



**Applied and Engineering Sciences
Science
Social Sciences and Humanities
Taskforce for Applied Research (SIA)**

Call for proposals

Smart Industry 2019 SI2019

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Netherlands Organisation for Scientific Research

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1 Introduction

1.1 Background

The Netherlands Organisation for Scientific Research (NWO; see also www.nwo.nl) supports a strong system of sciences in the Netherlands by encouraging quality and innovation in science. NWO provides indirect government funding. Our conviction is that scientific research contributes to our prosperity and well-being and that it provides for our growing need for knowledge: for facing societal challenges, for economic development and to better understand ourselves and the world.

That is why NWO actively participates in the top sectors of the Netherlands, both in agenda setting (in the various knowledge and innovation agendas) and funding. The Dutch government has designated nine top sectors that are of particular importance to the international competitive position of the Netherlands. Within these top sectors, industry, knowledge institutions and government bodies contribute finances and expertise to jointly produce new knowledge and realize innovations. The agreements for each top sector are recorded in so-called innovation contracts. The relevant top sectors for this call are:

- High Tech Systems and Materials (HTSM) www.hollandhightech.nl/
- Information and Communication Technology (ICT/Commit2Data) www.dutchdigitaldelta.nl/
- Creative Industry (Click.nl) www.clicknl.nl/

While the above top sectors each have their own knowledge and innovation agenda's (KIA), they have also produced a common routemap document outlining possible areas for collaborative crossover projects (in Dutch: "Smart Industry roadmap; Onderzoeksagenda voor HTSM en ICT en routekaart voor de NWA"). This call, 'Smart Industry 2019' (SI2019), implements part of that routemap document and was prepared in consultation with the above mentioned sectors.

As part of the [NWO-proposition 2018/2019](#) NWO has reserved and allocated a budget for financing applied, multidisciplinary research proposals at the intersection of the three relevant KIA's where the above mentioned routemap will be used as a reference. Furthermore, the importance of integrating fundamental academic and applied research made it possible to have a 'top up' subsidy for proposals in which universities of applied sciences participate. The call will adhere to the FAIR and FACT principles for handling and using (big) data.

This is a second call in this context; the first (SI2016) was organised in 2016 as part of the NWO-proposition 2016/2017 and resulted in six (6) granted research proposals.

Given the PPP-like nature of this call for proposals, financial contributions (i.e. co-funding contributions) are requested from at least one private partner, complemented with one or more additional private and/or public parties if suitable.

1.2 Available budget

The maximum NWO funding budget available for this programme is M€4.1. It is expected that this amount will be disbursed in a single call.

This call is aimed at multi- and interdisciplinary projects with 2-3 PhDs and/or postdocs, optionally complemented with researchers from universities of applied sciences (UAS). The projects have a duration of 2 to 6 years, are maximised at k€750 subsidy, and must be realised by knowledge institutions in collaboration with private and/or public partners. These partners must contribute at least 30% of the required project budget, and the cash co-funding must be at least 15% of the required project budget. The maximum subsidy can be increased with an additional budget for participation of UAS, maximised at k€ 100.

1.3 Validity of the call for proposals

This call for proposals is valid until the closing date **September 19, 2019**, 14:00 hours CE(S)T.

2 Aim

This call is a cross domain collaboration between the NWO Domain Applied and Engineering Sciences (AES), NWO Domain Science (ENW), NWO Domain Social Sciences and Humanities (SSH) and the Taskforce for Applied Research (SIA). Applications shall be handled by the Applied and Engineering Sciences Domain. For this, expertise from the other domains concerned will be involved where necessary.

This call operates at the intersection of Smart Industry, Big Data/Commit2Data, and Creative Industry and is based on the Smart Industry Roadmap (subtitle 'Onderzoeksagenda voor HTSM en ICT en routekaart voor de NWA'). The Smart Industry Roadmap document provides a description of the knowledge and technology challenges underlying the Smart Industry programme.

Smart Industry is the Dutch strategy to develop the Dutch industry to be fit for the future (see www.smartindustry.nl). Industry is defined as the activities that ultimately result in value created for customers and society. Intelligence or smartness can be more generally described as the ability or inclination to perceive or deduce information, and to retain it as knowledge to be applied towards adaptive behaviours within an environment or context. To realize intelligence in products and manufacturing systems one needs embedded computing or computational devices with network connectivity.

Smart Industry is about future-proof industrial & product systems; these are smart and interconnected and make use of Cyber Physical Systems. It is all about digital transformation and customization, hence, the cooperation of the involved top sectors for this SI2019 call is evident.

This SI2019 call addresses a subset of the topics described in the Smart Industry roadmap document. **It specifically addresses cross cutting science challenges at the intersection of user-centered customization, big data technologies, autonomous systems, smart systems and smart equipment.**

Table 1 visualizes the areas of interest and the connections between the creative industries sector, big data/ICT sector and the high-tech sector that have been selected for the focus of SI2019. On one axis in Table 1, Smart Industry is split up into smart products & services, smart manufacturing & processes, and smart systems. The other axis shows the three development areas that determine how the opportunities of Smart Industry are to be addressed in the Netherlands: Technologies, Business and Society. The areas of interest as depicted in the table will be elaborated on in the next sections with respect to the knowledge and technology challenges.

All projects are required to be a clear multidisciplinary collaboration, drawing from the creative industry, the High Tech Systems & Materials community and the Data Science / big data community. Furthermore, public-private collaborations are required as part of the projects, between scientists and companies; the scientists involved in the research can either be only academic or a mixture of academic and UAS.

From society as a whole there is increased attention for aspects like sustainable products with full life-cycle re-use, sustainable deployment of low, medium and high educated workforce, manufacturing based on ordering instead of based on stock, increased attention to individual needs and 'design for all', contributing to an inclusive society, which should facilitate consumer acceptance of smart, sustainable solutions. Project proposals submitted in this call are asked to address the requirement to be societally relevant and sustainable and to consider human interaction with (the product of) the technology and economic viability. This means that at least two of the themes mentioned under at least two of the

columns in Table 1 need to be addressed in an integrated manner in research proposals submitted. This will be part of the evaluation of the proposals.

Table 1 Chosen areas of interest for the SI2019 call.

IMPACT/development areas			
	Technologies	Business	Society
Smart Response			
Smart Products & Services			Human Centered Technology
Smart Manufacturing & Processes	Advanced Manufacturing	Mass customization / use-based adaptation	Human Centered Technology
Smart Systems	Digital Twin Robotics	Cyber Physical Systems (Trusted) Data Sharing	

The areas of interest as depicted in Table 1 will be elaborated on in the next sections with respect to the knowledge and technology challenges.

In each of the following section, first a general description of the theme is given, followed by the specifics that project submissions should focus on.

2.1 Research area 1: Mass customization / use-based adaptation

In mass manufacturing, the optimization of production processes is the primary driver for price competitiveness. Drawbacks of this approach are that it leads to “one-size-fits-all” products with standardized components, conservative product designs, limited shapes, rigid supply chains and pressure to minimize product variety.

