



Centre for Science and Technology Studies (CWTS)
Assessment 2016-2021
Leiden University

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1. Foreword by the committee chair

Since 2016, the Centre for Science and Technology Studies (CWTS) has successfully strengthened its position as a globally leading centre in science and technology studies (STS), with specialisation in research evaluation, research management and science policy. Drawing on a very strong legacy in scientometrics and quantitative methods, the centre has wisely chosen to strengthen its competencies in qualitative approaches. It is now one of the few research centres at international level with a high capacity to develop mixed approaches (quali/quant) in computational social sciences.

CWTS is outstanding in articulating excellent research and societal impact. This is achieved by a strong tradition of interdisciplinary and transdisciplinary research and by the development of three forms of engagement with stakeholders: (i) the production of tools for research positioning and multi-dimensional evaluation that are widely accessible to various users; (ii) the setting up of CWTS BV as an agile company that offers complementary services and training; (iii) the participation of CWTS members in influential committees, at national, European, and international level. In addition, CWTS is very active in the scientific debate on research evaluation through, e.g., landmark positioning papers such as the Leiden Manifesto, regular posts on its Blog, and weekly online seminars opened to the entire community. Until recently, the outstanding capacities of CWTS for research evaluation and research management were sparsely mobilised by Leiden University, a paradoxical but not exceptional situation (*nul n'est prophète en son pays!*). This is being changing as illustrated by the role of CWTS in the Leiden Open Science and Recognition and Rewards Initiatives.

As CWTS was created as a research-intensive centre, it still needs to strengthen its relation with teaching activities. This will have key implications for PhD training. Although CWTS has increased its number of PhD candidates and has appointed a PhD coordinator, it is still necessary to make efforts to increase the number of internal PhDs and offer them a mixed training and possibilities to participate in various activities, including BV ones and teaching. The creation of the new Bachelor programme Science for Sustainable Societies is a major opportunity to bridge the gap. The committee strongly recommends CWTS, but also the University Board, to take advantage of this opportunity to strengthen the interaction between research and training at different levels, and especially for setting up an ambitious PhD program.

At the time of the assessment the design of the new knowledge agenda of CWTS was still in progress. Our committee is very confident in the capacity of CWTS to develop an original, bold, relevant and shared agenda, thanks to the mix of strong leadership and participatory practices. The main challenge will be to both prioritise for concentrating on keys strengths and meanwhile allow for new experimentations.

The members of the committee learned a lot from this assessment. We hope very much this report will help CWTS strengthen its position and further develop its activities for the benefit of the research systems, at local and global level.

Pierre-Benoit Joly
Directeur de recherche INRAE
Chair of INRAE Center Occitanie-Toulouse

2. Procedure

2.1 Scope of the assessment

Leiden University asked an assessment committee of external peers to perform an assessment of the research conducted at the Centre for Science and Technology Studies (CWTS) over the period 2016-2021.

In accordance with the Strategy Evaluation Protocol 2021-2027 (SEP) for research assessments in the Netherlands, the committee was requested to carry out the assessment according to a number of guidelines. In line with the SEP, the assessment was to include a backward-looking and a forward-looking component. The committee was asked to judge the performance of the unit on the main assessment criteria specified in the SEP and to offer its written conclusions as well as recommendations based on considerations and arguments. The main assessment criteria are:

- Research Quality;
- Societal Relevance;
- Viability of the Unit.

During the assessment of these criteria, the committee was asked to incorporate four specific aspects relating to how the unit organises and actually performs its research, its composition in terms of leadership and personnel, and how the unit is run on a daily basis. These aspects are:

- Open Science;
- PhD Policy and Training;
- Academic Culture;
- Human Resources Policy.

For more information on the criteria and categories of the Strategy Evaluation Protocol 2021-2027, see Appendix 1.

2.2 Composition of the committee

The composition of the committee was as follows:

- Pierre-Benoît Joly (chair), Director of Research at the National Institute of Research for Agriculture, Food and the Environment (INRAE) and Chair of the INRAE Center Occitanie-Toulouse, France
- Anssi Mälkki, Director of Research Management Development, Research Services, University of Helsinki
- Arianna Becerril Garcia, Professor at the Autonomous University of the State of Mexico, Executive Director of Redalyc
- Steven Hill, Director of Research at Research England, UK Research and Innovation
- Liz Allen, director of Strategic Initiatives at F1000, Taylor & Francis Group & Visiting Senior Research Fellow, Policy Institute, King's College London.
- Ivan Veul, PhD candidate at Radboud University (PhD student member)

The committee was supported by Peter Hilderling MSc, who acted as project manager and secretary on behalf of Academion.

