposals with an eScience component. These additional committee members will only cover the evaluation of the eScience criteria, whilst the rest of the committee will cover the evaluation of the other (i.e. non-eScience) criteria, in the same way as done for the regular proposals). The assessment committee will be headed by an independent chair who supervises the process. The assessment committee is appointed annually after receipt of the applications.
The assessment committee will use the proposals, the comments from the referees and the rebuttal to reach an independent assessment of the proposals. For full proposals with an eScience component, the committee will also be provided with the written eScience Center advice resulting from the consultation meeting in the pre-proposal phase. In this way, the committee is given the possibility to assess to what extent the eScience Center advice has been incorporated in the full proposal.

The role of the assessment committee differs from that of the referees because unlike the referees they see all of the proposals, referee comments and rebuttals. The assessment committee can therefore reach a different assessment from that of the referees.

The members of the assessment committee will discuss all of the proposals on the basis of the applicable criteria (see Section 4.2) during a meeting. This will result in an assessment advice for every proposal and two separate priority rankings: one advised for the regular proposals and one advised for the proposals with an eScience component.

The data management section in the application is not evaluated and hence not included in the decision about whether or not to award funding. However, both the referees and the committee can issue advice with respect to the data management section. After a proposal has been awarded funding the applicant should elaborate the data management section into a data management plan. Applicants can make use of the advice from the referees and committee when they write the data management plan. The project can start as soon as the data management plan has been approved by NSO.

Applicants of proposals with an eScience component should be aware that the software sustainability section *is* part of the evaluation, as is also expressed in the assessment criteria of Section 4.2.

The assessment committee will issue an advice to the NWO Domain Science Board and to the Board of the Netherlands eScience Center about the assessment and priority rankings of the project proposals.

4.1.5 Decision

The NWO Domain Science Board will decide about the allocation of funding, based on the recommendations of the assessment committee. For proposals with an eScience component, the Domain Science Board and the Board of the Netherlands eScience Center will decide in joint consultation, based on the recommendations of the assessment committee. A maximum of three applications with an eScience component can be granted. The Domain Science Board reserves the right not to use all of the available budget if the minimum qualification criteria are not satisfied.

4.1.6 Schedule

20 June 2018	Information event at NSO
30 August 2018	Deadline for submitting pre-proposals
September 2018	Consultation meetings at NLeSC (proposals with an eScience component only)
15 November 2018	Deadline for submitting full proposals
November 2018 – February 2019	Consulting referees
Early March 2019	Applicants can issue a rebuttal
End of April 2019	Assessment committee assesses and ranks the proposals
May/June 2019	Decision of Domain Science Board and Board NLeSC
May/June 2019	NSO informs the applicants about the decision

4.2   Criteria

All regular applications will be assessed on the basis of four criteria. Only applications with an overall score of excellent or very good are eligible for funding. Additionally, a minimum score of very good is required for criterion 3 in order to qualify for funding.

Proposals with an eScience component are assessed on two additional criteria. These eScience criteria constitute 30% of the total assessment score.

Criterion 1. Originality/Innovative character
Weighting: 25% (regular); 17.5% (proposals with eScience component)

The potential innovation with respect to the broader field of the research theme must be elucidated. By definition, all research results shift the boundaries of knowledge. However, this point relates to research with a more innovative contribution to the discipline(s) in which it is intended to take place, as distinguished from more routine research based on traditional methods. Aspects which may be considered are the research question, the proposed research methods and the potential result of the research.

Criterion 2. Scientific quality
Weighting: 37.5% (regular); 26.25% (proposals with eScience component)

Quality of the proposal
The scientific quality of the proposal must be apparent through the objectives, scientific approach, methodology, and the effect of the study, as they are described in the application.

The research question and objectives must make it sufficiently clear where the focus of the research will be and whether there is a substantial objective that appeals to the imagination. The application should clearly show that the formulated objectives are of recognisable scientific importance.

With respect to the scientific approach and methods the assessment will be whether the methods and techniques chosen are clearly defined and whether the working plan is of a sufficiently high standard in the light of the research question and the objective of the research. The assessors may also look at the extent to which the proposed research relates to research being carried out internationally in this field.

In order to assess the effect of the research, the potential broadening/deepening of knowledge is taken into consideration: which avenues are opened up both within and beyond the relevant specialist area, by solving the described problem? What is the relevance of the proposal to the development of the area in question? If the intended research results would be useful to other research groups/disciplines in carrying out their research, thus encouraging better and innovative research in those fields as well, there may be a (huge) knock-on effect, for example.

