EXECUTIVE SUMMARY AND MAIN RECOMMENDATIONS

The committee found that on the whole WIMEK has managed to create a brilliant mind-hub for junior researchers, with on the whole impressive research quality and societal impact. Overall, the committee encountered a good, safe, and interacting atmosphere within the clusters. It considers it quintessential to preserve this atmosphere in the coming years. An issue that all clusters seem to grapple with to some extent is the ambition and necessity to stimulate collaboration across disciplines. Also, for all clusters a long duration of PhD trajectories is on the agenda, although it was not always identified as a major problem by PhD candidates themselves. Societal impact becomes more and more important for funding agencies, for the assessment of research organizations and for individual careers. However, the committee found that societal impact seems not yet to be sufficiently recognized in tenure track criteria. For all clusters, this seems to get in the way of truly boosting societal impact.

The committee found that the **Climate, Water & Society** (CWS) is a diverse cluster with a broad scientific focus, very topical expertise and excellent research. However, the committee found that the cluster's vision on where it wants to go is not yet fully articulated. It struck the committee that many of the CWS cluster's most influential publications are about transdisciplinary topics. It is therefore appropriate that the cluster strives to increase collaboration between groups, and the committee fully endorses this ambition. The biggest challenge for the CWS cluster is to set priorities. The committee observed that the CWS cluster makes excellent contributions to society at different levels, from the municipal to the international scale. If the cluster succeeds in its ambition to create more inter- and transdisciplinarity, this will allow it to have more direct relevance for a variety of stakeholders, and thus increase its impact even further. It would also help to incorporate more social sciences expertise. Currently, the societal dimension is prominent in the CWS cluster's mission, but weaker in the actual research activities and not entirely integrated. PhDs candidates within the CWS cluster experience a lot of room for creative input into their own trajectory. However, the flipside of the freedom they have is that they find it sometimes difficult to plan and finish their theses in time. The CWS cluster correctly identifies a lack of diversity in the tenured staff as one of its weaknesses. Overall, the committee was impressed by the high quality of research and impact within the cluster.

The **Soil Sciences cluster** is one of the top research and student education centres of excellence globally in soil science. The committee finds that the cluster has a clear and fitting mission. As with the CWS cluster, the intended future destination is less clear. By leading a number of large international projects over the past six years, the Soil cluster has demonstrated its ability to act as initiator of multidisciplinary and transdisciplinary projects with scientists, governmental institutions, land user associations, farmers, NGO's and other relevant stakeholders. These and other projects have resulted in many highly-quality publications that are often used by researchers within the field. The globally leading position of the Soil cluster and its strong relationships with the Dutch government, the EU and UN bodies places it in a uniquely strong position. It could and should, in the committee's view, deploy leadership activities that could build on this position. The committee got a very favorable impression of PhD supervision in the Soil cluster. It sensed a true feeling of excitement about the future. This will be a powerful motor.

In the cluster **Environmental Technology and Microbiology** (ETM), the themes of the three chair groups are very well aligned with global trends in circular economy and sustainability. The committee appreciates that the cluster is trying to open up new fields, and even to change established paradigms. The committee fully agrees with the 'science for impact' and 'from principles to technology' strategy and thinks that such a strategy can be very fruitful. ETM's field of research is a strategic priority in The Netherlands and across Europe, North America and East Asia. ETM's infrastructure will therefore likely be in substantial demand. According to the committee, expanding the use of its excellent infrastructures can have multiple benefits. However, the cluster will need to shape its proposition to the requirements of industry, and market its capabilities. The committee found that the ETM cluster has done well in the past six years in terms of research quality, but noted that both productivity and the use of research products by peers seems to have declined in the past years. This phenomenon need not be directly related to research quality, but there is cause for vigilance. Thanks to the excellent relations of ETM at different levels of private and public

society, stakeholders are strongly involved in the design and execution of ETM research. This is worth a compliment. Over the years, the ETM cluster has achieved world-class results in transferring technology, but the committee thinks ETM has the potential to realise even more impact. On some points, the PhD supervision at ETM could be improved, in the committee's view. It found that the frequency of supervision per PhD student varies widely, depending on the supervisor.

The committee finds that the cluster **Landscape Architecture and Spatial Planning** (LSP) has a well-articulated and unique mission. The cluster's transdisciplinary approach is well-timed and essential in order to deal with the urgent challenges to land use and landscape architecture. Development of innovative concepts and methods concerning landscapes is currently in high demand, both from the scientific and the policy communities. It is often advocated but hardly ever accomplished. The research quality of the LSP cluster has improved significantly in the past couple of years, and it has grown significantly both in number of staff and in number of publications. The LSP cluster puts a strong emphasis on transdisciplinary projects, with broad participation of citizens, local authorities, politicians, NGOs, farmers and other local commercial parties; it embraces the cooperation of academia, government, companies and civil society. The committee finds these practices exemplary. The remarkable success in recent years suggests an open and collaborative environment. The LSP cluster is a diverse community in terms of gender as well as age, nationality and scientific background. This diversity is essential for fulfilling its complex tasks. The cluster is therefore in an excellent position to do innovative and internationally highly visible research. The committee fully agrees with the cluster that after this recent renaissance it is now time to consolidate, identify its unique selling points and develop new strategies to reach its goals.