2.3 Independence

All members of the committee signed a statement of independence to guarantee an unbiased and independent assessment of the quality of the research performed by CWTS. The committee concluded that no specific risk in terms of bias or undue influence existed and that all members were sufficiently independent.

2.4 Data provided to the committee

The committee received the self-evaluation report from CWTS, including all the information required by the SEP.

The committee also received the following documents:

- The Terms of Reference;
- The SEP 2021-2027.

2.5 Procedures followed by the committee

The committee proceeded according to the SEP 2021-2027. Prior to the first meeting, all committee members independently formulated a preliminary assessment of CWTS based on the written information that was provided before the site visit.

In its first meeting, on 23 May 2022, the committee was briefed by Academion about research assessments according to the SEP 2021-2027. It discussed the preliminary assessments and identified questions to be raised during the site visit. It agreed upon procedural matters and aspects of the assessment. The site visit took place on 23-25 May 2022 (see the schedule in Appendix 2). After the interviews the committee discussed its findings and comments in order to allow the chair to present the preliminary findings and to provide the secretary with argumentation to draft a first version of the assessment report. The final assessment is based on both the documentation provided by CWTS and the information gathered during the interviews with management and representatives of CWTS during the site visit.

The draft report by the committee and secretary was presented to CWTS for factual corrections and comments. In close consultation with the chair and other committee members, the comments received were reviewed to draft the final report. The final report was presented to the Board of Leiden University and to the management of the research unit.

3. Assessment of CWTS 2016-2021

3.1 About CWTS

The Centre for Science and Technology Studies (CWTS) is an interdisciplinary institute of the Faculty of Social and Behavioural Sciences of Leiden University. The research staff of CWTS comes from a broad and diverse spectrum of academic fields, ranging from the social sciences and humanities to the natural and life sciences. CWTS studies the conditions and consequences of research evaluation in order to contribute to the debates about the role of science in society. CWTS has successfully strengthened its position as a globally leading centre in science and technology studies (STS), with specialisation on research evaluation, research management and science policy. Drawing on a very strong legacy in scientometrics and quantitative methods, the centre has wisely chosen to strengthen its competencies in qualitative approaches. It is now one of the few research centres at international level with a high capacity to develop mixed approaches (qualitative/quantitative) in computational social sciences. The institute works closely together with the in-house company under the same name (CWTS BV), which utilizes the research of CWTS in products and services to support research evaluations.

Research at CWTS is largely organized into three research groups: *Quantitative Science Studies* (QSS), which studies the research system from a quantitative perspective, *Science and Evaluation Studies* (SES), which analyses the politics and practices of research evaluation in connection with research governance, and *Science, Technology and Innovation Studies* (STIS), which performs analyses of links between science and technology. In addition to these research groups, CWTS has defined five thematically flexible hubs to foster internal and external collaborations on specific research topics. These currently are Academic Careers, Engagement and Responsibility, Open Science, Responsible Evaluation and Science in the Anthropocene.

Following the retirement of the previous director of CWTS in 2019, the institute is governed by a board of directors, consisting of the scientific director, a deputy director in charge of research, and a deputy director in charge of externally funded projects. The board of directors, together with the board's secretary, is part of a larger management team, also consisting of the head of ICT and the financial administrator. The institute has a total size of 27.7 fte, including research and support staff in temporary and permanent positions. It is funded through a basic funding of 1.85 M€ annually, provided by Leiden University and the Ministry of Education, Culture and Science. Additional funding is obtained through the revenues of CWTS BV and competitive research funding.

3.2 Mission, vision and strategy

Mission, vision and strategy

CWTS aims to be a globally leading centre in science and technology studies, with an emphasis on research evaluation, research management and science policy. By combining research excellence and societal impact CWTS aims to make high-quality contributions to science as well as important contributions to society. The institute uses and combines a diversity of theoretical and methodological approaches, ranging from statistical analysis, text mining and visualizations to ethnographic approaches and qualitative case studies. CWTS produces tools (such as VOSviewer, a platform for visualising relations between entities in the research system) that are widely used by the communities at international level.

In the past years, CWTS has increasingly reflected on the changing role of research evaluation in the academic landscape. Developments in the Netherlands and abroad increasingly question the metricisation of research evaluation, leading to various movements that strive for a more diverse and qualitative recognition and reward of research. CWTS believes that the practice of research evaluation should be reoriented and broadened to acknowledge this development. It aims to take an interventionist role in strengthening the science system in order to pursue responsible research evaluation and science policy.

The work done by CWTS over the past six years to strengthen the science system can be broadly organised into four clusters of strategic activities:

- Research governance and evaluation;
- Science and Society;
- Open Science;
- Methods and tools.