Customization is a game changer in high-value manufacturing and requires a much closer integration of design with manufacturing. High product variability should be offered in combination with scalable and viable manufacturing.

Mass customization must be supported by computational design tools and tools which ensure first-time-right manufacturability to avoid scrap or unnecessary material waste.

Main focus of this theme for this call is coupling heterogeneous and distributed data to model based engineering. This will allow for condition and usage/user based adaptation (in/before production), but also for products to be adapted to the changing usage and context. The challenges we call for in projects to address is how to realise mass adaptation from the perspective of the total system and how to cope with such adaption from the data-technical point of view. This calls for autonomous systems with customized solutions. An important facet is how to enable an end-user not skilled in digital solutions, to select the best digital solution. Mass customization also calls for highly integrated and adaptive service design solutions; services are by definition customisable and can increase the adaptation options of physical systems.

2.2 Research area 2: Human Centered Technology / Human Technology Interaction

To design new personalized products, industrial systems and product service systems we should employ an integrated approach to value creation, system thinking, human technology interaction (HTI) and scenario-based design involving all stakeholders. Human technology interaction will change because products & systems get smarter and become connected through the internet. As the use of sensors has become widespread, smart products and systems will increasingly present their users with actual information on their operation, giving usage, maintenance and repair instructions.

Main focus of this theme for this call is the combination of sensor data, autonomous robotic systems (in unstructured environments), and human actors in collaborative environments with person-tailored user interfaces for human technology interaction. Optimal support for human actors by new technology and proper user interfaces. Challenges aimed at for SI2019 projects are an inclusive technology design of intuitive and logical interfaces and interactions between humans, robots and manufacturing systems.

2.3 Research area 3: Digital Twin

A digital twin is a digital representation of the physical system (including processes, sub-systems, materials, products and assets). Physical-based models have been used in model-based design and virtual prototyping of high-tech systems. Key technical challenge is solution robustness and system interoperability: maintaining, reusing and exchanging information among different models. Data-driven digital twins based solely on data collected from the realized processes/systems/products. These models are typically used for monitoring, real-time process control and maintenance of the assets. Similar to the physical model-based approach, these different data-driven digital twins also face interoperability problems and do not allow the support of design cycles of non-existing products or processes. Future Twin will combine different type of information (data fusion).

The consequences of mass customisation are an increasing variety of products and solutions, matching individual human needs. This could open a road towards human based digital twin concepts.

Main challenges we aim for in this theme are interoperability, machine learning algorithms creating the Artificial Intelligence of the Twin, and humans with their digital twin representation and matching of the human twin with the system and product twins. A challenge is the fact that one needs models and simulations for very rare instances that faults occur; pattern recognition of almost never occurring flaws.

The digital twins should cover for IP sensitive data, e.g. manufacturer proprietary information, and hence a strong link exists to the separate theme of 'Trusted Data Sharing'.

2.4 Research area 4: Cyber Physical Systems

The digitization trend at the industrial level leads to a merger of the physical world of production with the virtual world of information, data and computational power. The importance of cyber physical systems (CPS) of systems in the context of Smart Industry is increasing. It involves integrating digital information technologies in products, processes and factories and connects them to perform a certain function, provide a service or produce a product with the goal to achieve better quality and to adapt automatically and instantly to, for instance, changing material conditions or customer demands. Compared to the digital twin of the previous section, CPS is in fact the runtime coupling of the digital twin with the real world system. Examples of CPS include communicating manufacturing systems/lines, systems to track and analyse emission, communicating (wireless) sensor systems, and systems to provide situational awareness.

Main focus of this theme for this call are semantically interoperable systems that collect and process detailed data about embedded and physical states, events and processes, Internet-enabled decentralized monitoring and control algorithms using wireless sensor systems. Those CPS solutions are aimed at improving process and product performance and enable proactive maintenance strategies using local and global information. The CPS will utilize effective, reliable, real-time and secure data collection, multi-physics predictive modelling, and data analytics under industrial conditions. It should include solution strategies for failing sensors, and feed the model strategies into the digital twin.

Obviously, the networked and information intensive nature of CPS, brings about big challenges with respect to security. This is covered by a separate challenge 'Trusted Data Sharing'.

2.5 Research area 5: (Trusted) data sharing

More and more products (and services) will be designed, developed and produced (provided) by multiple parties, often industrial parties, but more and more also in combination with public parties and customers.

To achieve a smooth and data-safe cooperation data and information about the product, the design, subsystems, use of the product, etc., have to be shared among all these parties. However, that what is being shared, here called 'data' for short, lies typically at the heart of the intellectual property and the competitive edge of the parties involved. Hence, the way the data is shared should make sure that the data can only be shared with the intended parties, and only for the intended purposes, hence, cannot be illegally handed to other parties, nor be used for other purposes than intended; this notion of sharing while keeping control is often referred to as 'data sovereignty'.

Main challenges we aim for in this theme are applications as servitization ('the usage of applications instead of the license of the application'), DLT (Distributed Ledger Technology) solutions for autonomous products with digital IDs and their own DLT history, data interoperability being compliant to (privacy) regulations and the secure and dependable storage itself. Abstractions of models for certain applications and usage patterns allowed (or not) on proprietary data are important challenges to cover in proposed projects. These issues closely link to the themes of digital twins and cyber physical system (of systems).

Of course, we expect that proposed solutions will make use of international I40 (industry 4.0) standards like IDS (Industrial Data Space) and OPC-UA or Reference Architectural Model Industry 4.0 (RAMI 4.0).

2.6 Research area 6: Advanced Manufacturing

Advanced manufacturing technology contributes to the realization of three major trends in production systems, i.e. increased efficiency, quality and reliability. It requires process monitoring and modelling approaches, associated with novel optimization and maintenance strategies. Improvements in manufacturing technology will be data-driven and can be based on measurements or models (deep-learning techniques, statistics, and physically based models).

In this call we aim in particular at solutions using data and personalisation to enable smart design both for smart end-user products as in smart factories with e.g. smart equipment or smarter robotic systems supporting humans.

2.7 Research area 7: Robotics

Smart Industry themes such as high mix, high complexity, low volume manufacturing, introduce new challenges to robotics such as zero-programming. The added value of robotics innovations is potentially very big, e.g. through integration of many sensors, wireless networks, and information technology (digital twins, artificial intelligence and control algorithms) across the industrial environment (but also other sectors such as food processing, and smart agriculture). This typically leads to integration of more feedback and feedforward control approaches and production automation/robotics technologies into the manufacturing and assembly environment.

Of particular interest in the context of SI2019 project proposals are adaptive/learning or robust control loops, autonomous reconfiguration of control algorithms, human robot interaction and decision-making systems for robotics, the development of novel sensor technologies and metrology, vision integration, in-line inspection and monitoring, fast data processing and transport with the ambition to maximise the flexibility and to minimise the time and cost of programming robotics for large varieties of products.