Quality of the research group
When assessing the scientific quality of the research group, the main applicant weighs significantly heavier than the other members of the research group. The prominent international status of the research group will have to be demonstrated by, among other things, publications in peer-reviewed top journals. In addition, the ability of the research group to carry out the proposed project will be evaluated. Does the group have sufficient expertise, the right collaborations and access to the necessary equipment?

Criterion 3. Extent of use of the space infrastructure
Weighting: 25% (regular); 17.5% (proposals with eScience component)

This programme is intended for scientific research that makes direct and substantial use of the space infrastructure and/or the primary data it produces. To what extent space infrastructure is used, and the importance of that usage for the quality of the research and the expected results, needs to be clearly described and motivated in the proposal. With respect to (real or simulated) data, *primary* data refers to data not yet irreversibly influenced or changed, e.g. raw data or their directly derived (geo-)physical quantities. The use of *secondary* data or 'indirect' use of data (such as higher-level combined data (i.e. data not exclusively resulting from space infrastructure), values taken from literature, or datasets consisting of model output) is not considered to be compliant with the use of space infrastructure as understood in this criterion. In order to qualify for funding, a minimum score of very good is required for this criterion.

Criterion 4. Knowlege utilisation
Weighting: 12.5% (regular); 8.75% (proposals with eScience component)

The proposal must provide information on the potential for the wider utilisation of knowledge resulting from the proposed research, to other scientific disciplines
as well as to users outside of science (industry/society). How will knowledge utilisation be implemented and how does the researcher intend to facilitate knowledge utilisation? During the assessment, attention is paid to
- a realistic representation of the knowledge utilisation possibilities (or the lack of possibilities);
- the extent to which the action plan is made tangible with respect to knowledge utilisation.

Proposals with an eScience component will also be assessed on the following two criteria:

Criterion 5. eScience state-of-the-art
Weighting: 15% (only proposals with eScience component)
- the eScience technologies applied (e.g. software for data analytics, data management, efficient computing, etcetera) should be sufficiently state-of-the-art, meaning that no alternative (proven) technologies exist that could serve better in solving the domain specific research questions, lead to more significant breakthroughs, or serve better in the pursuit of entirely new research questions;
- the research team should show awareness of the state-of-the-art of required eScience technologies.

Criterion 6. Lateral impact, re-use and sustainability
Weighting: 15% (only proposals with eScience component)
- the proposal must indicate how the proposed solutions will find use beyond the proposed work itself, preferably across disciplines, also after finalization of the project;
- the proposed solutions and (software) deliverables must be open source/open access and permit use and/or interpretation by other researchers;

- the proposal must indicate how the project will build further collaborations, in science, industry, or both; inclusion of concrete letters of intent from such foreseen partners will be valued positively, but is not required;
- the proposal must indicate how maintenance and sustainability of project results will be secured and managed.

5 Contact details and other information

5.1 Contact

5.1.1 Specific questions

For specific questions about User Support Programme Space Research (GO) and this
call for proposals please contact:

Netherlands Space Office (NSO)
Ms Danielle Hollman
P.O. Box 93144
2509 AC THE HAGUE
Phone: +31 (0)88 042 45 44 or +31 (0)6 5023 1589
E-mail: go@spaceoffice.nl

If you have questions about the Netherlands eScience Center, or the eScience
requirements for this call, please contact:

Dr. Frank J. Seinstra, Program Director Netherlands eScience Center
Science Park 140 (Matrix I)
1098 XG AMSTERDAM
Phone: + 31 (0)20 460 4770
E-mail: asdi-call@esciencecenter.nl

5.1.2 Technical questions about the electronic application system ISAAC

For technical questions about the use of ISAAC please contact the ISAAC helpdesk.
Please read the manual first before consulting the helpdesk. The ISAAC helpdesk can
be contacted from Monday to Friday between 10:00 and 17:00 hours CE(S)T on +31
(0)20 346 71 79. However, you can also submit your question by e-mail to
isaac.helpdesk@nwo.nl. You will then receive an answer within two working days.

5.2 Other information

All information can also be found on the website of Netherlands Space Office:
www.spaceoffice.nl/go. Further information about the Netherlands eScience Center
can be found at www.esciencecenter.nl.

Annex A

Annex A: Explanation of the questions on the application form

1a. Project title
Provide a (descriptive) project title of no more than 100 characters.

1b. Theme
Indicate the theme of application (earth observation or planetary research).

