# Knowledge Utilisation Manual

**Innovational research Incentives Scheme 2017**

# General introduction knowledge utilisation

Since 2009, NWO has pursued a concrete policy that aims to stimulate the transfer of knowledge generated with the help of funding from NWO. This transfer can take place to other scientific disciplines as well as to users outside of science (industry/society). The knowledge utilisation policy is mainly targeted at increasing researchers' awareness of knowledge utilisation. NWO therefore requests all researchers applying for funding to provide an explanation regarding the possible knowledge utilisation of their project by means of answering several questions (for example: how will knowledge utilisation be implemented and how does the researcher intend to facilitate knowledge utilisation?). This explanation is one of the assessment criteria.

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.

NWO realises that the possibilities for knowledge utilisation differ per discipline and that some research projects have few if any opportunities for (direct) knowledge utilisation. In this case, an applicant should explain why no knowledge utilisation can be expected for his or her project. The selection committee members will still be asked to assess this explanation: if they are convinced that the research project indeed has no knowledge utilisation possibilities and that the applicant has satisfactorily explained this, then this should not negatively influence the overall assessment score.

Examples of knowledge utilisation can be found at www.nwo.nl/en/policies/knowledge+utilisation.

The Dutch National Research Agenda can serve as a source of inspiration when you are thinking through the potential for knowledge utilisation. The routes within the Agenda can inspire Talent Scheme researchers and help them to pinpoint the potential importance of their research for other scientific disciplines as well as for society and to make this tangible.

A browseable online Dutch National Research Agenda book as well as the Portfolio for research and innovation with further information about the current routes in the Agenda (both in Dutch and English) are available at http://www.wetenschapsagenda.nl/publicaties. The digital version of the Agenda that contains all of the questions can be consulted, in Dutch, at vragen.wetenschapsagenda.nl

**Examples from specific research fields**

In addition to the general introduction, please find below some notes on knowledge utilization in specific researchfields. Most of the explanations contain a few examples that might give you an impression of the possibilities for knowledge utilisation.

**Content**

# 1 Humanities

Contributions to solutions for problems such as integration, the ageing population, healthcare and security can be made by humanities researchers, as their research clearly concerns people and reflection on human actions. In that sense it is hardly surprising that knowledge and skills from the humanities are in increasing demand within politics, education and the public domain. To strengthen this trend humanities researchers should not only comment upon social or cultural developments but also help to shape the debate right from the start. This is in the interests of society as equally the humanities and individual researchers. The NWO Division for the Humanities therefore wants to encourage and support the interaction between science and society.

Opportunities for potential knowledge utilisation from your research are best expressed if attention is paid to the following three subjects:

1. Relevance and objectives: what is the relevance of your research outside of academia and what is the objective that emerges from this?
2. Target group: who are interested in your research outside of academia?
3. Activity: which resources will be used to get the target group involved in your research?

A detailed manual on knowledge utilisation for the humanities can be found at www.nwo.nl\kennisbenutting-gw. This guide contains suggestions that you can use to determine what the relevance of your humanities research is outside of academia, which objective and target group emerge from this relevancy and which activity you can use to involve interested parties in your research. It is important that all of these aspects are closely correlated with each other: knowledge utilisation must be tailored to each specific situation.

The website www.nwo.nl\kennisbenutting-gw also details examples of knowledge utilisation from Innovational Research Incentives Scheme projects such as:

- Dr A. Geurds, Fixing history: Ancient cultural practices of stone sculpture in central Nicaragua (Leiden University) – Veni, awarded in 2010.
- Dr S. Roeser, Moral Emotions and Risk Politics (Delft University of Technology) – Vidi, awarded in 2009.

# 2 Social Sciences

Not all research within the social sciences is equally suitable for knowledge utilisation. You should therefore describe the knowledge utilisation that is appropriate for the type of research you are doing. Furthermore, the researcher is free to delegate various aspects of the knowledge utilisation process to other parties and/or individuals but the researcher is expected to take the initiative.

Three examples of projects from the Social Sciences awarded funding are now presented that received outstanding scores for knowledge utilisation. A brief summary of the knowledge utilisation section is given in everyday language. In the proposal, this section should of course be aimed at a public of committee members and subject specialists from one's own discipline.

**1. Veni: Tanzanian entrepreneurship assured - Dr W. (Wendy) Janssens VU Amsterdam**

Microcredit for small entrepreneurs is becoming increasingly popular in developing countries. However, high medical costs are a frequent source of problems for many of these entrepreneurs who are often uninsured. This research will investigate whether the combination of health insurance and microcredit in Tanzania has boosted the effectiveness of both programmes.