3 Guidelines for applicants

3.1 Who can apply

Full, associate and assistant professors and other researchers with a comparable appointment can act as the principal or co-applicant if they:

- are employed (i.e. hold a salaried position) at one of the following organisations:
 - Universities established in the Kingdom of the Netherlands;
 - University medical centres;
 - 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; and
- also have an appointment period for at least the duration of the application procedure and the entire duration of the research for which the grant is being applied for. Personnel with a zero-hour appointment is excluded from applying.

Co-applicant(s) from universities of applied science

Furthermore, in each application researchers from universities of applied science (UAS)¹ can participate as co-applicants. The co-applicant from a UAS must have a lector position or more than three years research experience.

Additional conditions²:

The principal applicant is to submit the application on behalf of the project consortium and is responsible for the scientific cohesion and the results as well as for the financial accounting. The NWO contribution that is awarded and the cash contribution(s) by third parties are transferred to the institute of the principal applicant, who is responsible for allocating funds to the partners in accordance with the budget agreed with NWO.

In this round, a researcher may submit no more than two applications, and may only do so once as the principal applicant. This means that he/she can act as the principal applicant for one application and can act as co-applicant for another application, or may act as co-applicant for two different applications. Researchers from UAS may participate as co-applicants in no more than two applications.

Consortium, User Committee and cofunding

The project consortium must consist of at least two (co-)applicants from different research groups (both with an appointment at one of the institutions defined in paragraph 3.1) and a User Committee that consists of at least four private and/or public partners. An interdisciplinary consortium, with principal and co-applicants from different scientific disciplines is mandatory. Participation of co-applicants from universities of applied science is optional.

¹ The universities of Applied Science as meant in this call are government-funded universities of Applied Science, as defined in Article 1.8 of the Law on Higher Education and Research Act (WHW).

² The word 'applicants' refers to both main applicants and co-applicants.

3.2 What can be applied for

The budget is built up using the NWO-wide standardised building blocks, the so-called budget items. These budget items are described below. In the proposal budget applicants choose which combination of budget items are needed to answer the research question and how often each budget item will be deployed. The project budget is maximised at k€750 subsidy for the sum of all budget items except those marked with (J). Additionally, for the budget item involving universities of applied sciences, marked with (J) a maximum of k€ 100 can be applied for. The following budget items are available for an application within this round:

3.2.1 Personnel:

NB: Remunerations for PhD scholarship students at a Dutch university are not eligible for funding from NWO.

- PhD/PDEng/MD PhD

The guideline is that 1 fte PhD for 48 months or 0.8 fte for 60 months can be applied for. If a different duration of appointment is desired for the realisation of the proposed research, then the guidelines may be deviated from as long as this is well justified (e.g. PDEng 2 years or MD PhD longer than 4 years).

The salary costs will be remunerated according to the agreements in the 'Agreement for Funding Scientific Research' made with the Association of Universities in the Netherlands and are based on the collective labour agreement of the Dutch universities (for ZonMw, the costs are based on the collective labour agreement of the Netherlands Federation of University Medical Centres).

In addition to salary costs, the project employee funded by NWO will receive a one-off individual bench fee (€ 5000) to encourage his or her scientific career. The agreement and the maximum amounts for personnel costs can be found at <https://www.nwo.nl/en/funding/funding+process+explained> and <https://www.nwo.nl/en/funding/funding+process+explained/salary+tables>.

- Postdoc

The guideline is that the appointment period of a postdoc can be between 12 and 48 months. The minimum size of the appointment is 0.5 fte for 12 months. This deployment can be spread over a longer or shorter period, for example across the entire duration of the project.

If the applicants wish to deploy expertise for a shorter period of time, then the material credit can be used for this.

The salary costs will be remunerated according to the 'Agreement for Funding Scientific Research' made with the Association of Universities in the Netherlands (for ZonMw, the costs are based on the collective labour agreement of the Netherlands Federation of University Medical Centres). In addition to salary costs, the project employee funded by NWO will receive a one-off individual bench fee (€ 5000) to encourage his or her scientific career.

- Non-scientific personnel

For the appointment of non-scientific personnel, specifically needed for the research project which funding is applied for, a maximum of € 100,000 can be requested with this module. This can concern personnel such as student assistants, programmers, technical assistants, analysts, et cetera. This budget item can only be applied for in combination with the budget items PhD/PDEng/MD PhD and/or Postdoc.

The minimum size of the appointment is 0.5 fte for 12 months. The minimum appointment can be spread over a longer period of time. If the applicants wish to deploy expertise for a shorter period of time, then the material credit can be used for this.

Salary costs are dependent on the level and are remunerated in accordance with the agreements in the most recent 'Agreement for Funding Scientific Research' made with the Association of Universities in the Netherlands and are based on the collective labour agreement of the Dutch universities. The agreement and the maximum amounts for personnel costs can be found at <https://www.nwo.nl/en/funding/funding+process+explained> and <https://www.nwo.nl/en/funding/funding+process+explained/salary+tables>.

- (♣) Personnel at universities of applied sciences

For the appointment of personnel at universities of applied sciences the system of the Handleiding Overheidstarieven (HOT) has been applicable since 1 January 2018. In particular the column 'cost covering rates per hour' (table 2.2, Integrale loonkosten), which is based on the collective labour agreement for universities of applied sciences with respect to the salary scale of the employee concerned. These rates are maximum values. The rates of 2017 should be used. For students, only the actual amounts paid to students can be entered as costs within the project. A maximum hourly rate of € 25.00 always applies to students.

- Research leave

In this module, the replacement costs for the principal applicant and/or co-applicants can be applied for, so that they can be released from educational, administrative and management tasks. The research leave grant can only be used in combination with and for the purposes of the projects or programmes applied for. For the research leave grant, a maximum size of 5 months per project applies based on 1 fte at the level of the postdoc employee, with the hourly rates according to the agreement with the Association of Universities in the Netherlands. This budget is intended for the release of the applicants from educational and supervisory tasks so that they can work on the research for which funding has been requested. The employer can use the research leave grant to cover the costs of the replacement for the non-research tasks of the applicant(s) such as education, administrative and management tasks. These tasks must be specified in the proposal.

- Other scientific personnel

Budget for other scientific personnel such as university graduates, graduate physicians and graduate physicians training to be specialists that are needed for the research project that funding is requested for. This module can only be applied for in combination with the budget items PhD/PDEng/MD PhD and/or Postdoc. The maximum period of appointment is 48 months for 1fte and 60 months for a part-time appointment. The minimum size of the appointment is 0.5 fte for 12 months. This deployment can be spread over a longer or shorter period, for example across the entire duration of the project.

3.2.2 Material credit

A maximum of € 15,000 per year per full-time scientific position (budget items PhD/PDEng/MD PhD, Postdoc and/or Personnel at universities of applied sciences(♣)³) can be applied for, specified according to the three categories stated below:

Project-related goods/services

— consumables (glassware, chemicals, cryogenic fluids, etc.);

³ In the HOT a full-time position is 1378 hours per year.

- equipment and/or software (e.g. lasers, specialist computers or computer programs, etc.);

For these small items of equipment and/or software, the amount may not amount to more than € 160,000 per application.

- measurement and calculation time (e.g. supercomputer access, etc.);
- costs for acquiring or using data collections (e.g. from Statistics Netherlands);
- access to large national and international facilities (e.g. cleanrooms, synchrotrons, datasets, etc.);
- work by third parties (e.g. laboratory analyses, data collection, etc.);
- personnel costs smaller in size than those offered in module 3.2.1.

Travel and accommodation costs (for the employees for which a personnel grant was requested in budget items PhD/PDEng/MD PhD and Postdoc)

- travel and accommodation costs (national and international);
- congress visits (max. 2 per year);
- fieldwork;
- work visits.

Implementation costs

- national symposium/conference/workshop organised by the project;
- costs of open access publishing;
- data management costs;
- recruitment costs (incl. advertisement costs);
- costs involved in applying for licences (e.g. for animal experiments).

Costs that cannot be applied for are:

- basic facilities within the institution (e.g. laptops, desks, et cetera);
- maintenance and insurance costs.

If the maximum amount of € 15,000 per year per full-time scientific position is not sufficient for realising the research, then it may be deviated from if a clear justification is provided in the proposal. The only exception to this is the amount for small equipment (€ 160,000).

3.2.3 Knowledge Utilisation

The aim of this budget item is to facilitate the use of the knowledge⁴ that emerges from the research. The contribution requested may be no more than € 25,000 and must be specified.

As knowledge utilisation can assume very different forms in the various scientific disciplines, it is up to the applicant to specify which costs are needed, for example for producing an educational package or realising a feasibility study into application possibilities, or the costs of submitting a patent application.

3.2.4 Money follows Cooperation

The aim of this module is to encourage international cooperation through the principle Money follows Cooperation, for which the national research budget is used for cross-border cooperation.

This module offers the possibility to deploy expertise from abroad for part of the research project.

⁴ For the purposes of this module, the definition for “knowledge transfer” as set out in the Framework for State aid for research and development and innovation (OJ 2014, C 198) applies.

In the proposal the applicant must convincingly demonstrate that the foreign knowledge institution contributes specific expertise to the research project which is not available in the Netherlands at the desired level for the project. If the arguments are not sufficiently convincing, then the funds for this module cannot be made available. This requirement is not applicable if NWO has concluded a bilateral agreement concerning Money follows Cooperation with the national research funding organisation of the country where the foreign knowledge institution is established.

Furthermore, the applicant needs to state the amount to be deployed for this module in the budget. The amount requested for this module must be less than 50% of the total project budget.

Knowledge institutions established in the following countries are excluded from participation in research projects funded by NWO due to international sanctions:

- the Islamic Republic of Iran
- Democratic People's Republic of Korea

A (researcher employed by) a foreign knowledge institution must satisfy the criteria for co-applicants as stated in paragraph 3.1 of this call for proposals, except for the requirement that a co-applicant must be established in the Kingdom of the Netherlands.

In accordance with the NWO Grant Rules 2017, version January 2019 the knowledge institution of the main applicant will receive the full grant amount, and will subsequently be responsible for transferring the MfC-part of the subsidy to the foreign knowledge institution(s) in accordance with the approved project budget.

NWO assesses applications under this arrangement according to her policy concerning "money flows abroad". This policy aims to ensure that (inter)national laws and regulations, such as sanctions or laws concerning the prevention of money laundering and terrorism. Assessment according to this policy can result in the rejection of the application or in the setting of additional conditions in an eventual Grant Award Decision.

3.2.5 PPP/Co-funding

Participating organisations are expected to contribute to the proposal in the form of co-funding. NWO understands co-funding to mean: 'Contribution from a private or public party in cash or in-kind to a project or programme funded by NWO'; NWO is the legal entity here that enters into financial obligations.

A distinction is made between cash co-funding, which is used by NWO to cover the research budget for the knowledge institutions in the proposal, and in-kind co-funding, which can consist of the use of resources from the organisations involved for the proposal.

At least 30% of each project's total costs (required financial resources plus in-kind contributions) must consist of co-financing from users (cash and/or in-kind contribution).

At least 15% of the financial resources required to conduct the research must be in the form of cash co-financing from the users. Calculations examples for the required co-financing can be found in the Appendix.

Please note that a letter of support confirming the co-funding of all private parties is required as part of a full proposal.

3.3 When can applications be submitted

The deadline for the submission of **mandatory** Expressions of Interest is **27 June 2019**, at 14:00 hours CEST.

The deadline for the submission of full proposals is **19 September 2019**, at 14:00 hours CEST.

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.

3.4 Preparing an application

Both for the Expressions of Interest phase as for the full proposals, please:

- Download the application form from the electronic application system ISAAC or from NWO's website (on the grant page for this programme).
- Complete the application form.
- Save the form as a PDF file and upload the PDF form, together with the required attachments in ISAAC.

You should write your application in English using the application form provided. 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.

When writing your proposal please bear in mind that it will be read by expert referees as well as a more broadly composed international assessment panel.

For every proposal submitted, NWO assumes that the applicant has informed the host institution and that the university or institute has accepted the funding conditions of this programme.

3.5 Conditions on granting

The NWO Grant Rules 2017, version January 2019 and the Agreement on the Payment of Costs for Scientific Research apply to all applications.

User committee

NWO ensures that the knowledge generated by the research is practically and effectively transferred to users by consulting with the project leader of each research project to set up a user committee on the basis of the users proposed in the project plan.

NWO assumes that parties which provide co-funding have an interest as a user of the research results and will ensure the use of the results outside science. Co-financiers are therefore always a member of the user committee. In the SI2019 programme multidisciplinary consortia are expected to represent the relevant organisations for the subject concerned. Such organisations can include academic knowledge institutions, TO2 institutes, universities of applied sciences, companies (including SMEs), NGOs, and relevant government organisations. The direct involvement of government ministries and the TKI organisations from the top sectors is also a possibility in this regard.

Potential knowledge users and end users from outside the researchers' circles and research area should clearly be involved in the project from the start to the end. The users must be able to use the knowledge from the research in the medium to long term and be able to contribute to the development of results in the project. In the Expression of interest and the full proposal, the actual and potential users of the knowledge must be addressed.

The members of the user committee are formally invited by NWO to sit on the user committee. Those participating in the user committee commit themselves to the conditions included in the Guidelines Users' Committee NWO. See the brochure 'Guidelines Users' Committee NWO domain TTW' on www.nwo.nl/en/about-nwo/organisation/nwo-domains/ttw/projectleader

In addition to the active user committee participation, all consortia are expected to participate in events organized for all projects granted in this call to stimulate collaboration and exchange of ideas across the projects.

Applicants of projects that fit in the COMMIT2DATA programme are expected to contribute to additional reports, meeting and/or evaluations if so requested. Applicants of projects with a creative industry aspect are expected to participate in CLICKNL DRIVE.

Intellectual property and publication agreements

During the knowledge transfer between research and users within NWO projects, it is essential that the research results are treated responsibly with a view to contributions to science and the application of the knowledge. NWO's aim is, on the one hand, to exploit the research results as widely as possible and to publish these and, on the other hand, to encourage collaboration between researchers and several organisations. The NWO Grant Rules 2017, version January 2019 provide possibilities for the applicants to acquire intellectual property (IP) rights and to possibly transfer these or licence these to the user(s).

The principal applicant of a SI2019 proposal should – in consultation with the full consortia and his/her own institution – choose between making 'own IP and publication arrangements' or to follow the lead of NWO. The two options and the attendant implementing conditions are described in the appendix 6.5. NWO asks the party submitting the research proposal to indicate, in advance, which option has been chosen with regard to IP&P arrangements for the results of the research.

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/en/policies/open+science.

Data management

Responsible data management is part of good research. NWO wants research data 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. Proposals should therefore satisfy the data management protocol of NWO. This protocol consists of two steps:

1. Data management section

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

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.

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 can only be submitted to NWO via the online application system ISAAC. Applications not submitted via ISAAC will not be taken into consideration.

A principal applicant must submit his/her application via his/her own ISAAC account. If the principal 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 principal applicant already has an NWO-account, then he/she does not need to create a new account to submit an application.

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

4 Assessment procedure

4.1 Procedure

In general

NWO Code for Dealing with Personal Interests

“Up to and including 30 June 2019, the NWO Code of Conduct on Conflicts of Interest applies to all persons and NWO employees involved in the handling, assessment and/or decision-taking process. On 1 July 2019, this Code of Conduct will be replaced by the new Code for Dealing with Personal Interests. From 1 July 2019, the assessment and/or decision-taking process for this funding round will therefore be carried out according to the Code for Dealing with Personal Interests. More information concerning the Code for Dealing with Personal Interests can be found on the NWO website.”

Data management

The data management section in the application is not evaluated and therefore not included in the decision about whether 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 researcher should elaborate the data management section into a data management plan. Applicants can use the advice from the referees and the committee when writing the data management plan. A project awarded funding can only start after NWO has approved the consortium agreement.

Qualification

NWO will award a qualification to all full proposals and will make this known to the researcher with the decision about whether or not the application has been awarded funding.

Only applications that fulfil the quality requirement as mentioned under assessment criteria (see section 4.2) will be eligible for funding.

Phase 1 - Expressions of Interest

Applicants are required to submit an expression of interest and indicate which themes their proposal will address, including a description of the proposal's approach in each addressed theme, and indicate the multi- or interdisciplinary aspects of their proposal. NWO will advise the applicants on the next stage of the procedure, depending on how well the proposal fits into the themes of the SI2019 call.

Submission of an expression of interest is obligatory.

Phase 2 - Full proposals

Pre-selection of full proposals

If at least four times more proposals are submitted than can be funded, NWO retains the right to perform a preselection.

Admissibility of the proposals

The first step in the assessment procedure is to test whether an application is admissible. Only those proposals that satisfy the criteria stated in Chapter 3 are admissible and will be taken into consideration.

Evaluation of proposals

Referees and rebuttal

As soon as a full proposal is declared eligible, NWO will submit this for advice to external referees. These independent advisers are experts in the field of the proposal. For each proposal NWO tries to consult four to five referees but at least three referees will assess each proposal. The referees will assess the proposal against the assessment criteria as detailed in Section 4.2 and will not give a graded assessment. The referees' reports will be made anonymous and will be sent to the applicant for a written rebuttal.

Evaluation committee

The evaluation committee will consist of a balanced mix of experts from fields involved in this call. The committee members will receive all full proposals, review reports and rebuttals. During a meeting and based on the assessment criteria the evaluation committee will reach a single prioritisation of the full proposals.

The task of the evaluation committee is to make their own independent consideration based on the proposal, the referees' reports and the rebuttal. The referees' reports will to a large extent 'guide' the final assessment but will not be blindly accepted by the committees without question. The committee will consider and compare the referees' arguments (also among each other) and examine whether the rebuttal contains a well-formulated response to the critical comments from the referees' reports. Furthermore the committee, unlike the referees, can see the quality of the other proposals and rebuttals submitted. The committee can therefore reach a different assessment from the referees.

The evaluation committee will issue an advice to the NWO Domain Applied and Engineering Board about the evaluation and ranking of the project proposals. During the realisation of this advice, policy considerations can play a role, such as realising a balance on the content of the programme or a reasonable spread of the projects across the research fields covered by the programme, in the case of project proposals that have the same qualification.

Decision

The NWO Domain Applied and Engineering Board takes a decision about granting based on the advice of the evaluation committee. The Board has the right not to use the entire budget available, depending on the number and quality of the applications.

Tentative timeline

27 June 2019	Submission of Expression of Interest
19 September 2019	Submission deadline full proposals
October 2019	Referees are consulted
Medio November 2019	Applicants can submit a rebuttal
Beginning of 2020	Selection committee meeting
Beginning of 2020	Decision AES Board
Beginning of 2020	NWO informs applicant about the decision

4.2 Criteria

The full proposals will be assessed using the following criteria:

1. Scientific quality
2. Utilisation potential (the application of the results of the research by third-parties)
3. Fit to the themes of the programme.

These criteria will carry an weighting in the assessment and ranking as follows: 45% ("scientific quality") : 45% ("utilisation") : 10% ("fit to theme").

Furthermore, a quality requirement will be applied as follows: proposals will qualify for funding only if they do not score higher than 4.0 for each of the criteria "scientific quality" and "utilisation" and "fit to theme", and such that the sum of these grades may not be higher than 10.5.

1. Scientific quality

- 1.1. To what extent is the proposed research original and how would you rate the innovative elements?
- 1.2. What is your assessment of the design of the project, including the goals, hypotheses, research methods, and scientific feasibility?
- 1.3. What is your assessment of the coherence and time schedule of the proposed lines of research?
- 1.4. Is the research group competent enough to carry out the research? Does the group have a relevant position in the international scientific community? Is the available infrastructure adequate?
- 1.5. Are the number and category of requested personnel, budget for materials, investments, and foreign travel adequate?
- 1.6. What are the strong and weak points of the scientific part of the proposal?

2. Utilisation potential (the application of the results of the research by third-parties)

- 2.1. What is your assessment of the description of the commercial and/or societal potential impacts of the research given in the proposal?
- 2.2. What is your assessment of the contribution and commitment of the user(s) and the proposed composition of the user committee?
- 2.3. Do you expect the application of results to be hampered by commercial propositions, existing patents, eligibility or societal acceptance?
- 2.4. What are the prospects for collaboration with the industry and knowledge transfer, assuming the project is successful? Please address both aspects.
- 2.5. What is your assessment of the research group's competence regarding the transfer and application of research results?
- 2.6. What are the strong and weak points of the utilisation plan?

3. Fit to the themes of the programme

- 3.1. What is your opinion regarding the strategic contribution of this project to the aims of the Programme (see programme description)?