Furthermore, CWTS aims to ‘practice what we preach’, and embrace the principles of responsible research evaluation, reward & recognition and open science in its own internal policies. CWTS is currently working on an overarching knowledge agenda for 2023-2028, that will describe the key challenges that CWTS will address in the coming years, as well as the strategy and organizational structure to do this.

3.3 Research Quality

General assessment

In order to assess the quality of the research conducted at CWTS, the committee considered the activities, research output and research strategy of CWTS over the past years. CWTS presented evidence in the form of case studies, scientific publications, collaborations, citations and other uses of output by peers. In most cases, these indicators were shown in dashboards and tools developed in-house.

The committee was very impressed by the research quality of CWTS. The institute has a strong and internationally very well recognized profile regarding method and tools for research evaluation. Its results are widely used, as demonstrated in a dashboard constructed by CWTS that shows citations as well as collaborations. The CWTS Leiden Ranking, a university ranking based on bibliometric analysis, is used in evaluations worldwide. Its reputation leads to many collaborations on an institute level, as well as commissioned projects worldwide, including the UK, Norway, Brazil and China. The recognition of CWTS is further demonstrated in competitive grants, prizes and memberships gained by its researchers. Impressive examples are an ERC Starting Grant, multiple Horizon 2020-projects on Responsible Research and Innovation, two times highly cited researcher in Social Sciences, the EAAST Ziman Award for the Leiden Manifesto and the Derek de Solla Price Medal.

Responsible research evaluation

Considering its high reputation in quantitative research evaluation, the committee applauds CWTS for its bold step to broaden its focus from the scientometrics with which it earned its reputation, towards a mixed methods approach that combines quantitative and qualitative methods for responsible research evaluation. Rather than staying in its comfort zone, CWTS envisions a role of initiator in strengthening the science system through responsible research evaluation. According to the committee, the first results already look very promising. The Leiden Manifesto for research metrics, in which CWTS researchers played a key role in 2015, is a leading publication in the debate on moving away from ‘impact-factor obsession’ and was important in establishing CWTS as an initiator of change. With new methods and tools for responsible research evaluation, CWTS is increasingly positioning itself as leading experts in mixed methods research

evaluation. The VOSviewer is a good example of this: a tool that visualizes bibliometric networks, showing the network of institutes, groups or individual researchers based on citations, co-authorship and text mining for co-occurrence of relevant terms. The committee fully endorses this development and is looking forward to seeing more of this in the coming years.

In order to consolidate its globally leading role in responsible research evaluation, which CWTS can rightly claim according to the committee, the institute should keep working on showcasing its expertise. Internationally, the reputation of CWTS is still very much associated with its work on scientometrics. The frequent publishing of the CWTS Blog as well as the open Friday research seminars that CWTS organizes are good initiatives to highlight the broader approach of CWTS. The committee encourages CWTS to keep up these outreach activities to underline its current research focus.

3.4 Societal Relevance

General assessment

To assess the societal relevance of CWTS's research activities, the committee considered the interactions that CWTS has with society and the associated strategy, the involvement of CWTS in open science, and various output for societal target groups, such as blogs, commissioned projects, courses and the use thereof.

The committee concludes CWTS has highly invested in the societal relevance of its research. CWTS researchers are often invited for influential policy discussions on the research system, such as the European Expert Group on Indicators for Researchers' Engagement with Open Science, the Open Science Advisory Committee of UNESCO and the Dutch Taskforce on Responsible Management of Research Information and Data. The institute takes care to make its work policy-relevant and -sensitive, working in partnerships with research funders and policy makers. Furthermore, the institute is in the process of setting up a UNESCO Chair: a UNESCO-supported research position related to one of UNESCO's priority areas. This Chair will focus on diversity and inclusion in global science. CWTS has a strong network of international partners in Low- and Middle-income Countries and emerging economies, such as in Mexico and Brazil, and through the Participatory Research in Asia (PRIA) network. Another special chair has been established with the Rathenau Institute, the Netherlands national institute for technology assessment. These special chairs strongly connect CWTS's research with relevant stakeholders, which the committee considers a strong asset of CWTS.

Overall, CWTS has an impressive network of stakeholders related to research evaluation. Many collaborations are established through the services for research evaluation it provides through CWTS BV. This allows CWTS to bring its expertise into practice, and use input collected through commissioned projects to further develop its ideas, methods and tools. The committee considers that interactions between CWTS and its in-house company are very fruitful and that they accelerate translation between research and practice. CWTS is also successful in working with commercial partners, such as the major publishers, which are influential parties in the research evaluation system. The committee considers these collaborations to be very important when striving for responsible research evaluations.