Knowledge utilisation:
This project could increase the effectiveness of two relatively new instruments that are increasingly being used to alleviate economic and health problems in one of the poorest parts of the world.

The research forms part of a large study into the impact of private health insurance in sub-Saharan Africa which is being developed by a Dutch non-profit organisation. By means of regular exchange, the results from the Veni research project will be directly fed back to and incorporated in the design and implementation of this programme. In addition to this, the result will be disseminated within the wider microfinance community by means of presentations and policy reports.

This research will therefore directly impact policy and practice in three ways:

- Provide figures to compare the advantages and disadvantages of private insurance versus state-funded healthcare.
- Provide knowledge about the influence of health insurance on the effectiveness of microcredit.
- Provide experience with the potential effects of group processes in microcredit groups on the demand for health insurance. This knowledge can be used to improve the financial sustainability of health insurances.

**2. Vici: Simplifying the group-forming process - Prof. J.K. (Jeroen) Vermunt - Tilburg University**

Researchers often want to divide people into groups, such as groups of young offenders who commit other crimes, groups of consumers with different preferences or groups of patients suffering from depression who need different treatments. This project will simplify the existing statistical techniques used to form such groups.

Knowledge utilisation:
The research results are relevant for various areas of research such as marketing, health and criminology. The target group consists of market research agencies and non-profit institutions for applied research in the areas of health, transport, the environment etcetera.

Researchers from this project will facilitate the utilisation of their results by publishing a handbook and by developing a free online course. Furthermore, the new tools developed in the project will be included in a software package that is frequently used throughout the world. We will therefore collaborate with the company that produces the software; they will be responsible for the necessary programming.

**3. Veni: Measuring the motivation to help society– Dr W.V. (Wouter) Vandenabeele - Utrecht University**

Public sector employees derive a significant part of their work motivation from the contribution that they make to society. This study will investigate how this can be measured and compared in an objective manner between different sectors and different countries.

Knowledge utilisation:

This research is particularly relevant at the moment, as the current economic crisis and the domination of right-wing parties in politics are both giving rise to an increasingly negative attitude of the public towards the public sector. Moreover, it is important as a motivational factor in a period of spending cuts when it is hard for the public sector to compete with the private sector on the employment market in terms of salary. Also the role of motivation among HRM professionals in the sectors to be investigated in this study, namely healthcare, the police and social work, is relatively unknown. Target groups are HRM professionals, future managers, policy makers in this area and the general public in both the Netherlands and other countries where data for this project will be collected. These target groups will be reached through various channels. The researcher will give guest lectures at various institutes where future HR and other managers are trained. Furthermore, he will participate as much as possible in the public debate to increase the general public's knowledge of this subject. An instrument to measure motivation will also be developed. The outcomes of this could be used as a starting point for job interviews, for example. A short training course on the use of this instrument will be given for professionals. Finally, the researchers will provide feedback to the organisations that participate in the study so that they can benefit from the insights it provides.

# 3 Health Research and Development

The results which emerge from the research funded by ZonMw cover the entire knowledge chain from fundamental research to implementation. ZonMw therefore wants researchers to consider possible pathways to knowledge utilisation in a manner appropriate to the nature of the proposed research. An example is involving partners and/or users in your research or collaborating with them. When there is a clear link to the proposed research, ZonMw expects you to describe the relationship with the most important partner(s) as a way of strengthening the contribution of the research to economy and/or society.

Appropriate activities and project-specific knowledge exchange varies between projects dependent on the target groups and context. Below we provide several examples of parties who could be important for the realisation of knowledge utilisation based on our experience with the knowledge utilisation within the research funded by ZonMw:

- In the case of medical scientific research patients are the end users of your research results. (Representatives of) patient organisations can make a contribution at various levels and stages of the research. For instance, they can help to attune the results to the need of the patient, they can play an important role in informing their supporters about the (expected) results of the research, and they can bring together patients and body material in patient registers or biobanks. It is important that you as a researcher describe in what way you are planning to enter into dialogue with patients and how you mean to cooperate. Please clearly state whether you have contacted patient organisations and mention contacts by name. It is important that you have contact with them at an early stage, although the outcome may be that more intensive cooperation is only to be expected at a later stage. The feasibility will partly be assessed on the basis of (your) past experiences. Inspiring examples on the additional value of cooperation with patient organisations in research projects and on how to involve end users in your project can be found in the booklet (in Dutch) ‘Fundamenteel onderzoek en patiëntenorganisaties: een verrassende combinatie!’.

- Medical specialists work according to guidelines and protocols; new knowledge can usually only be applied if it is included in a guideline or protocol. Dependent on the subject a researcher needs to come into contact with the right parties to realise this. One example in this context is the modification to the Dutch College of General Practitioners Practice Guideline following research into antibiotic use for acute coughing within general practice medicine.
  Besides being an important partner for fellow physicians, specialists are often an important partner for translating results into an application but also for identifying problems from clinical practice. Therefore it is not enough to merely state that you plan to cooperate in the realisation of a guideline or protocol but you also need to indicate how you will approach the professional association concerned. Once again your past experiences are a useful illustration.

- Companies can market knowledge in the form of products, but that can only be done if the knowledge concerned is sufficiently protected. Results published or presented without patent protection are very difficult to protect in retrospect. However, publication is always possible as long as the patent protection is arranged in advance. Patenting a discovery opens up possibilities for using this knowledge in the pharmaceutical industry, for example, which could ultimately lead to a treatment for patients that might

not have been realised otherwise. Information about this can be found at: http://www.octrooibureau.nl/nl/producten_en_diensten/patents. Other forms of collaboration with companies are also possible such as the direct collaboration between radiologists and Philips Medical Systems. For example a new MRI method was developed at a UMC. However, this could only be used more widely after new software had been developed for the MRI and that was done in close collaboration with the company. You should therefore state as clearly as possible how you will deal with commercialisable results and indicate as tangibly as possible which potential companies/commercial sectors you view as potential 'buyers' and how long it will take before the research can actually be applied.

- Most research institutes have Technology Transfer Offices (TTO) or similar advisory departments. The TTOs are important partners to consult regarding patent protection or the elaboration of collaboration agreements with commercial parties. In some cases research results are further developed in a spin-off company. For advice in such cases, you should also preferably consult the TTO. You should inform the TTO of your plans or obtain advice from them at an early stage. Existing contacts you have with the TTO can be given as an example of a successful transfer in the project under consideration.

- Statutory bodies play an important role in medical research and the field of healthcare. Fundamental research is followed by the translation to clinical practice and the Central Committee on Research involving Human Subjects sets conditions for research on humans. If you are doing research with the ultimate objective of an application in humans then due consideration should be given to the requirements statutory bodies will make in later phases of the research. For example, in which medium are cells cultured and is this in accordance with use in humans? In such cases adhering to GLP and GMP conditions will enable an application to be realised sooner at a later stage. Therefore make sure that you are aware of the requirements that will apply in a later stage of the research and make this explicit in the application.

- Outside of your own network, other parties that you could consider involving in the knowledge utilisation of your project are health funds, the Health Care Insurance Board, health insurers, other knowledge institutions, other healthcare professionals and international partnerships. Make sure you state such partnerships! In all of these cases, the aim is to describe in concrete terms how the application is relevant to the research project in question and therefore what exactly you will do during the project to facilitate the application. In doing this, be aware that ZonMw will expect you to state the progress made when you write the interim and final reports.

**In summary**

The assessment of the knowledge utilisation section concerns researchers thinking about the possible impact of the research, when this impact could be realised, who the target group is and which parties or partners could be interested in the research results. Next, it is important that you clearly state the steps which you must take to realise the application of the research results and how you are going to contact or conclude agreements with users and/or target groups.

Applicants who are of the opinion that knowledge utilisation as described above and in the Innovational Research Incentives Scheme brochure 2014 is not applicable to their research will have to provide reasoned arguments for this. These will be

assessed in relation to the proposal. It should, however, be noted that virtually all clinical research and research involving human subjects should by definition be applicable within the foreseeable future.

# 4 Earth and Life Sciences

Highly relevant research can take place in all fields within the Earth and Life Sciences: examples are ecological research for nature management, earth sciences research on natural resources, microbiological research with medical implications but also fundamental research with a significant impact on other scientific disciplines. The applicant should clearly indicate the relevance and address the potential external use; vaguely stating unsupported possibilities is not enough in this case.

The description of the knowledge utilisation must address how the knowledge acquired will actually be disseminated outside the field of research. How this happens will of course differ per project, but scientific reporting for one's own discipline is not what is required here. Aspects that can make a positive contribution include: a plan for the dissemination of a fundamental research result to educational institutions or the media, formal contacts with potential users, and a good plan for how intellectual property will be made available. Here the applicant should realistically state his/her own possible contribution in terms of time and the overall process.

# 5 Mathmetics, ICT and Astronomy

In the field of ICT knowledge utilisation is mainly expressed in the creation of possibilities for innovation and applications, whereas in astronomy it is more concerned with creating value for the benefit of society. Mathematics forms the basis for possible applications in a variety of fields.

In the Innovational Research Incentives Scheme knowledge utilisation focuses on the following aspects:

1. **Potential**

- Possible examples are technology development (e.g. software, product and process design) or scientific knowledge development that is usable in other disciplines.
- Another example is the development of scientific knowledge that is expected to have an impact on other disciplines, for example results that could lead to the development of an instrument that can be used for research within another discipline.
- Scientific research can also have an economic impact, for example the substitution of costly experiments with simulations. After research has been carries out, the innovative applications can be translated into user-friendly tools for everyday use with the aim of increasing efficiency.
- Societal impact is more than just an economic interpretation. Besides a contribution to solving societal problems (such as the ageing population, healthcare, the environment, etc.) it also means the dissemination and translation of research results to a wider public, for example.

2. **Implementation**

- The knowledge utilisation section will be stronger if consideration is given to the benefiting parties in the proposal. When doing this, you should state the current or future need of the benefiting parties (research groups, public sector, industry, etc.) in relation to the proposed research.
- You should clearly state how the end users/stakeholders will be reached and how they will be involved in the research. If relevant, you should detail how the applications to be developed will be shared with potential users in a realistic environment so as to realise the application of the research results in practice.

You should state applications that are specifically related to the research presented in the proposal. Examples from previous years have revealed that stating applications from general research within astronomy, mathematics or ICT does not strengthen the proposal. The review committee will critically examine the possibilities for knowledge utilisation and, if relevant, the approach described in the proposal.

The following list is neither exhaustive nor discipline specific but provides some pointers as examples of knowledge utilisation:

1. The methods and techniques that arise from ICT research can be applied in many different ways. The areas of application range from medical to economic to cultural. The rapid development of technology contributes to increasingly advanced techniques that produce complex data such as MRI images of the brain or CT scans of the lungs. Research into fundamental aspects of the brain, for example, requires advanced hardware and software to image the brain functions. The application of innovative methods and techniques to support medical research requires the active

involvement of end users such as radiologists, clinical researchers and possibly patients. A clinical research environment for the purpose of testing and implementation can be an important success factor in this case.

2. In everyday practice we are faced with obvious situations such as public transport timetables, energy companies, financial operations, etcetera. The realisation of these situations usually requires the correct matching to optimise efficiency, for example. Scientific research into mathematical models that describe the real-life situation can make a vital contribution to this. The models are systematically analysed to predict behavioural changes or disruptions. Using specially developed software this information can be processed and used for industrial applications. In the longer term the research will yield economic value for the industry concerned. Moreover the research results offer a tangible solution to the needs that prevail in everyday life.
3. Knowledge and innovation are important aspects for an economically and socially prosperous nation. The key conditions for this are education, research and innovative entrepreneurship. The professionalisation of scientific fields by investing in education can contribute to this. Although astronomy draws considerable interest from the general public when it comes to the discovery of new planets or new life on existing planets, the scientific discipline astronomy continues to face problems in recruiting new young talent. The same is true for other natural sciences. A recent analysis has revealed that natural sciences do not have a positive image among high school students (12 to 18 years). This is partly due to the lack of a clear career perspective. The same study has also shown that representative role models can make a positive contribution to the study choices of high school students. Knowledge dissemination in the form of lectures and interviews with students is a good way of presenting research and its results in a highly accessible manner. These outreach activities make a considerable contribution to raising young people's awareness of astronomy as a science, with the most important objectives being knowledge dissemination, expertise development and education.

# 6 Chemical Sciences

**What is knowledge utilisation?**
There are many examples of chemical research which sooner or later have had a considerable impact on society. Applicants should bear in mind that this section of the application will be assessed against the following two criteria (see Innovational Research Incentives Scheme brochure as well).

**1) Potential**
Research in physics and chemistry has an economic relevance if it creates products that contribute to wealth creation, technological relevance if it contributes to developing or improving tools and instruments in another field of research or in other sectors of society, societal relevance if it contributes to solving problems that society considers to be important and cultural relevance if it culturally enriches members of society by giving them a better understanding of humans in their physical constellation.