5 Contact details and other information

5.1 Contact

5.1.1 Specific questions

For specific questions about Smart Industry 2019 and this call for proposals please contact either of the following persons:

Prime contact AES

dr. ir. Herma van Kranenburg

T +31 30 6001 308

E h.vankranenburg@nwo.nl

Prime contact Science

dr. Femke Stephan

E f.stephan@nwo.nl

Prime contact SSH

drs. Shahnaz Bodeving

E s.bodeving@nwo.nl

Prime contact Task Force SIA

dr. Frank Karelse

E frank.karelse@regieorgaan-sia.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.

6 Annexe(s)

6.1 Examples of funding calculations

6.2 Letters of Support

6.3 Expression of Interest

6.4 Regulations governing contributions in kind

6.5 Intellectual Property policy (IP policy) & Publication arrangements

6.1 Examples of funding calculations

Proposals submitted for SI2019 must satisfy the following financial requirements:

- The maximum NWO contribution for academic research amounts to € 750,000 per project; and
- The maximum NWO contribution for UAS research amounts to € 100.000 per project; and
- Total co-funding amounts to at least 30% and at most 50% of the total project costs; and
- Financial co-funding amounts to at least 15% of the total financial resources required.

The following definitions apply here:

- Total project cost: required financial resources plus in-kind contributions.
- Required financial resources: NWO contribution plus financial contributions (or, actually: the NWO contribution is equal to the required financial resources minus the financial co-funding).
- Co-funding: financial and/or in-kind contribution(s).
- Financial contributions (*in cash*): financial contributions are used to cover a portion of the project costs and thus form the required financial resources together with the NWO contribution.
- *In-kind* contributions: capitalised personnel and/or material contributions from users.

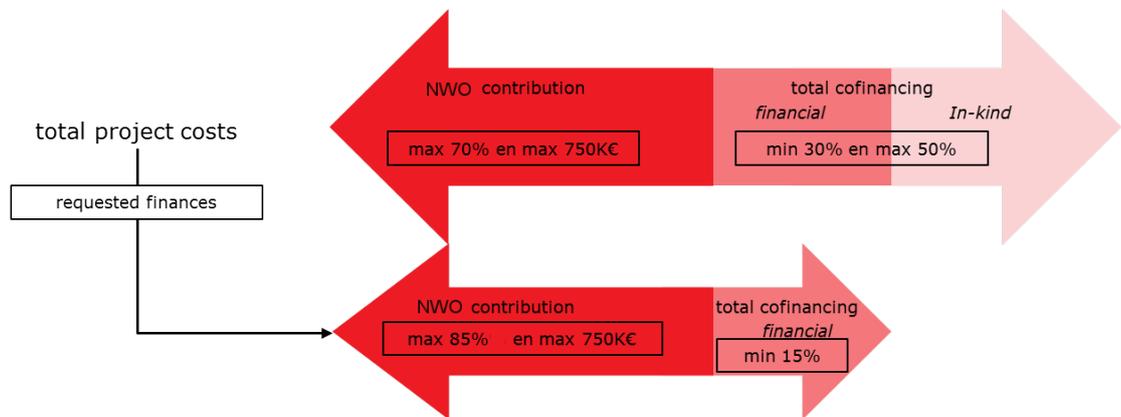


Figure 1: Graphic illustration of the SI2019 co-funding requirement (example without UAS top-on subsidy).

Calculation example

The form "SI2019 Financial Planning" can help you with the co-funding calculation.

Example 1

Imagine: you estimate the required financial resources for your project (personnel and material costs (academic and UAS), required investments, plus costs for foreign travel) to be a total of € 560,000.

- If co-funding consists only of financial contribution(s), then the financial contribution must amount to at least 30% of € 560,000, or € 168,000. The NWO contribution is then € 392,000. In that case, the required financial resources are equal to the total project costs.
- A second possibility is that part of the co-funding will consist of in-kind contributions. (In fact, this amounts to expanding the content of the project: total project costs increase.) In that case, the minimum financial co-funding is equal to 15% of the required financial resources, or € 84,000. Establishing the minimum required co-funding is essentially the same as resolving the equation $0.30 \times (\text{€ } 560,000 + \text{€ in-kind}) = (\text{€ } 84,000 + \text{€ in-kind})$. Expressed in words, this means that a minimum of 30% of the total project costs must be from co-funding. In-kind co-funding must amount to € 120,000. Accordingly, total project costs end up at € 560,000 + € 120,000 = € 680,000 and the NWO contribution is € 560,000 - € 84,000 = € 476,000.

Example 2

Imagine: you estimate total project cost for your project to be € 1,250,000, consisting of € 1,000,000 in required financial resources and € 250,000 in in-kind contributions. The minimum total co-funding amounts to 30% of the total project cost, or € 375,000, and the minimum financial co-funding amounts to 15% of the required financial resources, or € 150,000. However, the NWO contribution for academic research is a maximum of € 750,000. In the case the cost are for academic research only, this means that the minimum financial contribution will have to amount to € 250,000. With this, total co-funding ends up at € 500,000 - also above the minimum limit of € 375,000.

In case UAS participates in this example project, this changes. Imagine in this example UAS costs are the maximum amount of € 100,000, as part of the total project cost of € 1,250,000. The minimum total co-funding still amounts to 30% of the total project cost, or € 375,000. The NWO contribution is now a maximum of € 750,000 (academic) + € 100,000 (UAS) = € 850,000. The required minimum financial co-funding is 15% of the required financial resources, or € 150,000. (total financial resources € 1,000,000). With this, total co-funding ends up at € 400,000 - also above the minimum limit of € 375,000.

Please note: the NWO contribution amounts to a maximum of 70% of total project costs and a maximum of € 750,000 (€ 850,000 with UAS). Co-funding of more than 50% is not permitted.

Please note: If anything is unclear we recommend that you contact the NWO office in advance.

6.2 Letters of Support

A letter of support is obligatory if co-funding is provided by the users. NWO advises applicants to ensure that the users pay particular attention to endorsing the importance of the utilisation plan for their operations. The letter of support should satisfy the following requirements:

A. General requirements

- Letters of support must be printed on the letter paper of the co-funder.
- Letters of support are addressed to the project leader.
- Letters of support must be written in English.
- The address on the letter is complete and correct.
- Letters of support must be signed by an authorised signatory.
- The cash contribution stated in the letter is exclusive of Dutch VAT and paid to NWO plus Dutch VAT (21%).

B. Specific requirements

- Brief description of the company and the core business (type of company, size, which service, products).
- A statement that the company is interested in and will commit itself to the research.
- An explanation as to why the answering of the research question is important to the company. How does this solution fit in their strategy?
- A brief explanation as to why this particular research group and research proposal are receiving support.
- What the company will contribute in concrete terms (incl. capitalisation) and why this fits in the research proposal/planning.
- Further specification of the in kind support, both hours (number and/or tariff applied) and materials (numbers; cost price; tariff; percentage that can be attributed to the project, etc.).
- The company provides the contribution described without additional conditions.

