



WORKING PAPER NO. 5

Kennispark Twente as Global Science Scape

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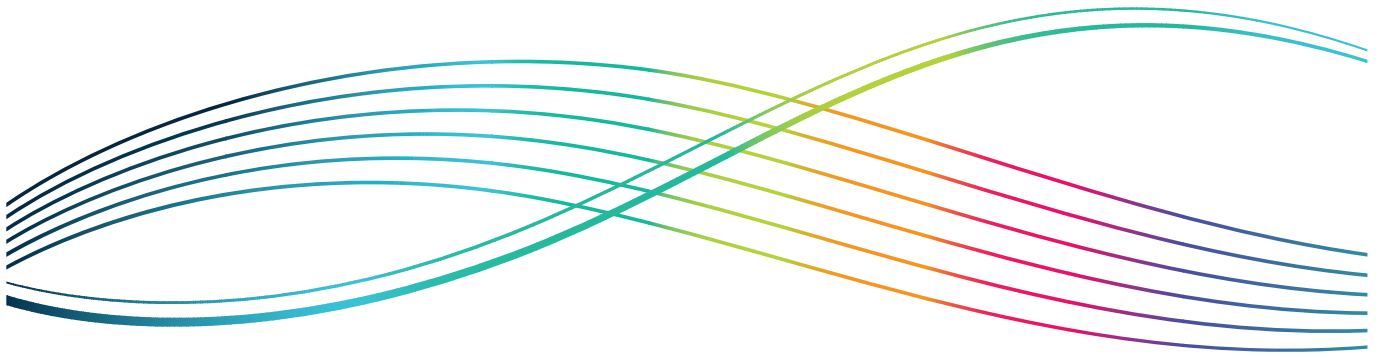
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01/ Introduction: Global Science 'Scapes: *Dimensions of Transnationalism*

MAJOR SCIENCE AND TECHNOLOGY parks have become vital elements of economic and development strategy in societies across the world. These spatial imaginaries find expression in government policy across scales and are an important aspect of political discourse projecting the dynamism of national, regional and local economies. While considerable research attention has been directed towards the efficacy of such spaces in promulgating economic competitiveness and innovation, science spaces also operate as a locus for transnational flows of technological know-how, development practice and symbolic capital. In this context The Leverhulme Trust has supported a new international network operating under the title '*Global Science 'Scapes: Dimensions of Transnationalism*' in order to examine how global labour markets and knowledge flows interact with patterns of international diplomacy and ideas about science, architecture and planning to create distinctive science (land)scapes around the world. The network comprises 7 partner institutions across the UK, US, Europe and Asia and runs from September 2014 to February 2017. It focuses initially on six national comparative case studies: Science Vale UK, Oxfordshire; Kennispark, