What Happens Next

René Penning de Vries, Chairman Dutch National Photonics Agenda 2018

Remarks in The Hague, July 13th, 2018.

On Friday July 13th, René Penning de Vries handed over an 8-year plan to Mona Keijzer, the Netherlands State Secretary for Economic Affairs & Climate. It is designed to accelerate development of the Dutch photonics industry, by creating a "one-stop shop" for the development and manufacture of integrated photonic chips. Jonathan Marks of PhotonDelta spoke with René to understand why this national effort to build a photonics agenda is so important now.

Action required to maintain global lead

Everyone in this business is aware of the need for action. Product life cycles have never been shorter. Competition from outside Europe is becoming fierce. So, if The Netherlands wants to

maintain the advantage we have established in photonics and get back to being ahead of the pack, then we really have to speed up.

But the development of photonics fits very well into the Dutch government's coalition agreement for the next four years which was agreed upon last October. The funds have been reserved and the government Departments, both national and regional, have started to execute the agreement based on well-reasoned plans to spend the public money wisely. An initial amount of €242 million of public and private funds have been reserved for a period of 8 years for photonics to kick start the process. We have the ambition that our combined efforts will create an ecosystem by 2030 of more than 25 companies, with an estimated 4000 jobs and turnover of €1 Billion.

Three regional governments in the Netherlands, of North Brabant, Gelderland and Overijssel have played a key role in bringing together the funding model for this. These are also the leading provinces where the Dutch photonics supply chain is thriving.

Better Understanding Industry Needs

I believe we are the first to submit a thorough plan to tap into these new initiatives by the Dutch government.

But let me stress that this plan is *not* a technology push based on our belief that we have a fantastic technology. If we want to maintain and grow our position as a global leader, we need to use photonics to fulfill the needs of real customers.

It is very important to realize that technology on its own is not enough. Don't misunderstand. I'm a strong believer in the power of technology. I built my career at Philips and NXP through technology.

But if we could go back and repeat photonics development over the last 3 years we would change the approach. We need to focus much more on understanding what our customers need and then deliver product. We're past the "evangelization period" for photonics.

So, we have four developed deliverables in our national photonics agenda plan which we submitted to

1. Strengthen National Production Platforms, Offer Guarantees

First and foremost, the plan is to stabilize our production platforms as it relates to the combination of technology and product, especially in Triplex, Indium Phosphide and hybrids. We need to be able to say to the global market - anybody who designs a product using our technology, we guarantee you within eight weeks you will get 10 qualified, tested, and functional samples. Note that I used the word "guarantee", not a commitment or an intention but as a firm guarantee. 21st century Global business practice demands this.

2. Roadmap development for Next Generation Photonics

Secondly, we want to work big time on the next generation photonics technologies. We know that

once you have achieved something in technology there's always a smarter solution. So, we're going to fund technology roadmaps in a much more structured way, driven by what customers tell us they want to see. In PhotonDelta we have already started an extensive outreach programme. That means building trusted networks. We're actively talking with both large corporates and SME's to understand their needs and determining the role that light-enabled technologies could mean. There is a universal drive for cheaper, faster, lighter, greener, more robust and reliable solutions.

3. Infrastructure Support when and where it is needed

Thirdly we're going to support infrastructure that would realize this overall ambition. That could include test or packaging equipment or whatever- facilities that a single company could not afford. These will be shared facilities since they are partly funded with public money. But in this way, we avoid duplication of effort and facilities. It is an extension of the open access model we have seen from the 5 Dutch Nanolabs.

4. Expand the Ecosystem Through Strategic Application Development

Last, but not least, we're going to support application development. We believe that will have an important role in attracting both scaleups and startups from home and abroad into the Netherlands to fully exploit these technology platforms. In this way we can valorize the knowledge and bring new and valuable applications to the global market.

On Friday July 13th, René Penning de Vries, chairman of the National Photonics Agenda handed over an 8-year plan to Mona Keijzer, the Netherlands State Secretary for Economic Affairs & Climate. It is designed to accelerate development of the Dutch photonics industry. The goal is to create a "one-stop shop" for the development and manufacture of integrated photonic chips. Ewit Roos, Managing Director of PhotonDelta elaborates on the plans and how public and private funds will be allocated later this year:

We have been visiting many photonics companies that make up the entire supply chain. For many, a financial stimulus is needed to allow these companies to scale-up to the next level, as well as more trained engineering capacity at all levels of competence. So, from chip design right up to final module assembly. There are two types of pressure coming from the market:

Technology Optimization Pressure.