C. Declaration and signing by the User

In the final paragraph of the support letter should include the following statements from the company and the representative signs for this:

- The company states that it has read the proposal and signs for this.
- The company states that it will actively participate in the User Committee (UC) and signs for this.
- The company states that it agrees to the NWO Grant Rules 2017, version January 2019, Guidelines Users' Committee NWO Domain AES and IP arrangements as proposed in the Partnership project agreement and signs for this.

A template support letter is available on the NWO Domain AES website (www.nwo.nl/en/about-nwo/organisation/nwo-domains/ttw/applicant).

Letters of support are unconditional and do not contain any opt-out clauses!

The amounts stated in the letters of support must correspond with the amounts stated in the budget presented in the application. A copy or scan of the letter will suffice for the submission of a research proposal. NWO will not approach persons or organisations who have signed letters of support to act as referees (code of conduct on conflicts of interest).

After the research proposal has been awarded funding, NWO will request a confirmation of the co-funding ("confirmation obligation third parties") and in relevant cases will record any further arrangements in an agreement.

6.3 Expression of Interest

Instructions for Expressions of Interest

In order to be considered for the full proposals, it is mandatory for the intended principal applicant to have submitted an Expression of Interest (EoI). The purpose of this EoI is to:

- inventorise at an early stage the intended project proposals and its contributions to the thematic focus of the SI2019 call.

What is required?

- An overview of the intended research, its relation to the SI2019 thematic focus and a clear description of the multidisciplinary approach of the intended project.
- An overview of the applicants and intended users.

Submission of the EoI is done via the electronic application system ISAAC.

6.4 Regulations governing contributions in kind

Definitions

- Total requested project budget: requested budget from NWO/Partner.
- Total project costs: necessary financial resources plus in kind contributions.
- Financial in cash contribution: Financial contributions are used to cover part of the project costs and so, together with the contribution from NWO, constitute the necessary financial resources.
- In-kind contributions: In-kind contributions means capitalised personnel and/or material contributions from users.

Notes on Criteria relating to co-funding

- NWO uses the financial co-funding to cover part of the project costs. After a project is approved, NWO sends an invoice to users who have pledged a financial contribution. Once the funds have been received, they are allocated to the project. The cash contribution stated in the letter of support is exclusive of Dutch VAT and paid to NWO plus Dutch VAT (21%).
- NWO accepts personnel input and material contributions as co-funding on the condition that these are capitalised and that they form an integral part of the project. This should be made clear in the description and planning/phasing of the research.
- NWO is the main funder of the projects. Project applications where the co-funding from users exceeds the amount to be borne by NWO will not be considered.
- NWO assumes that providers of co-funding have an interest as users and therefore as appliers of the research results outside science. Co-funders always participate in the user committee.
- Government agencies can play various roles in NWO projects, namely: (1) as a research partner (without entitlement to NWO funding), (2) as a subcontractor of a specific assignment (at market rate) or (3) as a user. Government agencies may act as users under the same conditions as private users.
- The co-funding to be provided by users must be confirmed in a letter of support. These letters must explicitly state: 1) the importance of the research proposal for the organisation, 2) the importance of the utilisation plan for the organisation's operations, 3) the pledged financial and/or the specified capitalised material and/or personnel contribution(s), and 4) whether the user intends (i) to allow NWO to take the lead in making IP arrangements in accordance with NWO Domain AES's current IP policy or (ii) to make its own arrangements with the knowledge institution(s) and user(s) concerned. See also the requirements under 'Letters of support' and the 'Notes on Intellectual Property & Publication arrangements' in this brochure.

Notes on Criteria relating to in-kind co-funding

- Part of the research may be conducted by third parties. A condition is that the expertise provided in the form of man- hours is not already available at the research institute(s) and is used specifically for the NWO project. For personnel support by third parties, NWO applies fixed rates in order to capitalise the number of man-hours used (up to 1400 direct hours/year/fte) for a senior or junior researcher. For the current rates, see www.nwo.nl/ttw-aanvrager.
- For pledges of material resources, charge the cost price. Commercial rates are not accepted. For pledges of equipment, take previous depreciation and intensity of use into account.
- Pledges in the form of supplies of services are possible only if the service can be itemised as an identifiable **new** endeavour. The service should not already be available at the research institute(s) realising the research. Applicants may wish to claim services already supplied (such as a database, software or plant lines) as in-kind co-funding. Acceptance is not automatic in such cases. Contact NWO about this. Further consultations will take place to decide whether a specific value can be determined for this supply of services.

NOT permissible as the co-funding

- NWO guards against the improper mixing of funding sources: co-funding can never come from direct or indirect (NWO, KNAW) government funding. As a result, co-funding can also never come from the research institute of the (co-) applicant(s) or from institutes which are themselves eligible to apply to NWO.
- Discounts on (commercial) rates for materials, equipment and/or services, for example.
- Costs relating to overheads, supervision, consultancy and/or participation in the user committee.
- Costs of services that are conditional. No conditions may be imposed on the provision of co-funding. Nor may the provision of co-funding be contingent upon reaching a certain stage in the research plan (e.g. go/no-go moment).
- Costs which are not paid by NWO (e.g. clinical trials, costs relating to the exploitation of the research results, service costs equipment).
- Costs of equipment if one of the (main) aims of the research proposal is to improve this equipment or to create added value for it.

6.5 Intellectual Property policy (IP policy) & Publication arrangements

NWO facilitates the transfer of knowledge between the technical sciences and users. In this process it is important that a responsible approach is taken with regard to research results in general, and patentable inventions and discoveries in particular. NWO's aim is firstly to exploit and publish the results of research as widely as possible, whilst retaining the possibility to establish IP rights and to subsequently transfer these rights to user(s) or grant a licence to user(s) for these and, secondly, to stimulate collaboration between researchers and various external companies.

NWO adheres to a set of rules concerning Intellectual Property (IP) that support NWO's mission and are covered by NWO's IP policy.

NWO's IP policy can be found in chapter 4 of the NWO Grant Rules 2017, version January 2019.

NWO's IP policy is in line with the '*Rules of Play for public-private collaboration*' as presented to the Lower House of the Dutch Parliament on 25 June 2013.

NWO offers knowledge institutions the opportunity to make their own IP and Publication (IP&P) arrangements with the parties with which they cooperate. In this way, NWO hopes to respond better to the wishes of the researchers and co-funders who are involved in NWO projects. It will continue to be possible to opt for the approach whereby NWO takes the lead in making arrangements for IP and similar matters; in such cases, NWO's Intellectual Property policy will be followed.

If knowledge institutions prefer to make their own arrangements, they must make this known - with the approval of the companies concerned - at the time the application is submitted, and have concluded the arrangements within three (3) months of receiving NWO's approval for the project. The main applicant/project leader has the lead in these circumstances. The arrangements will subsequently be reviewed by NWO to ensure they are compatible with four criteria that reflect the task and mission of NWO.

NWO asks the party submitting the research proposal to indicate, in advance, which option has been chosen with regard to IP&P arrangements for the results of the research. The two options and the attendant implementing conditions are described in the table below.