Main Recommendations

To WIMEK as a whole, and Wageningen University and Research:

- Give the WIMEK clusters a helping hand in stimulating exploratory interdisciplinary and transdisciplinary, high-risk research with high impact, to ensure that this kind of research becomes more structurally embedded.
- Be aware that interdisciplinary and practice-oriented research cannot be directly compared with single-disciplinary research. The criteria for the assessment of academic outputs should therefore be adapted.
- Share experiences on co-creation, in order to better understand the conditions under which participatory methods will have added value and lead to larger societal impact.
- Give junior researchers more accountability and acknowledgement for scientific advancement and highlight achievements at the junior level. This may ultimately encourage more junior researchers, and in particular female and non-Dutch academics, to look for long-term research opportunities at WIMEK.
- Prioritize the types of societal impact and then strive for explicit and objective recognition of societal impact and activities, to align human resource processes with organizational objectives.
- Avoid fierce competition between individual researchers, since this does not contribute to a happy working environment, fruitful collaboration, and productivity in general.
- Integrate supporting activities for PhD's (such as peer groups, buddy system, postdoc being coaches to PhDs) are well appreciated. It would be good to integrate such activities in a WIMEK-wide policy.
- Assess the needs of postdoctoral students and help them, for instance with career guidance tools.
- For all PhD projects, make ambition meet duration. This pertains both to the scope of the project and the number of papers needed to be able to graduate.
- Add intermediate milestones explicitly in PhD guidance and policy, particularly in the second and third year, where they are now lacking.
- Make sure that staff has sufficient time for mentoring and supervision.
- Set clear goals for the training of junior as well as senior scientists in research integrity.

To the cluster Climate, Water & Society (CWS)

- Embark on a focused effort to build a vision on where you want to be in six years. In doing so, look broader than just the water topic. Take into account your great expertise on for instance climate, energy storage systems, biodiversity, and pollution.
- Subsequently, determine what combinations of expertise are necessary to perform cutting-edge research with regard to the challenges you identified.
- Be bolder, and do not shy away from international ambitions
- Define stakeholder groups and processes more distinctly, and develop a strategy for interactions at the science-policy interface. This will lead to trans- or interdisciplinarity in a natural way.
- Give high priority to organizing the cross-disciplinary PhD activities you planned. Hire a staff member dedicated to improving funding for interdisciplinary research projects.
- Integrate social science and even humanities into the natural and life sciences.
- Put clear interventions and targets in in place to hire and keep female and international full and associate professors.
- Train supervisors to intervene when PhD students are overambitious.

To the Soil Sciences Cluster:

- Embark on a dedicated collective effort to set priorities and operationalize indicators and processes to assess how things are developing. This will help you to get a stronger grip on the future and reinforce international leadership. Be ambitious on societal impact.
- Affirm your international stature by publishing a strategic paper on the role of soils in the UN's sustainable development goals.
- For inclusion, safety and equality, do not solely depend on an open culture but have some mechanisms in place that safeguard these aspects.
- Install targeted measures are required to encourage the promotion of females and internationals to the higher-ranking functions of associate and full professors.
- Guard the balance in the ratio between PhD candidates and experienced staff, in order to keep up PhD supervision at the present high level.

To the cluster Environmental Technology and Microbiology (ETM):

- Clearly articulate outcome expectations at the end of six years from a problem-solving perspective, to enhance your attractiveness both to potential staff members and to external partners and stakeholders.
- Seek more European leadership positions. This will help to build new projects and alliances, and also allow you to better showcase your excellent research infrastructures.
- Conduct strategic pre-market assessment research, to determine which of your strengths is in greatest demand. Consult your many private sector and government partners.
- Investigate whether it is possible to widen the range of your clients and possible markets.
- Be more inclusive towards young scientists from the Global South, who are normally severely resource-constrained.
- Investigate the underlying cause of declining productivity and use of research products by peers.
- Include more societal issues in your research programme, in collaboration with social scientists.
- Actively stimulate collaboration between cluster members.
- Make sure that every PhD candidate gets sufficient supervision. Consider working with external mentors.

To the cluster Landscape Architecture and Spatial Planning (LSP):

- Take a step back; analyze ongoing processes and networks carefully, as a base for identifying your unique selling points, setting priorities and selecting a few key opportunities to maximize societal impact.
- Put special funding mechanisms in place to stimulate collaboration across clusters, share best practices on how to do interdisciplinary research, organise seminars and institute advisory roles to stimulate interdisciplinarity in research projects.
- Consider collaborating with other research clusters within WIMEK, such as CWS and Soil, that both adopt a landscape approach in some research lines.
- Take up leadership in defining new collaborative research lines, as knowledge integrators and process designers, promoting the landscape approach as key to sustainability and resilience.
- Strengthen the methodological side of your research.
- Document your work in at least two key publications: one on conceptual foundations and another on the methodological mixed methods approach.
- Put further emphasis on the use of the agent-based models.
- Train supervisors to see it as their task to guard that PhD students do not do too much work, so that they stay on track.