2a. Details of main applicant
Details of the main applicant, the research institute and the research school. Also, state the name and address of the responsible person at your institution (for example the scientific director of the institute or dean of the faculty).

2b. Alternative contact
Please state the name and address of the person who can provide further information about the application in the applicant's absence.

2c. Renewed application
Applications which have previously been assessed and rejected, are only eligible in case they have been substantially revised. If you have previously submitted an application for this research project which was rejected by NSO or NWO, please indicate which points of the application have been changed. Please also state the previous file number.

2d. Similar grant applications
In case you applied for any additional grant(s) for (part of) this project or a similar research topic from NWO or from any other institution/funding agency, please provide the details here.

3. Applying for
Please indicate whether you are applying for a PhD or postdoc position and indicate whether you request eScience support (in-kind).

4. Duration of the project & Proposed starting date
Indicate the intended duration of the project and the proposed starting date.

5. Composition of the research team
Please indicate who will be verifiably involved in carrying out the proposed research, including the personal support requested. Please give their surnames with initials, titles and specialisation. You should also state the nature of their involvement, such as day-to-day supervision, technical support, promotor, or advisor. When applying for a PhD position the 'promotor' (doctoral advisor) must be indicated here. In case you also apply for eScience research engineer support, please include 'eScience engineer' in the field 'Name' and state the period and the needed expertise of the eScience engineer.

6a. Scientific summary (max. 300 words)
Please provide the scientific summary of the fact sheet with up to 300 words. This summary will be used to invite reviewers to assess your proposal, it should therefore have sufficient scientific content.

6b. Summary for the general public (in Dutch and English)
Please give a short summary in Dutch and English (each with a maximum of 50 words) of your application for the general public. If your application is awarded, this summary will be used for publicity purposes.

6c. Keywords

Provide six relevant keywords.

7. Description of the proposed study

7a. Science (max. 6 pages)

Please describe the proposed research and address the following aspects:

- (historical) background and position of the research in the relevant specialist area,
- research question(s) and objective(s) of the project proposal and scientific significance,
- innovative aspects and impact: describe the originality and the innovative aspects of the research question and the proposed approach; indicate the importance of the project both within and beyond the relevant specialist area,
- scientific approach (including research plan, methodology and (technical) feasibility): indicate how the research is to be conducted and which methods and equipment will be used,
- indicate how and why you will be using space infrastructure,

7b. eScience (max. 1½ page)

- eScience (technologies, methods, and expected impact on the research):
  please indicate which key technological challenges are dealt with (e.g. Optimized Data Handling, Big Data Analytics, Efficient Computing, etc.), which eScience tools and methodologies will be applied (re-used), integrated, extended, or developed, and how the technologies help to solve the scientific problem.
- Re-use, sustainability, dissemination, and collaboration:
  Please indicate how the proposed technological solutions will find use beyond the proposed work itself (preferably beyond the discipline and lifetime of this project), how maintenance and sustainability beyond the lifetime of the project will be secured and managed, which further collaborations are foreseen, and which efforts will be made to promote the results of the project.

7c. literature references

Please give a list of references including full bibliographical details, such as authors, title, journal. Other references if applicable.

8. Space infrastructure

Please indicate which satellite data or which space infrastructure will be used in this project. The space infrastructure must be (a) existing space infrastructure, or (b) planned space infrastructure, which is being developed within a programmatic framework or is at least being considered in a peer-review process. Please also indicate how you plan to gain access to the satellite data or space infrastructure.

9. Knowledge utilisation (max. 1½ page)

9a.   Societal aims and target groups (Potential)

- What contribution might your proposed research make to society and/or to other fields of study/other academic disciplines?

Explanation: For example, contributions may relate to the economy, social administration, the arts, technology, medicine or democracy. 'Society' means the whole of society, including both the public and the private sector. 'Other fields of study/academic discipnes' means distinctly different areas of scientific endeavour; for example, results of astronomical research might find an application in the medical sciences field.

- What other disciplines and organisations stand to benefit from the results of your proposed research?

Explanation: The question applies to users in both the public and the private sector, including researchers in other academic disciplines.

- What benefits to society are envisaged?

Explanation: In terms of commercial products, new methodologies, processes, protocols, prototypes, joint publications, artefacts, media appearances, teaching methods/materials, patents/licences/contracts, specific network meetings, medical interventions, websites, etc.

Benefits to society may also include benefits to science, since it tends to be difficult to separate the two.

- How might these benefits contribute to the societal relevance of the research project?

