A Reflection on 365 Days of Public Engagement with Science

On Friday the 23rd of June, the leadership team behind Leiden2022 invited experts, partners, and participants in the year to a hybrid event reflecting on the year that Leiden was the European City of Science. Leiden was the 10th city to carry the title, awarded every two years by EuroScience, but was the first city to programme a full year of events and 365-day science festival for anyone with a curious mind. The resulting Leiden2022 Model is paving the way for a brand-new tradition and a new form of public engagement with science that steps out of the academic buildings and into the neighbourhoods of the city.

During the Expert Meeting event, a rotating group of panellists looked back at some of the highlights and lessons learned from putting this model into practice, but also looked forward towards the ongoing ripple effect in the city of Leiden, in the next European City of Science Katowice, and in public engagement with science as an essential pillar of Open Science. The panel topics were:

- **GETTING CLOSER TO CITIZENS**: The local distributed Leiden2022 Model for Public Engagement with Science
- **BRAVE YOUNG MINDS:** Fostering youth engagement in science, culture and society
- **BEYOND YOUR COMFORT ZONE:** Challenging the scientific perspective; towards 'engaged universities'
- I**MPACT & LEGACY**: What's next?

The event opened with a brief video showcasing key moments of the year, with the moving message that "*Curiosity thrives on shared interests, accessibility, and the excitement of ideas that arise in complete freedom*" and the reminder that '*in the end, the messy stuff wins*'.

Explaining more of the Leiden2022 Model's origins in response to a question from the audience, Director Meta Knol said:

> "*The European City of Science title has been issued by EuroScience in Strasbourg with the support of the European Commission for 20 years, and it has always been connected to the EuroScience Open Forum (ESOF) conference, which is the largest European interdisciplinary scientific conference. Lucien* [Leiden 2022 Intendant Lucien Geelhoed] *is the one who flipped the script and proposed to make it a full year celebrating science with as many citizens as possible. So we were actually a European pilot year, inspired by Europe's cultural capitals, and we are really happy to know that Katowice in Poland will be the next European City of Science and they will also take on this mission to present a full year programme."*

Moderator Dr. Pedro Russo, Assistant Professor of Astronomy & Society at Leiden University, set the stage for the afternoon by highlighting the wide range of event types throughout the year - from large-scale European events such as the award-winning ESOF EuroScience Open Forum, the EUCYS conference for Young Scientists, and the first-ever edition of the EU Talenton - to the smaller daily events in the 'Knowledge throughout the Neighbourhoods' programme with its

accompanying tear-page calendar of daily themes and QR codes for event details. More than 10,000 people engaged with science in Leiden thanks to this open and flexible approach.

The Keynote - and the Big Frickin' Wall

At the heart of the event was a keynote lecture by the internationally renowned cultural sector strategist, consultant, and thought leader Michael Peter Edson. Michael presented his bird-eye view on Leiden2022 in the context of the global cultural and scientific and public engagement landscape, and his own experience of various events throughout the year. He reflected on the role of curiosity in all of our lives, and the urgency of many of the issues facing us that require both science and society to work together to break down the big barriers holding us back from real change.

Relating the aims of the year back to the UN Sustainable Development Goals, and the need to dramatically increase people's involvement in achieving them at the level of the neighbourhood, Michael spoke about the power of intersecting culture with science, and the magic that happens when people are invited to experience the wonder of something microscopic like plankton, with the "*sort of joyousness playfulness that tells me that people are not just approaching science like they did with their science textbooks in sixth grade and memorising things, but seeing it as part of their daily lives, and something that can bring them joy, or spark their interest"*.

Perhaps most poignantly for the global / local nature so well captured in the Leiden year, Michael referred to an illustration by the designer Victor Papanek who advocated for socially and ecologically responsible design, of what he called the 'designer's share' - the very tip of the pyramid of all of the relevant work to be done that is often the only area where you get to have some influence after all of the important decisions have been made about the underlying problem. He drew the comparison to the way that Leiden2022 shared the knowledge and wonder of science with the general public throughout the year, moving away from the Nobel prize paradigm of science where the credentialed scientist stands on stage to inform the public of their work "*and the trick that the Leiden team effortlessly imagined was how to turn this into a street fair, this magnificent chaos and beauty, that really is like life itself*".