CWTS is also very active in direct communication with societal stakeholders. The institute has a very influential blog with frequent contributions by CWTS researchers on current debates in research evaluations and new findings from CWTS research, as well as a newsletter with over 200 subscribers. The methods and tools that CWTS develops are publicly available, with opportunities for extra courses and training through CWTS BV. The committee is impressed by these activities and the efforts CWTS makes to create societal impact.

The committee wants to point out another indirect way through which CWTS contributes to society, namely through its education of researchers. Alumni of CWTS are important ambassadors of the institute, as well as of the principles of responsible research evaluation that CWTS stands for. The committee advises CWTS to invest in its network of alumni in order to keep in touch, and also to view the education of talent, most prominently PhD candidates, in the light of creating societal impact (see Chapter 3.5 for further discussion).

Global impact

Whereas most of the societal impact of CWTS is on the national and European level, the institute increasingly aims for global societal impact of its research, in particular in advocating for open science and responsible assessment beyond Europe. The committee fully supports this ambition and encourages CWTS to further pursue this. According to the committee, global collaborations go beyond spreading the word of responsible research evaluation and can contribute to a more equitable and fair view of the global science system. Many scientific results generated in for instance the Low- and Middle-income Countries and emerging economies remain invisible in the current indicators, as they are often expressed in local languages and circulate in a wide variety of channels and sources. Getting a better view of this in global collaborations with countries in the Global South could increase inclusivity and diversity of data sources, and improve representation of many countries and research fields that are currently invisible to quantitative studies, and therefore also to global decision makers and policy makers. CWTS could become a strong advocate for this, based on mutual learning with partners in the Global South and willingness to understand the local context.

The committee realizes that there are many opportunities for such collaborations, and that the capacity for CWTS to pursue these is limited. The committee recommends considering potential impact when deciding which regions and countries to focus on, and formulating what it aims to achieve through these collaborations. Furthermore, the institute could finetune its strategy by following up on projects to assess the actual impact the collaborations made. This also applies to current and previous international collaborations: it could be very instructive to learn about the intended and unintended effects of an intervention in another research system.

Open science

CWTS is highly active in promoting open science, including open access publishing, open research data, and open source software. The institute is active in various expertise groups on the topic (see above) and works directly with partners such as the Dutch Research Council, Quality Open Access Market (QOAM) and in the Research Data Alliance, founded by the governments of EU, USA and Australia. CWTS participates in various initiatives to provide open bibliographical data through platforms such as ORCID and Crossref. CWTS is strongly involved in the Open Science and the Recognition and Reward initiatives recently launched by Leiden University as part of its Academia in Motion programme. CWTS will house staff hired through the Open Science program and Sarah de Rijcke will be one of two champions of Academia in Motion as member of a newly installed Steering Group, starting in September 2022. These initiatives are expected to accelerate interest throughout the university for topics such as FAIR (Findable, Accessible, Interoperable Reusable) data management, open access and citizen science. The committee is impressed by the work of CWTS on open science, and considers the institute to be one of the frontrunners worldwide, setting the agenda as well as co-producing open science initiatives. The Leiden Open Science initiative will probably bring more opportunities to get involved in shaping policies on a university level and beyond.

In line with its 'practicing what we preach' principle, CWTS aims for an ambitious open science policy for its own research activities. Next to participating in the abovementioned open infrastructure and making its tools publicly available, CWTS aims for 100% open access publishing, either through publishing in open access venues or by posting its work in repositories. Data management guidelines have been developed,

which require all new projects to have a data management plan and archive project data for at least 10 years. The committee is very impressed by the ambitions of CWTS to be exemplary regarding its open science policies. The ambition of 100% open access of output as well as tools is very strong, and the data management and storage procedures are solid. If CWTS wants to pursue an even higher ambition, the committee thinks the institute could work towards full open access publishing (including sharing preprints when relevant), or even diamond open access, with no fees for authors as well as readers. That being said, CWTS is already very fair in reflecting upon and practicing open science.

Citizen science

In recent years, CWTS has primarily invested in its network of major stakeholders, including policy makers, research funders and publishers. According to the committee, another group of stakeholders to consider is civic society, namely societal organizations, local governments and (groups of) citizens. The Leiden University initiative on open science and citizen science in which CWTS is involved might offer good opportunities to connect to this broad group of stakeholders. Involving this group in debates on what is expected from good research evaluation could help shape the knowledge agenda of CWTS on this aspect. The committee recommends developing new types of interactions with actors of civic society. This could for instance take the shape of pilot projects, which can be expanded if successful.

3.5 Viability

Future mission and strategy

As described in Chapter 3.2, CWTS is working on developing a new knowledge agenda that fits its new, broader focus regarding research evaluation. This knowledge agenda will prioritize research directions and is developed to enhance participation. All staff members of CWTS can participate in discussions to develop future priorities. Furthermore, open brainstorming sessions will be organized with (potential) academic partners and other stakeholders to consult them on the future directions of CWTS. The resulting knowledge agenda should be completed in 2023, and will consist of the ambition of CWTS aligned with the key challenges faced by the science system at the national, European and global level.