9b. Design and team (Implementation)
- What experience of knowledge utilisation is possessed by the coordinator and/or other members of the research team?
- What posts held by team members might facilitate utilisation of the research results (for example through dual appointments or other secondments)?
- What financial resources will be deployed to achieve the aims of the project regarding knowledge utilisation?

9c. Interaction with knowledge users (before, during and after the project) (Implementation)
- Are potential knowledge users involved, or will they be involved, in the research project? If so, how?
Explanation: Have their responsibilities been clearly defined? Have such potential users been involved in the articulation of the research question? How can they contribute to the achievement of the societal aims? How will continuing researcher involvement with users be guaranteed? For example, via user committees, matchmaking, consortiums/networks, Public-Private Partnerships, or contract research.
- What action is planned to ensure that the results of the planned research benefit potential knowledge users?
- Within what time-frame is possible knowledge utilisation expected to occur?

10. Timetable of the project (max. ½ page)
Indicate the schedule of the entire project, in time periods (no more than half a page). Specify the activities to be carried out as part of the project. Which tasks can be distinguished as those of the researcher requested, and how will they be timetabled? For a PhD position: when will the doctoral thesis be defended? It is important that doctoral research should be completed within the 4 years available. This is why there should be a realistic timetable. NWO requires the work plan to be framed in such a way that the experimental phase is completed after 3½ years and the writing of the thesis is started in good time, to enable the doctoral thesis to be defended at the end of the grant period.

11. Deliverables
Provide a detailed list of the expected deliverables of the project, e.g. publications, (video) presentations, software releases, demonstrators, etcetera.

12. Scientific embedding of the proposed research (max. ½ page)
Describe the relationship with national and international research programmes and the collaborations relevant to this project.

13. Data Management Section
For the completion of the section please contact the university library/intended repository/ICT Department of your institute or university. They can help you with the completion of the data section.
The data management section focuses on FAIR (findable, accessible, interoperable and reusable) data during and after the research (archiving). In this section, NWO understands 'data' to be both collected, unprocessed data as well as analysed, generated data. Under this all forms are conceivable; digital and non-digital (for example samples, completed questionnaires, sound recordings, etc.). NWO only requests storage of reusable relevant data. NWO assumes, in principle, that within different disciplines there is a widely held view about which data are relevant to store for re-use. See also: http://www.nwo.nl/en/policies/open+science/data+management+chapter.

14. Software sustainability (eScience proposals only)
Please answer the following questions:
14a.: Is software generated during the project that is appropriate for re-use? If so, please indicate which software will be appropriate for re-use.
If Yes, please answer questions b. to e.

14b.: How will the software appropriate for re-use be licensed and made available for third parties?

14c.: What measures are needed to make the software appropriate for long-term re-use for third parties?

14d.: In your expectation, how large is the expected community that will potentially use the software, and do you expect outside contributors to the software?

14e.: What expertise do you expect to be needed to make the software appropriate for long-term re-use by third parties? Is this expertise available? Please state what your expectations are of the contribution from the eScience Center in making the software appropriate for long-term re-use.

15. Use of national e-infrastructure (eScience proposals only; max. 200 words)

Please indicate the project's (national) e-Infrastructure needs, in terms of compute hours, data storage capacity, lightpath connectivity, or otherwise.

16a. & 16b. Budget overview & specification and motivation of the requested material costs

See 3.2 for conditions!

In the table, state the number of research years for which the PhD or postdoc is requested. PhDs must be requested for 4 years, postdocs for up to 3 years.

Specify the requested equipment and consumables. Only costs which are very specific to this research. The applicant should argue why this expenditure is necessary for the research and why it cannot be paid by the relevant institution as part of the 'standard facilities package'. Standard office or laboratory equipment is not funded. If there is no (clear) motivation of the funds requested, the budget will not be granted.

17. Curriculum vitae

Give a brief CV of the main applicant and other members of the research group listed under item 5 (max. 1 page A4 per person, including a list of max. 12 relevant publications). Separately added CV's will not be accepted!

Annex B

eScience Center Core Technological Competences

The Netherlands eScience Center is the Dutch national center of excellence for the development and application of research software to advance academic research. We contribute to research projects in at least two important ways:

1. We continuously scout the international spectrum of research software; we have a broad overview of relevant software solutions and a detailed understanding of how to apply these in a broad range of research disciplines;
2. We have expertise to extend and build high-quality, sustainable, and reusable research software using modern software development techniques and standards.