At the close of his talk, Michael shared his final message and challenge to the audience, which continued to echo throughout the subsequent panel talks - the concept of 'the big frickin' wall' and the need to not be passive or slow to action in the face of the challenges facing us, but working together as society and science with more urgency.

> *"It came from a drawing by the great Kathy Sierra, one of the great thought leaders of social media, and she said within every organisation or even within every sector of society there's a big frickin' wall. On one side of the wall is where you are, the work you're doing, and the way you conceive of work and what's normal or what's weird in the norms of your practice. For example, is it weird that the City of Science has a tear-off calendar of events, or is that cool and ok. On the other side of the wall is the work you really have to do, the work you must be doing in your organisation, or your sector, or your government . Kathy observes that you can get up to that wall with careful incremental work. A little bit of change here, a little bit of improvement there, and you don't really risk much or expect much in return. But in this way you can't really get over the wall to the other side.*
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> *I think Meta and Lucien and the team have taken the opportunity to materialise on the other side of the wall. They just showed up there, they made the wall disappear through this belief that it would be normal and revolutionary and disruptive and beautiful to strengthen the connection [*between science and society] *and allow people everywhere to become a part of this thing that is supposed to happen on a stage, or in a laboratory, or in an office in Brussels. To me that is the most beautiful and consequential contribution that anyone could have made to this idea of what science is and must be."*

The Panel Discussions

The interactive, curated panel discussions were an opportunity to share stories and experiences of those varying levels of engagement from small and local, to large and global, with examples of community participation and sparking curiosity throughout.

The introduction by Dr. Russo to each of the panel sessions was interspersed by presentations from the Leiden 2022 Impact Report by Cigarbox Director Peter Brower. For example, for the assessment of whether or not the year succeeded in bringing science closer to society, the survey responses showed that 52 percent of the people who engaged in events throughout the programme in the neighbourhoods were new to science and had participated in one or no scientific event over the past five years. Responses also indicated that close to half of those attending those events came from within walking distance of those locations.

PANEL 1: Getting Closer to Citizens

In the first panel on 'Getting Closer to Citizens', local neighbourhood committee leader Judith Vastenburg reflected on the eagerness of local residents of the Vreewijk neighbourhood in Leiden to learn more about the science of quantum physicist Paul Ehrenfest, who once resided there and often hosted science debates with other scientists such as Albert Einstein. She admitted that this is a more privileged neighbourhood with many well-educated residents who already have a strong affinity for science, but the selected day theme of 'Quantum' is nonetheless a more difficult topic that can be complex to understand. She complemented the creativity of Dr. Julia Cramer, Assistant Professor Quantum & Society at Leiden University for bringing this topic to life for visitors of all ages.

Dr. Cramer, who oversaw the engagement activities during the event, reflected on how smoothly the collaboration with local residents went, and how the residents came into contact with her and other Quantum & Society colleagues via the Leiden2022 liaison at the Faculty of Science, Marin Visscher.

> "*One of the people in the neighbourhood made their impression of quantum soup which was given to everyone who was there. Kids were playing around because it was a good location, and people were talking to their fellow residents in the neighbourhood so that was really nice. We held soapbox talks by 'Insiders' in Quantum technology, and then we had 15 minutes for interaction [*between each of these*], and people really talked to each other.*"

Margaret Gold, Coordinator of the Citizen Science Lab at Leiden University shared the story of 'Seeing Stars Leiden', when the entire centre of the city together turned off their lights to look up at the stars, and the parallel citizen science investigation into the 'before and during' degrees of light pollution. The dramatic 'go / no go' decision was made in the face of imperfect weather, so there was unfortunately just enough cloud cover that night for the measurements themselves to be inconclusive, but the reactions shared across a wide range of social media made it clear that those who experienced the event were very engaged with the topic of local light pollution, and were alarmed to see just how much light pollution there indeed is.

> *"It took almost a full year of planning to pull this off, and you'd be amazed how difficult it is to find out how and where to turn off the lights of a city. But this event had two stories. There was a top level story which was the main event, turning off the lights at the centre of the city to look up and reconnect with the night sky ... it was a really amazing experience, thousands of people walking through the streets and and this instinctive reaction when the lights went off that everybody's voices went down to a whisper, quite a big goosebump moment. It was also part of the experience that the clouds would part like curtains to reveal Jupiter at its closest point within its 60 year orbit. But also in that one and a half*

hour window, more than 150 people took almost 500 measurements of light pollution, and the social media channels were filled with reactions to the light pollution exposed."