The committee is very positive on the plans of CWTS to formulate a knowledge agenda. It praises the participatory, non-hierarchical approach in developing the agenda. Also involving the younger generation of researchers promotes a more diverse input. In formulating the agenda, the committee advises CWTS to start this process by carefully describing the big picture (who are we and what do we want to do) and write down the identity and values of CWTS. The resulting 'brand' of CWTS should be the starting point of the knowledge agenda.

The committee agrees that setting priorities is an important goal of this knowledge agenda, and advises to accompany these priorities with formulating realistic goals. There are so many initiatives and so many areas in which CWTS could make a difference that scattering of efforts is a risk. Prioritization could help mitigate this, and promote maximized impact (see also the discussion on global impact in Chapter 3.4). Of course, some of the prioritization will follow the network and funding opportunities. However, there is always a delay between funding applications and activities, which will result in chasing moving targets if a too opportunistic approach is adopted. An approach that the committee thinks will fit CWTS is a step-by-step, experimental approach. This could consist of small projects and activities in a strategically interesting area, with the option of expansion and pursuit of more substantial funding when it turns out to be fruitful.

Apart from its strategic role in setting up the knowledge agenda, the literal branding of CWTS, as reflected in its tagline ‘meaningful metrics’ and the logo that depicts a pie chart, will probably also need to be adapted to reflect the new, broader approach of CWTS.

General outlook

The committee considers CWTS to be generally well-equipped for the future. The institute has strong leadership and a clear vision on the future. The basic funding provides CWTS with a stable basis for its activities, with additional sources of income through CWTS BV and competitive research grants. CWTS has a diverse, talented and motivated staff, with research methodological expertise spanning the qualitative and quantitative spectrum, that stood out to the committee for their focus on team effort and collaboration. The institute convincingly focuses on team achievements rather than individual results, which is a very fruitful basis for joint projects. In previous years, CWTS has shown to be able to attract and retain talented researchers, which the committee considers proof for the attractiveness of the research environment as well as the reputation of CWTS.

The governance structure that increasingly favors thematic collaborations rather than disciplinary research groups fits the mission and strategy of CWTS. The committee thinks that this will assist the institute in formulating and executing its knowledge agenda. It understood that the further development of the governance structure of CWTS will also be part of the discussion on the knowledge agenda. The committee advises CWTS not to spend too much time on this. CWTS is not a very large institute, and the committee was impressed by the flat non-hierarchical structure and short lines of communication. The committee considers the governance of CWTS to be very good already, and thinks that further improvement should not be a major priority at the moment.

During the site visit, the committee spoke with several CWTS representatives about the potential threat of commercial providers placing restrictions on data sources relevant to CWTS’s tools. The committee acknowledges that this is scenario is not unlikely, as commercial partners will need new sources of income now that open access increasingly becomes the norm. It recommends a proactive switch to open resources for tools and services as much as possible to reduce dependence on proprietary databases. This will probably require substantial support, for instance in ICT and data stewardship. The allocation of appropriate human resources will be important to realize this. The committee encourages CWTS as well as Leiden University to discuss this allocation.

Another threat indicated by CWTS is that open infrastructures themselves might reduce the need for CWTS’s specialist services offered through the BV. The committee acknowledges this to some extent, but also considers it an opportunity to work with the providers of these open infrastructures on new tools and services. As long as CWTS remains on the forefront of these developments, the committee expects that the institute will be able to remain a major player in the field of open science.

The committee expects that the near future will bring CWTS new opportunities for funding and projects. Responsible research evaluation as well as open science is high on the agenda within the university, as well as in the national, European and global research system. There will probably be opportunities to participate in EU projects on these topics, as well as locally in the Academia in Motion programme at Leiden University. The committee learnt from the interviews that CWTS is well aware of these opportunities.

Internal culture and talent management

CWTS considers an attractive and healthy research environment to be one with an appreciative and inclusive working culture, that promotes well-being and provides a safe space for its staff members. It invests in this

for instance through fair and transparent career paths, a leadership style that empowers staff members, and a diverse staff in terms of gender, age and nationalities. During the site visit, the committee experienced a very open culture at CWTS, where staff members feel safe to reflect and be vulnerable in order to learn from their experiences and the feedback of others. The committee praises the institute for this. It also noted that there are appropriate procedures for research integrity in place, including a Code of Conduct and an ethics review committee that reviews research proposals.

Regarding diversity, the committee approves of the diverse composition of staff in terms of gender, nationality and age. To ensure that CWTS remains sufficiently diverse, for instance in the case of staff mobility, the committee recommends formulating explicit aims regarding diversity. This includes reflecting on what diversity means to CWTS, and how this can be structurally embedded in the composition of the research staff as well as the internal culture. This might also help to further exploit the current diversity in the institute.

During the site visit, the committee spoke with several representatives of CWTS on talent management in the organization. As a relatively small institute in a highly specialized field, the training of the next generation of researchers is crucial for the viability of the institute. The committee noted with approval that the focus on team science allows the institute not to become too dependent on individual researchers, and that continuity can often be provided by internal promotions in the case of changes in research staff composition or leadership.

Due to the absence of associated BSc and MSc programmes at Leiden University, CWTS does not have a natural flow of new talent to the institute, and mostly relies on recruiting for new research talent. The committee understood that CWTS is planning to become involved in a new bachelor's programme Science for Sustainable Societies at Leiden University, where it will offer a number of courses. This will provide some opportunities to attract undergraduate students to the institute and its research field. The committee applauds this, and thinks that is important for CWTS to keep working on finding ways to connect to the BSc and MSc programmes at Leiden University. This will make it easier to train a new generation of researchers in the field starting at the junior level, as well as increase its visibility within Leiden University. Furthermore, this will provide PhD candidates at CWTS possibilities to obtain teaching experience, which is important for a possible further career in academia (see below).

PhD training

Based on the recommendations of the previous assessment committee, the institute has worked on increasing the number of PhD candidate within CWTS. Next to the abovementioned absence of a natural flow of PhD candidates to the institute, the nature of CWTS's funding makes it harder to fund PhD candidates. Budget is mainly provided through basic funding and commissioned projects rather than large competitive research funds, from which PhD candidates are often funded. Since 2017, 23 PhD candidates started at CWTS, which is an increase from the approximately 2 PhD candidates per year before that time. 18 PhD candidates are either self-funded (often part-time) or bursary PhD candidates, five are funded PhD candidates. CWTS has had 3 PhD graduations between 2015 and 2021. This low number in relation to the total number of PhD candidates can be explained by the large number of part-time PhD candidates that do not work on a fixed timeline, and the fact that all current internal candidates started in 2017 or later.

The committee commends CWTS for investing in PhD candidates. Nevertheless, the majority of the growth originates from external, often part-time PhD candidates with limited presence at the institute. For training a new generation of researchers, it is also important to keep investing in PhD candidates as junior staff members. The committee advises CWTS to keep investing in its PhD candidate body, for instance by

formulating a funding strategy for PhD positions. Ideas to investigate could be stepping up the acquisition of external grants that include PhD positions, or finance PhD candidate positions partly through CWTS BV. The added benefit of the latter is that PhD candidates could also dedicate some of their training to BV activities, which could be valuable to PhD candidates that aim for a career outside academia after graduation.

During the site visit, the committee learnt that the supervision of PhD candidates, as well as the embedding of PhD candidates within the institute, form points of attention at CWTS. Due to the relatively small number of PhD candidates and the lack of a defined cohort of candidates all enrolled at the same time, there was some indication that PhD candidates felt isolated in the institute. Furthermore, individual supervisors used to largely create their own supervision structure, which leading to inconsistencies in supervisory practices between PhD candidates.

CWTS has started to invest in a more formalized approach for supervision through the appointment of a PhD coordinator that monitors progression and well-being of PhD candidates, regular meetings between PhD candidates, as well as the introduction of supervision plans and training courses for supervisors. PhD candidates that recently started at CWTS recognized and appreciated this more structured approach. The committee applauds this, and encourages CWTS to keep working on structurally embedding PhD support in the organization and in working to develop a more defined support system. According to the committee, a regular meeting and supervision structure for PhD candidates and more clarity about the role and structure of PhD training will help PhD candidates feel fully embedded in the institute.

Another issue that CWTS is working to address is the opportunity for PhD candidates to gain teaching experience. As the institute is currently not involved in BSc and MSc level education, most PhD candidates are not involved in teaching, and are therefore not in a position to obtain a teaching qualification during their PhD. Both CWTS and the PhD candidates themselves feel that this is a disadvantage in their further academic career after PhD graduation. For this reason, CWTS embraces the opportunity to contribute to the new BSc Science for Sustainable Societies (see above), and is planning to give its PhD candidates an opportunity to participate. The committee agrees that more teaching opportunities for PhD candidates, and the option to pursue a teaching qualification, would be very welcome. It advises CWTS as well as Leiden University to work towards a solution. There might be programmes in Leiden that would welcome extra teaching capacity and be interested in collaborating with CWTS on this.