Our core competence is the *creation* and *application* of research software. What software is already available? When and how can we apply this software? Can we extend already existing software? How do we build new software, if needed? In the process of extending and building software we apply high standards of software quality, and put significant effort into testing, documentation and packaging.

In addition to this core competence, we focus our efforts in three expertise areas: Optimized Data Handling, Big Data Analytics, and Efficient Computing. Together, these cover a large part of the spectrum of required software and expertise in research projects. Below each of these expertise areas is outlined further.

Optimized Data Handling

This expertise area includes a.o.:

- FAIR data
- streaming data
- databases
- linked data
- data fushion

Storing, accessing and sharing voluminous and rapidly generated data

Data are generated at increasing speed and abundance due to the miniaturization and parallelization of experiments, the deployment of sensors and the digitization of experimental practices. From radio telescopes to social media, the development and application of methods to store, access and share large volumes of rapidly generated data are becoming universally important.

At the eScience Center, we have expert knowledge on handling large volumes of data (using both traditional databases and their NoSQL alternatives), processing streaming data (as produced by sensors such as radio telescopes), and linked data (typically used to add meaning to text data). In addition, we have ample experience in sharing data according to FAIR-principles (i.e.: making data Findable, Accessible, Interoperable, and Reusable).

Big Data Analytics

This expertise area includes a.o.:

- machine learning
- natural language processing
- search
- computer vision
- visualization

Identifying patterns and relationships

From data to information to knowledge to insight. Current research challenges demand robust and reliable methods to identify the patterns and relationships contained in, but also obscured by, large amounts of data.

eScience approaches can enable researchers to recognize sources of relevant information, prepare raw data, use statistical tools, extract and search for meaningful information, recognize potential problems and make visualizations to communicate their findings.

With the application of statistics and state-of-the-art machine learning techniques at its core, the use of data-analytics and visualization are generic requirements for many scientists. Combining 'big data' with theory and conceptual models enables scientists to structure the wealth of data and provide skillful forecasts.

Efficient Computing

This expertise area includes a.o.:

- high-performance, distributed, and energy-aware computing
- efficient algorithms
- scalability
- ease-of-use

Optimizing for performance

As the ambition and data volumes of researchers grow, processing requirements grow accordingly. To keep up with the sizes of the data and models, software must be optimized for performance (resulting in more processing power per computer) and/or scalability (allowing more computers to share the processing load).

By applying state-of-the-art technologies such as GPUs, a significant performance increase can be achieved, while simultaneously reducing energy requirements. This requires expert knowledge, however, as GPUs are very hard to program.

Often, research data are stored in multiple locations and are too large to gather in a single place. In such cases, it may be necessary to move computing to the data, and not vice versa. Such a distributed computing solution requires specialized software to organise which computation runs where. For the user, such techniques are a means to an end, and must be made transparent to not get in the way of the research itself.

Annex C

The Research Software Directory (RSD)

The Research Software Directory (RSD)[4] is the eScience Center's primary facility for open, sustainable and re-usable research software, expertise, and eScience research. First and foremost, the RSD contains *research software.* In part, this software constitutes results of the collaborations between the eScience Center and its project partners. Other parts of the RSD are formed by software that is developed in-house at the eScience Center, and by software developed by external parties to which the eScience Center has made significant contributions. The eScience Research Engineers contribute to the RSD by generalizing and inserting the technologies they develop in the projects in which they are partnering as a research team member.

Apart from the software itself, the RSD contains *supporting material* associated with the actual tools, applications, scientific workflows, algorithms and libraries. This material can take the form of documentation, best practice guides, tutorials, training material, papers, demos, blog posts, etcetera. This collection of supporting material grows as software is re-used in other projects. In this way, the software in the RSD is presented in its *research context*. This context helps researchers to quickly judge if a certain piece of software is relevant to their particular problem, if others in their field are using it, how to get started with the software, and whom to contact for questions. This improves the findability of software and promotes its re-use.

While the RSD is the primary facility for managing and disseminating software created in the eScience Center's project portfolio, all aspects of the RSD can be applied in a broader context than just a single project. As such, the RSD supports multiple research efforts, an entire research discipline, and even multiple disciplines. The RSD explicitly aims to promote the exchange and re-use of knowledge and best practices and to prevent fragmentation and duplication of research software.

Serving research communities

It must be stressed that the technological developments undertaken by and with the eScience Center are not aimed at realizing benefits for the eScience Center itself. All developments are in support of the scientific goals of the research project, with the additional aim to also serve other research communities as much as possible, now and in the future.