1. We have identified the weak spots in the current supply chain which are primarily related to production. The bottom line is that cycle times need to come down, as well as the manufacturing costs. Many companies can produce in small quantities. But the whole process needs to become faster, more predictable as well as delivering a more reliable product. We can talk for ages about development strategies, but this is what customers need now and in the next few years.

Responding faster to Customer Pressure.

2. Many people in the industry know what needs to be delivered for sectors like datacentres to cope with exponential growth. There are already some very large customer commitments made in the supply chain or in the platform. So, as well as a technology optimization pressure, there's also customer pressure. If your company cannot deliver, then it reflects badly on whole photonic ecosystem in the Netherlands. And we need to address that.

René Penning de Vries speaks about Roadmap development for Next Generation Photonics, Infrastructure Support and Strategic Application Development.
Do you already have programs and roadmaps?

Not yet in detail, but we have developed outlines for data centers, telecom networks and 5G. We have started fruitful discussions with major industry players who are sharing with us, the broad direction they expect from research. But at the same time, researchers still need to have the freedom to explore and discover the challenges they are meeting within the roadmaps and develop unchartered territory. The balance between the two will be important for the wise use of public funds.

And secondly and that's very important, we are working very closely with a broad range of European equipment manufacturers. Because once you know what you want, you must be able to make it reliably, in quantity and to strict delivery deadlines. We're tapping into the expertise we have built within the PhotonDelta cooperative, which is a trusted national network including leading companies like Demcon and Prodrive.

By December 2018, we intend to have at least four major roadmaps budgeted for and with committed partners on board. Data centre/ telco will be one of those. But you can think about LIDAR, or the sensor systems that are needed by agriculture, medical, aerospace, and food processing industries.

And then we have the fourth pillar and that's basically about the Dutch Photonics ecosystem development and understanding its real economic value (valorisatrion).

We want to make sure that we attract new companies creating spinoffs and spinouts that can collaborate with other sectors. Several large Dutch hospitals have already said they want to explore the development and manufacture of new surgical tools that make procedures possible that are impossible today.

Collaboration is key

We're establishing better, simplified ways in which companies can test, validate, and modify their applications alongside those with domain expertise in that industry. That's a major set of assets in the Netherlands. Our "delta" is compact and connected.

We are fortunate that we have some major players in the chemical and materials industry, we have great academic hospitals which are very advanced in photonic enabled applications for surgery. Within the next two years, colleagues in Wageningen are building several digital innovation hubs to understand, monitor and control plant growth and yields. And we are the third country in the world when it comes to the datacentres. We see a lot of cross-overs, and discussions are ongoing. We are currently reaching out to others to join. Potential partners are welcome to get in touch with me directly.

Quote: To summarize our plan is based on four pillars: Pillar One fast track basically building the platform while improving the platform. The second pillar is about roadmaps and programs. The third pillar is about supporting infrastructure. And that's closely linked to second pillar of course because it's following what's needed for roadmaps and programs. And the fourth one is ecosystem development and valorisation.

How will you organize these activities?

We're going to grow PhotonDelta into an independent public-private consortium. Its program office consists of a core team of people with relevant deep domain knowledge to lead the calls for participation, as well as evaluate and approve. The exact form is being discussed during the summer, with a goal that by 4th October 2018 we are ready to sign a covenant with funder's, the PhotonDelta Public Private Partnership. We need to formalize the financial contributions both in cash and in kind from the Dutch government and industry.

We want to execute the national plan which is basically a one stop shop for complete photonics solutions and production. The global market is agnostic when it comes to whether the technology is based on Silicon, Indium Phosphide, Triplex, Gallium Arsenide, or any hybrid you care to mention. They want a product that is reliable and performs to the required specification. And in large volume industries like datacom, they are very conscious about the price, the cost per Gigabit. So, we're not pushing a particular technology. We're simply saying with our suite of technologies, we can provide for a particular application the best solutions in terms

of turnover and performance. And we can also tap into the vast experience from the semiconductor industry because photonics needs to work in harmony with electronics. One does not replace the other.