PANEL 2: Brave Young Minds

The second panel on 'Brave Young Minds' opened with a discussion of the newly-minted EUTalenton and its role in fostering early-career engagement in science in the European Year of Youth. Contestant and prize winner Andrea Stephany reflected on her experience of the brand new event focusing on finding solutions to the EU Missions in the hackathon style.

> "*It was truly life-changing. As a scientist who has always had an entrepreneurial drive, I was on the look for a programme like this. You were talking about bringing science closer to people, but for the EUTalenton it was different, it was about expanding the scientist mindset beyond the lab. So going to Leiden and getting to know all these people that want to do something more impactful through entrepreneurship was really amazing. In our case it led to connecting with a problem in the Cancer Mission. We focused on the problem of late detection and identified a potential solution that we ended up pitching, and had so much fun. We connected to the problem so deeply that the team and I decided to take it forward and make the life-changing decision to start a company. Now we are nine to ten months later, and in California fundraising and talking to investors. My co-founder Pablo is working with one of the best lung cancer doctors to get access to the data of 150 lung cancer patients to test our hypothesis and conduct validation trials. So I think I could say our experience has been amazing.*"

Event coach and 'Mission Navigator' Henrik Scheel found it really interesting to see people who hadn't had a lot of exposure to the entrepreneurial world come together and experience a "*time-crunched process where they had to really nail the problem, understand their customer, come up with a brand new idea that the world has never seen before, all in a very short amount of time. It was very intentional from the organiser's side that we wanted these two worlds to collide, so that scientists really experience what it's like having to work on a very tight timeline in a startup-like environment.*"

Roosmarijn van de Velde, who was Chief New European Bauhaus Leiden during the year, shared her experience of the innovative 'Plekberaad' event series, which is a bottom-up version of a Citizen's Assembly geared towards engaging young people. "*Leiden is quite a young city. Close to half of the city is below age 35. ..I think they were the eye opener for lots of other people, and what we did together was deliberate on how the future of our city looked like. "*

In response to a question from the audience, about whether there is something about Leiden that makes it easier to reach a young audience, Rosemary stated that the fundamental approach to inviting the opinions of young people toward developing the future could be applied anywhere.

> "*I'm confident that this could happen in every city, but I do think there are some structures here both from universities, and schools, and the municipality as well, that show they are quite open to collaborate. Students collaborate very closely and I think it helps that the Dutch in general are quite organised with associations and clubs for everything.*"

Karen Slavin from the European Commission, who manages the annual European Union Contest for Young Scientists (EUCYS) confirmed that these events geared towards engaging a younger audience were a big success.

> "*I think it's safe to say they exceeded all of our expectations...it doesn't actually happen very often that we get invited back at the end of a project to see the success and to enjoy it.* [The Leiden2022 team] *organised three major events including the young scientists contest - almost 90 projects, 35 countries, 150 participants plus another 100 participants,*

auxiliary staff and and the rest - it was such a pleasure to work with everybody here. They made it easy and that's such a huge compliment, you just don't say that very often."

PANEL 3: Beyond Your Comfort Zone

The third panel, 'Beyond your comfort zone", shifted the attention to the impact that the Leiden2022 year long programme had on the academics and researchers who became involved in the various events, and how this is shaping thinking about the future role of knowledge institutions.

Tamara Witschge, Lector in Creative Media for Social Change at Amsterdam University of Applied Sciences, opened the discussion with a reflection on her NWO-funded project "The Art of the Scientific Story" that partnered with Leiden2022 to take a co-creative approach to enabling citizens, scientists and artists to tell the story of knowledge in a more experimental way.

"We had eight questions from people participating in the 'Knowledge through the Neighborhoods' programme and they were very diverse, for example: 'What is art?', 'Can bacteria combat viruses and vice versa?', and 'Are women really more caring than men, and is this why they are over-represented in healthcare?'. For each of those questions we coupled the person to an artist and to an academic and we would let them be outside of their comfort zone. It can be really challenging to even think of sharing your knowledge in a different way and then also giving ownership over to citizens and to artists to make a story and an artwork."