Make choice known on submission

NWO takes the lead in making Intellectual Property and Publication* arrangements ('TTW IP&P arrangements')

- Part 3 of the 'Guidelines Users' Committee NWO Domain AES' on 'Intellectual Property' (see the brochure on www.nwo.nl/en/about-nwo/organisation/nwo-domains/ttw/projectleader) is applicable.

Access to foreground IP rights for private party or parties / consortium:

- 0-10% private contribution private party or parties: private party/parties have no automatic right
- 11-30% private contribution private party or parties: private party, parties or consortia have right of option
- 31-50% private contribution private party or parties: non-exclusive non-transferable commercial licence + right of option to exclusive right. Contribution towards patent costs can be required
- Private parties can combine their contributions so as to achieve a more favourable ranking
- Confidential information remains confidential
- Results can always be published but publication may be suspended for a maximum of 9 months in connection with the protection (patent) of the results
- Agreements must be confirmed in writing within six months of the project being awarded

Further information on the options can be found in chapter 4 of the NWO Grant Rules 2017, version January 2019, the brochure 'Guidelines Users' Committee NWO Domain AES' and in the relevant/underlying 'Guidelines for financing applications'

Main applicant / project leader takes the lead in making Intellectual Property and Publication* arrangements ('Own IP&P arrangements')

- 'Own IP&P arrangements' fulfil the following criteria:
 - All necessary foreground information (IP ensuing from the NWO project) and - insofar as legally possible - background information (already existing IP from company and/or knowledge institution) is available for the execution of the project
 - The agreement is aimed at the application or allocation of the results by way of publication
 - Publication of scientific knowledge from the project will not be obstructed by users, but the beneficiary and users may determine the publication schedule
 - Any results generated from the project by the beneficiary remain available for the beneficiary for educational and research purposes
- On submission: The knowledge institution(s) and all users agree that the provisions under 'Own IP&P arrangements' will apply to the NWO project and declare that they do or will satisfy the criteria from i to iv above
After award: All beneficiaries and all users approve the agreement in writing
- NWO will receive from the project leader, no later than three (3) months after awarding the project:
 - The signed agreement in which IP&P arrangements are made with the user(s)
 - A signed IP&P statement in which the beneficiary declares that the agreement relating to the IP&P arrangements with the user(s) satisfies all the pre-determined criteria. The project leader hereby refers to the relevant provisions in the agreement
- NWO reviews the agreement against the pre-determined criteria; if NWO approves the agreement, NWO informs the project leader that the project can be started

***NB:** 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.

Notes on: when NWO makes Intellectual Property & Publication arrangements

NWO takes the lead in the negotiations on the subject of IP&P arrangements. Once a project has been approved, all users that contribute to the project receive a letter from NWO informing them that the project has been awarded to the knowledge institution. In addition, NWO asks the user to sign the letter to (re)confirm its participation in and contribution to the project. The user can also indicate a desire to enter into a more comprehensive agreement, setting out the reciprocal rights and obligations involved in the cooperation. That is possible.

Further details of NWO's IP policy can be found below.

The main principles of NWO's IP policy.

- **Ownership of the results of research**

The results of research carried out by the research institute(s) in the context of a NWO project are owned jointly by the participating institute(s) and by NWO.

- Ownership of the results of research that are generated exclusively by user(s) in the context of a NWO project is vested in the user(s) in question. The user(s) will allow NWO and the research institute 'freedom to operate'.
- The results of research that are generated jointly by the research institute(s) and the user(s) in the context of a NWO project are owned jointly by the participating institute(s) and by NWO. If the co-inventing user has itself provided more than 10% of the project funding in the form of personnel, that user will be granted a non-exclusive, royalty-free and non-transferable licence for the use of the invention, patent or patent application.
- Existing IP rights continue to be vested in the holder(s) of such right who contribute these rights to the project. Insofar as it is possible under the law, and insofar as it is not detrimental to the reasonable commercial interests of the right holder, this/these right holder(s) will facilitate, at their own discretion and in all reasonableness, a freedom to operate.
- 'Freedom to operate' means that the holder of the intellectual property right grants licences to others within the project:
 - insofar as legally possible;
 - insofar as necessary for the project (without charge);
 - insofar as necessary for the exploitation of the results of the research and possible concomitant results (at a fair market price);
 - insofar as such freedom to operate is not detrimental to the reasonable commercial interests of the right holder.

- **Protection of research results, confidentiality and publications**

NWO attaches considerable importance to the protection of knowledge in the process of knowledge transfer. Users admitted to the user committee, undertake to maintain confidentiality with regard to the research results. However, parties can agree - either prior to or during the lifecycle of the project - that protection of the knowledge generated by the project can be suspended if that would be beneficial to the commercial exploitation of the expertise and intellectual property generated by the project.

The researcher is obliged to report any invention to NWO immediately.

NWO should receive prior warning about any obstacles to the free use or exploitation of results. Should any obstacles to the implementation of NWO's IP policy emerge, NWO will impose additional conditions. If it emerges during the course of the project that the project leader has failed to notify NWO about such relevant information, NWO may suspend the project until the obstacles concerned have been removed. NWO may request access to contracts and/or patents in this respect. Contracts must not be in conflict with NWO's IP policy. If it emerges that NWO cannot have free access to the results of the NWO research, NWO may decide not to award or to discontinue the project.

Notes on: when own Intellectual Property & Publication arrangements are made

If the knowledge institution elects to make its own arrangements with the user for Intellectual Property rights and Publication, those arrangements must be set out in writing. They must also satisfy the following conditions:

- i. All necessary foreground information (IP ensuing from the NWO project) and - insofar as legally possible - background information (already existing IP from company and/or knowledge institution) is available for the execution of the project;
- ii. The agreement is aimed at the application or sharing of the results by way of publication;
- iii. Publication of scientific knowledge from the project will not be obstructed by users, but beneficiaries and users may determine the publication schedule;
- iv. Any results generated from the project by the beneficiary remain available for the beneficiary for educational and research purposes.

Furthermore, the following conditions apply on submission or on award of a project:

- On submission: the knowledge institution(s) and all users agree that the provisions under 'Own IP&P arrangements' will apply to the NWO project and declare that they do or will satisfy the criteria from i to iv above.
- After award: The knowledge institution(s) and all users approve the agreement in writing.

Within four (4) months of the award of the project, the main applicant/project leader will submit a copy of the agreement to NWO, indicating where arrangements for each of the specified conditions can be found.

Within four (4) months of the award of the project, all beneficiaries and users concerned will also declare that all the conditions have been satisfied; this will be done by signing and returning the contract.

If, on review, it transpires that the arrangements made do not satisfy the conditions set out above, NWO can extend the original four (4) month period after award by a further period of up to two (2) months, to enable the user(s) and the beneficiaries to modify the arrangements so that they do satisfy the pre-determined conditions.

If at the end of this period the conditions have not been satisfied, this means that the conditions attached to the award have not been fulfilled and there can be no allocation of funding.

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