Considering their role as junior researchers and future ambassadors of CWTS, the committee thinks that all PhD candidates should be made familiar with the mixed methods approach for research evaluation, also if they are primarily engaged in quantitative research activities. Conversely, PhD candidates engaged in quantitative research should benefit from a training in quantitative methods. This will foster the integration between qualitative and quantitative methods, so that PhD candidates can be part of the change in the research system that CWTS pursues.

4. Executive summary

Conclusion

CWTS is a high-quality, reputable and internationally well-recognized institute on research evaluation and the role of science in society. Its historically strong position on scientometrics is increasingly complemented with a mixed methods approach: CWTS positions itself convincingly as a leader and advocate for responsible research evaluation and open science. Research and societal impact are closely interwoven at CWTS: the institute works with policy makers, funding agencies, companies and other relevant actors on a national and international level on innovating research evaluation. The in-house company CWTS BV is a key asset in directly putting research results into practice. CWTS is a vibrant research community with good leadership, with a strong focus on team effort and collaboration, and a strong ‘practice what we preach’ approach regarding responsible and open science. The institute is well-equipped for the future regarding staff, funding and strategy. The new knowledge agenda will help shape challenges and priorities for the coming years, which the committee expects to be dynamic and fruitful for CWTS.

Main recommendations

1. Formulate the ‘brand’ (identity and values) of CWTS as a starting point for the knowledge agenda, and focus on prioritization in order to maximize impact and prevent scattering of efforts. This strategy can be finetuned by starting with smaller projects, and assessing their actual impact before deciding to make larger efforts in a particular area.
2. Proactively work towards using open data sources for CWTS’s tools to reduce dependency on proprietary databases that might impose restrictions in the future. This includes additional investments in for instance ICT and data stewardship.
3. Further invest in PhD candidates: formulate a funding strategy for creating additional PhD positions, and further develop and implement plans for supervising PhD candidates and embedding them within the institute. The BV might provide extra training opportunities for PhD candidates interested in a non-academic career.
4. Invest in collaborations with Low- and Middle-Income Countries in order to increase inclusivity and diversity of data sources, and improve representation of many countries and research fields that are currently invisible to quantitative studies, and therefore also to global decision makers and policy makers.
5. Increase interactions with actors of civic society (citizen science). This could for instance take the shape of pilot projects, which can be expanded if successful.
6. Make all PhD candidates familiar with the mixed methods approach of CWTS, and invest in a network of alumni. They are important ambassadors of CWTS’s mission and vision regarding responsible research evaluation and open science.

7. Keep working on finding ways to connect to the BSc and MSc programmes at Leiden University in order to be able to train a new generation of researchers in the field starting at the junior level, and to provide PhD candidates with the opportunity to obtain teaching experience.

Appendix 1: The SEP 2021-2027 Criteria and Categories

The committee was requested to assess the quality of research conducted by the UHS as well as to offer recommendations in order to improve the quality of research and the strategy of the UHS. The committee was requested to carry out the assessment according to the guidelines specified in the Strategy Evaluation Protocol. The evaluation included a backward-looking and a forward-looking component. Specifically, the committee was asked to judge the performance of the unit on the main assessment criteria and offer its written conclusions as well as recommendations based on considerations and arguments. The main assessment criteria are:

- 1) **Research Quality:** the quality of the unit's research over the past six-year period is assessed in its international, national or – where appropriate – regional context. The assessment committee does so by assessing a research unit in light of its own aims and strategy. Central in this assessment are the contributions to the body of scientific knowledge. The assessment committee reflects on the quality and scientific relevance of the research. Moreover, the academic reputation and leadership within the field is assessed. The committee's assessment is grounded in a narrative argument and supported by evidence of the scientific achievements of the unit in the context of the national or international research field, as appropriate to the specific claims made in the narrative.
- 2) **Societal Relevance:** the societal relevance of the unit's research in terms of impact, public engagement and uptake of the unit's research is assessed in economic, social, cultural, educational or any other terms that may be relevant. Societal impact may often take longer to become apparent. Societal impact that became evident in the past six years may therefore well be due to research done by the unit long before. The assessment committee reflects on societal relevance by assessing a research unit's accomplishments in light of its own aims and strategy. The assessment committee also reflects, where applicable, on the teaching-research nexus. The assessment is grounded in a narrative argument that describes the key research findings and their implications, while it also includes evidence for the societal relevance in terms of impact and engagement of the research unit.
- 3) **Viability of the Unit:** the extent to which the research unit's goals for the coming six-year period remain scientifically and societally relevant is assessed. It is also assessed whether its aims and strategy as well as the foresight of its leadership and its overall management are optimal to attain these goals. Finally, it is assessed whether the plans and resources are adequate to implement this strategy. The assessment committee also reflects on the viability of the research unit in relation to the expected developments in the field and societal developments as well as on the wider institutional context of the research unit