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[4] See also: http://www.esciencecenter.nl/expertise/ and https://www.research-software.nl/.

Annex D

The Dutch National e-Infrastructure

In this call, all applicants are asked to indicate the project's e-Infrastructure needs, in terms of compute hours, data storage capacity, lightpath connectivity, or otherwise. A 'use-or-explain' policy will be applied, meaning that

- projects *without* e-Infrastructure needs are asked to give a brief explanation;

- projects with clear e-Infrastructure needs are expected to select the hardware resources and services as part of the Dutch National e-Infrastructure as first option, and to indicate the expected extent of use;

- projects with clear e-Infrastructure needs that aim to use international (e.g. PRACE, XSEDE, etcetera) or commercial (e.g. web, cloud, etcetera) hardware and services instead are required to give a brief explanation.

The use of the Dutch National e-Infrastructure is not a requirement, nor is it a formal review criterion. However, in all cases in which the Dutch National e-Infrastructure is not used, a justification should be provided.

In this call, the Dutch National e-Infrastructure is defined as follows:

all publicly-funded hardware resources (e.g. compute, data, visualization, networking, etcetera) and directly connected support services (people, software), set up and maintained with the aim to support publicly-funded research in the Netherlands, and made available to either all or a selected subset of all researchers from a.o. Dutch universities and research institutes affiliated with NWO or KNAW.

The definition distinguishes between hardware resources and services available to all researchers in the Netherlands (Category I), and those made available to a selected subset (Category II). The Category I e-Infrastructure, outlined below, is formed by the hardware resources and services provided and maintained by SURFsara, SURFnet, DANS, and – in part – also by Nikhef and RUG-CIT.

The Category II e-Infrastructure is formed by all other hardware resources and services that are accessible to a selected group of researchers following thematic or geographic criteria. Examples of such infrastructures include the Distributed ASCI Supercomputer (DAS) and the many stand-alone local facilities at various universities (e.g. the Peregrine cluster (RUG-CIT), the GPFS data storage facilities (Target), the WUR HPC Cluster (Wageningen), etcetera).

Overview: Category I e-Infrastructure

While it is impossible to provide a complete overview of all resources part of the Dutch National e-Infrastructure in this call text, the following provides entrance points to the major Category I e-Infrastructure resources and services. For more information, it is advised to contact the organisations and institutes responsible for these resources directly, in particular SURF: https://www.surf.nl/en/contact.html.

Compute Resources and Services
- Cartesius: National supercomputer for maximum performance
  https://userinfo.surfsara.nl/systems/cartesius
- HPC Cloud: Complete control over your own computing infrastructure
  https://www.surf.nl/en/services-and-products/hpc-cloud/index.html
- Grid: Distributed computing system for fast processing of large data sets

https://www.surf.nl/en/services-and-products/grid/index.html
- Hadoop cluster: Big data processing and analysis
  https://www.surf.nl/en/services-and-products/big-data-services/index.html

Data Resources and Services
- BeeHub: Easily save and share large volumes of data
  https://www.surf.nl/en/services-and-products/beehub/index.html
- Data Archive: Secure long-term storage of research data on tape
  https://www.surf.nl/en/services-and-products/data-archive/index.html
- DataverseNL: Store, share and register research data online
  https://www.dans.knaw.nl/en/about/services/DataverseNL
- EASY: Online archiving, depositing and downloading of research data
  https://www.dans.knaw.nl/en/about/services/easy

Networking Resources and Services
- Lightpaths (SURFlichtpaden): Ultra-fast and high capacity connectivity
  https://www.surf.nl/en/services-and-products/surflichtpaden/index.html

Cloud and Collaborative Resources and Services
- SURFconext: Online collaboration and services in a single environment
  https://www.surf.nl/en/services-and-products/surfconext/index.html
- SURFdrive; Personal and secure cloud storage, synchronization, sharing
  https://www.surf.nl/en/services-and-products/surfdrive/surfdrive.html

Visualization Resources and Services
- Remote visualization: Visualize large datasets on your desktop
  https://www.surf.nl/en/services-and-products/visualisation/index.html
- Collaboratorium: Sophisticated presentation and visualization aids
  https://www.surf.nl/en/themes/research/overview-services-for-research/big-data-analytics-and-visualisation-processing-data/index.html

SURF
For a complete overview of all Category I services provided by SURF, see:
https://www.surf.nl/en/services-and-products

DANS
For a complete overview of all Category I services provided by DANS, see:
http://www.dans.knaw.nl/en/about/services