You are encouraged to explore various possibilities for knowledge utilisation that are appropriate to the nature of the proposed research, for example through the involvement of potential partners or collaboration with them. Academic impact within one's own field of research is not an aspect of knowledge utilisation but falls under scientific relevance/impact of the proposal. Relevance is a very broad concept and it is expected that all applicants will be able to describe this for their research. However, if you are of the opinion that you cannot do this, then you should provide a reasoned explanation for this.

**2) Implementation**
Aspects 1) and 2) should form a clearly coherent case. Examples include patent applications, spin-off companies, partnerships with public bodies and industry, collaboration with potential partners, participation in networks, workshops to provide training or information, dissemination lectures for the general public, etcetera.

# 7 Physics

**Purpose of the Knowledge Utilisation section**

*"It is generally accepted that our society will face unprecedented challenges over the next century. The most important of these with respect to climate, energy, sustainability, health and safety directly affect the future of our existence. It is clear that these problems cannot be solved without radical new concepts and technologies, and physics and physicists will play a crucial role in the development of these.*" (Strategic Plan FOM/N 2010-2015).

**Two aspects of Research Impact**

**1) Potential**

Physics research can have:

- societal relevance if it contributes to the solution of problems that society considers to be important;
- technological relevance if it contributes to developing or improving tools and instruments in another field of research or in other sectors of society;
- economic relevance if it creates products that contribute to wealth creation.

Relevance, here, is very broadly defined, and everyone is expected to address this topic for his/her research. Neither applicants nor peer reviewers are expected to be able to fully predict the non-academic impact that the described research will have at the application stage.

The extent to which the applicants realistically assess whether or not the proposed research is relevant for the development (in the longer term) of future applications in science, technology, industry or society, will be reviewed together with the proposal.

**2) Implementation**

Examples include patent applications, spin-off companies, partnerships with public bodies and industry, collaboration with potential partners, participation in networks, workshops to provide training or information, dissemination lectures for the general public, etcetera. Applicants who feel that describing activities aimed at enhancing impact is not applicable to their research, must state their reasons for this.

# 8 Technical and Engineering Sciences

Valuable knowledge is generated from the groundbreaking technical sciences research funded by TTW. Besides funding excellent science, TTW wants to facilitate the application of knowledge. This also applies to projects within the Innovational Research Incentives Scheme. At TTW, knowledge utilisation means the sum of activities that have the aim of maximising the use of research results by third parties. Users of research are defined as the parties outside of the applicant's field of research who can apply the results in the medium to long term.

**Facilitating knowledge utilisation**
TTW expects applicants to actively cooperate in facilitating knowledge utilisation and to contribute to TTW's objective of transferring knowledge to users. To facilitate the utilisation, a users' committee is appointed for each project which will be involved from the start to the end of the project. At a committee meeting the researchers report on the research, and the users provide input for the research and insight into the questions they face as they seek to apply the knowledge as well as the problems they would like to see solved.

**Tips**
When writing your TTW proposal please bear the following points in mind:
1. Which societal or industrial problem with a strong scientific-technical component can be tackled? (Which clear deliverables do you foresee?)
2. How will you as the applicant contribute towards solving this?
3. State what is innovative and challenging in the scientific-technical research.
(Is the possibility created to realise new technologies or is it more a matter of applying existing technology in a new domain?
4. Which users could potentially apply the knowledge and have already expressed an interest?

**Examples**
TTW projects in which the knowledge generated will lead to important applications.

**Molecular materials and nanosystems (Veni 2010), Dr Jan Anton Kosher, Eindhoven University of Technology**
Plastic solar cells are a highly promising new type of solar cell. A clear picture of how they work is needed in order to develop them further. This research will investigate how the complex and chaotic internal structure of these solar cells influences their efficiency.

**Controlling dry and wet (Vidi 2010), Dr Jacco Snoeijer, University of Twente – Physics of Fluids**
Drops do not usually move in straight lines but in random streams. This study will investigate how such streams can be controlled in modern techniques for printing and the chip industry that require a perfect control between 'wet' and 'dry'.

**Wireless control (Vici 2010), Prof. W.P.M.H. (Maurice) Heemels, Eindhoven University of Technology - Mechanical Engineering**
Nowadays wireless communication has many applications in our homes, at work and when we are on the move. Yet wireless communication also offers unparalleled possibilities for the computer-based control of high-tech machines, industrial processes and robots. How such wireless control systems could become a reality will be investigated.