During the evaluation of these criteria, the assessment committee was asked to incorporate four specific aspects. These aspects were included, as they are becoming increasingly important in the current scientific context and help to shape the past as well as future quality of the research unit. These four aspects relate to how the unit organises and actually performs its research, how it is composed in terms of leadership and personnel, and how the unit is being run on a daily basis. These aspects are as follows:

- 4) **Open Science:** availability of research output, reuse of data, involvement of societal stakeholders;
- 5) **PhD Policy and Training:** supervision and instruction of PhD candidates;
- 6) **Academic Culture:** openness, (social) safety and inclusivity; and research integrity;
- 7) **Human Resources Policy:** diversity and talent management.

Appendix 2: Programme of the site visit

Monday 23 May 2022

- 14:00 - 15:00 Meet & Greet
- 15:00 - 15:30 Welcoming speech by scientific director CWTS
- 15:30 - 18:30 Committee deliberation – Instructions by Academion

Tuesday 24 May 2022

- 09.00 - 09.45 Interview Management Team
- 10.00 - 10.45 Interview Science & Society
- 11.00 - 11.45 Interview Research Governance and Evaluation
- 11.45 - 13.00 Lunch
- 13.00 - 13.45 Interview Methods & Tools
- 14.00 - 14.45 Interview Open Science
- 15.00 - 15.45 Interview Practising what we preach
- 16.00 - 16.45 Interview PhD candidates
- 17.00 - 17.30 Further discussion of CWTS tools and dashboards

Wednesday 25 May 2022

- 08.30 – 09.00 Committee deliberation
- 09.00 - 09.45 Reflection session Management Team
- 10.00 - 12.00 Committee deliberation – Composing conclusions
- 12.00 - 12.30 Plenary feedback session

Appendix 3: Quantitative data

Quantitative data on the research unit's composition and funding, as described in SEP Appendix E, Tables E2, E3 and E4:

Research staff

| | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|-----------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Full Professors | 2.5 | 2.6 | 2 | 3.3 | 3 | 2.6 |
| Researchers | 12.5 | 13 | 18.3 | 19.3 | 19.8 | 21.1 |
| PhD Candidates | 3 | 2.4 | 2.3 | 2.2 | 2.5 | 4 |
| Staff | 7.2 | 5.8 | 7.7 | 7.8 | 6.2 | 7.9 |
| Total | 25.2 | 23.8 | 30.3 | 32.6 | 31.5 | 35.6 |

Funding

| | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|------------------------------------|---------|---------|---------|---------|---------|---------|--------|
| Total funding | €3,065 | €3,423 | €3,756 | €4,069 | €3,795 | €4,106 | €2,501 |
| Direct funding | €1,687 | €1,733 | €1,756 | €1,815 | €1,854 | €1,891 | €1,181 |
| External funding | €1,378 | €1,690 | €2,000 | €2,254 | €1,941 | €2,215 | €1,320 |
| Total costs | -€3,215 | -€3,433 | -€3,800 | -€4,339 | -€3,889 | -€4,201 | €2762 |
| Personnel costs | €2,261 | €2,344 | €2,614 | €2,851 | €2,665 | €3,089 | €2187 |
| Material costs | €954 | €1,089 | €1,186 | €1,488 | €1,224 | €1,112 | €575 |
| RESULTS | -€150 | -€10 | -€44 | -€270 | -€94 | -€95 | -€261 |
| EU-part external funding | €205 | €475 | €455 | €658 | €556 | €663 | €387 |
| BV-coverage personnel costs | €231 | €290 | €410 | €357 | €304 | €403 | |

PhD candidates

| Starting Year | Male | Female | Total (M + F) | Graduated (in years) | | | Not yet finished | Discont. |
|------------------|-----------|-----------|---------------|----------------------|----------|-----------|------------------|----------|
| | | | | Up to 4 | 5 | 6 or more | | |
| 2012-2014 | 5 | 2 | 7 | | | 1 | 3 | 3 |
| 2015 | 0 | 1 | 1 | | 1 | | | |
| 2016 | 1 | 1 | 2 | | | | 2 | |
| 2017 | 6 | 1 | 7 | | 1 | | 5 | 1 |
| 2018 | 2 | 2 | 4 | | | | 3 | 1 |
| 2019 | 4 | 2 | 6 | | | | 6 | |
| 2020 | 1 | 3 | 4 | | | | 4 | |
| 2021 | 3 | 3 | 6 | | | | 5 | 1 |
| Total | 22 | 15 | 37 | | 2 | 1 | 28 | 6 |