Tamara gave the specific example of one question from a seven-year-old who was curious about how animals like bats experience the world. He was coupled with a music collective and an academic and together they made a music video. Everyone who had a question that was approached co-creatively in this way was invited to share what they learned within their own community, and this boy wanted to share this with his entire class. And he specifically wanted to do this in the Naturalis natural history museum, which felt very prestigious to him. "*We were able to facilitate that for him, so the music video was shown there and he was able to tell the story of what he learned. That was a really really interesting journey.*"

She also reflected on the difficulty of reaching out as widely as they had hoped, to have a diversity of people asking questions, especially from those who otherwise have less contact with science.

"*We weren't able to do that, even though we went out of our way. We put flyers out in all the neighbourhoods. We went to the neighbourhoods* [during events] *to ask if they had questions. And that brings me back to one of the things that was in the beautiful starting video. It said 'curiosity is free'. And yes, curiosity may be free, but how to practice your curiosity, and be taught that it's okay to follow up on your curiosity... not everyone has the same experience with that."*

Tamara also reflected on the challenge of measuring the impact of this type of co-creative artistic intervention, which cannot be measured in the usual way.

"*We're figuring out now how to do justice to the multiple levels where impact was made. Some people had WhatsApp groups with the people participating, and now all of a sudden they are sharing academic papers that people would normally never know about. Or they went into the science lab - the artist that worked on the bacteria question started to grow her own bacteria to understand it.*"

Although proud of the achievements of the year, Professor of Science Communications Ivo van Vulpen felt that the unique nature of Leiden2022 might not have come to pass if the traditional academic world had been in charge of organising it.

> "I*t's sometimes very difficult to move beyond the frame of cutting-edge science and the latest result. With the competition between the universities we sometimes forget to tell the story of science itself, the whole reason for having a university. Curiosity is the driver, but also innovation, and also creativity - and this is not a monopoly of the university. It's actually something that is hidden in all of us all*."

Ivo pointed out that connecting on the level of curiosity is something very natural, and this was something in particular that Leiden2022 achieved within the small daily public engagement events, where scientists and people from the public could meet and share their curiosity with and about each other.

> "*These very small levels allow you to bypass the PR machine of the university and go into the city. These are all small pieces of the puzzle. And then after this one year, you zoom out and you see this really beautiful picture emerging where many people have connected in exactly the right way - it's amazing to see, and good that we look back now and see that it is also really very very powerful.*"

In conversation with this panel, Michael also felt that it won't be Universities that help us to get beyond the 'big frickin' wall' and engage much more closely with society on the urgent issues. *"To be frank, I don't think there's any chance in hell that* [it will happen] *at any time scale that's reasonable for us to be acting and planning... when it comes to climate change, winning slowly is the same as losing."* Michael compared academia to Museums and classical cultural institutions such as the Smithsonian where he worked *"it's set up on the model of enduring wisdom like a university, and the university doesn't have to think quickly or react to the real world or or be nimble on its feet because wisdom endures...if you want this beautiful dream to grow and continue you're gonna have to really rethink things entirely.*

Michael described the ideal picture as a partnership, *"where you combine the authority, trust, staying power, permanence, reputation, and accountability of the big Institution with the vitality and know-how and imagination of the crowd."*

Opening up the conversation to the audience, local teacher and activist Mandy van Valkenburg concurred with the message of partnership and urgency, remembering a recent newspaper article written by Leiden2022 Director Meta Knol "*where she said if everybody would put their thinking powers together we could contribute so much. Now we have all these scientists and all these citizens together we can't let this moment go to waste."*

She went on to encourage those in attendance, particularly the Mayor of Leiden also in the audience, to think more boldly:

> "*We're talking about a wall, but I would say it's an elephant in the room, which is the climate crisis and the ecological collapse we're facing. I think all the knowledge and networking that has been done the last year can't just be a happy memory - it needs to be sustainable. What I would really really really hope for is that Leiden will take it on to be the first sustainable City by 2025*."

Professor Emeritus Jos van den Broek, an active participant in Leiden2022 with his 'Wijscocar' (Wisdom Car), was also in the audience and shared his optimistic view of the achievements so far and the ongoing momentum for real change.