The financials

Around 250 million Euro has being set aside to implement the agenda as described in the National government plan we submitted on July 13th. A significant portion of this is in cash, some of it is in kind.

Once a project is approved by government, then we look at the best methods for structuring support within the consortium partners. For instance, let's say a spin-out project requires a loan over a 3-year period to fast-track a particular innovation. Once approved by PhotonDelta, then we look to our partner network.

In this case the best expertise around funding is the business development units within the provinces of Overijssel, Gelderland and North Brabant. These three provinces have backed us from the beginning both nationally and through Inter-regional funding schemes supported by the European Commission. We save time because the provinces entrust PhotonDelta to do the due diligence on the project, since we have the domain expertise within the public-private partnership. The key to success is to attract the right partners at the right moment to our consortium. But we also get engaged in support of especially applications driven research.

This funding is in addition to funds set aside for fundamental research in the Netherlands, of which about 90% which is funded by the Netherlands Organisation for Scientific Research (NWO). And during the course of this year, NWO is announcing a new streamlined funding procedure.

PhotonDelta has also taken the initiative to drive the European Photonics Alliance. Does this fit into a Dutch national photonics plan?

It fits perfectly because the EPA is all about identifying Europe's brightest companies in photonics and matching them to relevant (non)photonics organisations. Around 23 European regions have put photonics technologies in their list of priorities. Inter-regional co-operation is needed because sharing facilities and knowhow are

essential. We need to avoid wasteful duplication of effort and to reduce time it takes products to get to market. I'd also like to acknowledge the valuable input we have been getting from industry organisations including PhotonicNL and the European Photonics Industry Consortium (EPIC).

What role with TNO play?

TNO, the Netherlands Organisation for applied scientific research, is very much on focused technology transfer and are important partners for the plan. They always have a priority with the customer. The user has a challenge and TNO is expected to come up with a technical solution. For that, they sometimes dive deep into the academic research or sometimes it is just more mix and match of different technologies. But they always have an application in mind. This approach is intrinsically different from any technology push like you see in academia or other institutions elsewhere in Europe.

Four High Tech Roadmaps

As a national organization, TNO is focused on 22 different roadmaps. They cover many topics, from defence to space, right through to behavioral sciences. In the high-tech sector, TNO has four technology roadmaps, photonics will become a fifth.

TNO will be making sure that that's research knowledge in the Netherlands is transferred as fast as possible to match industrial requirements. TNO is also involved in the valorization of the Dutch photonics ecosystem, so we better understand the intrinsic value of a company or invention.

So how will companies like Technobis based in Alkmaar benefit from such a scheme? They have recently been awarded a contract in connection with their photonics-based systems-on-a-chip which can add 6000 real-time sensors to aircraft to measure what cannot be measured.

In the case of Technobis, PhotonDelta will be able to assist in two ways. Firstly, by fast tracking the development of specific activities in the supply chain. Technobis has secured a major customer who also has large demands that need to be fulfilled within two years.

A company like Technobis gets support for the fast track development of their products. But the public money that's put into this is designed to leverage the entire Dutch photonics industry, not just one company. Technobis gives leverage to the activities in the entire supply chain, enabling higher efficiency, value and quality. And we expect this approach to leverage private funding, so for every Euro of public

money we put in, we are looking to get 2+ Euros from other private companies.

And the second way that a company like Technobis can benefit is the way we work with them in a broader sense. For instance, how does their technology need to adapt to industry demands from tomorrow? Where are the promising markets and what needs to be developed now to be a leading player in those markets tomorrow?

How will this national plan be seen internationally?

This is Dutch public money and needs to be spent here. But that doesn't exclude companies from elsewhere in the world tapping into that development and manufacturing capability.

For example, during the recent World Technology Mapping Forum which we co-organised in June 2018 in Enschede, we heard that the Photonics Agritech sector in Australia and New Zealand is looking for European partnerships. They need a fab to build their chips and one which respects their intellectual property rights. We also think that what we're building here is definitely of interest to the members of the European Photonics Alliance and members of photonics21.org.

Interested in being part of the PhotonDelta PPP? Now is the time to act by registering your interest with the PhotonDelta office. Discussions will be taking place throughout the summer.