"I'm about the oldest here in this room, and when I started to become a Science Communicator it was not done at all. It was not done when I became a Professor in Science Communication here in Leiden becuaseI had to do research, and I wanted to do something else. But when I look around me I see colleagues, I see professors inside science communication, I see a wonderful group of science communicators around you all. I'm an optimist because we achieved a lot in those years. It's only been a couple of decades, but I think we gained a lot of power."

PANEL 4: Impact & Legacy

The final panel of the Expert Meeting reflected on the impact of Leiden2022, and shifted the focus forward to its future legacy. Remembering back to when the city first applied for the title, Mayor Henri Lenferink commented that it turned out to be lucky to have been chosen to follow Trieste and wait an additional two years:. "*We had some extra time to organise it, and we saw that organising this helped the city wake up after the pandemic, and it helped us to come out of our holes again*."

He was particularly pleased that the programme of events helped to show that science is not just something for specialists "*with very bright minds, and extremely intelligent people, and not ordinary people - but that isn't the case. Science is fun as well and it's something that can be celebrated. For us it was a celebration for a whole year. All those events in all the neighbourhoods was a very good idea, and especially to organise this in the less privileged neighbourhoods where people normally don't get in touch with science - I think this is the best result.*

Professor Tomasz Pietrzykowski, Vice-Rector for International and Domestic Cooperation at the University of Silesia in Katowice, the European City of Science 2024, spoke about following in the footsteps of Leiden as the first city in Central Europe to be chosen.

"*We take this idea of the European City of Science as something that is evolving, and we certainly want this evolution to continue by upholding the best and more successful part of the previous editions, and developing that further. For us the most important achievement has been transforming the previous formula focused on one huge event, namely ESOf, into a full-year celebration that includes and connects more distant circles away from the university."*

The discussion then turned to reflecting on the role that these innovative forms of public engagement with science play in helping to open up science. Frederike Schmitz, the Societal Engagement / Citizen Science lead within the Open Science NL programme at the Dutch national research council NWOl, agreed that Open Science has the potential to be transformational for the way that we do research in Europe, and that public engagement with research is at the heart of this.

"I really want to come back to that big frickin' wall - that made a huge impression - because I think you can also take open science as the idea to remove that wall. Open Science is really about removing barriers. It's very often about processes such as data or publishing, and that's all happening within the academic side of the wall.

If you think about it that way, on the other side of the wall might be society and for some reason we built this massive wall in between us. When both of these parties remove the bricks then there are holes, and at one point we find doors such as societal engagement, or science communication or citizen science where citizens do science together with researchers. I think all of that needs to happen and that's why as part of the open science movement nationally, as well as in a lot of universities and research performing organisations, every one of us is finding their own brick to remove. In this way it's possible

> *for research organisations and universities to be transformational and really support the transition that is needed*.

> *To come back to Leiden2022 I think what needs to happen is to structurally embed* [public engagement with science], *and that's a theme that has been discussed here multiple times - this takes relationships. it takes a mindset, and resources, and expertise, and recognition. That also ties in very well with the Recognition & Rewards movement to recognize the value of the work that we do in societal engagement and citizen science and enable more of that.*

This positive view was shared by members of the audience joining the conversation. Menno Tummers, Director of the Association of Science Centers and Museums, complimented the organisers and noted the active role that the Museums in Leiden also played throughout the year. "*I'm encouraging more cooperation between all parties involved in science, we all have a role to perform in the transition*"

Moderator Pedro Russo closed the event by thanking the audience, the panellists and the organisers of the Expert Meeting. He shared his own reflection, that Leiden2022 had certainly set a new standard and a new model for a city-wide and european-minded celebration of interactions between science, technology, and broader society.

> *"These interactions create new knowledge and new insights, but also new debates like the one that we had here today. These interactions can create something beautiful, but many times they are also 'messy', and I think that's also something that we need to value and keep doing in a way that's very rooted in the eagerness of humankind to better understand ourselves, the world, and the universe.*

The full recording of the Expert Meeting can be found on the Leiden2022 YouTube channel at: https://youtu.be/O2f-Kj-rU5w

Read more about the Leiden2022 Model at https://www.modelleiden2022.nl/

An overview of the impacts of the year, along with a link to the full CigarBox impact report, can be found on the Leiden2022 website at: https://leiden2022.nl/en/newsroom/impact-legacy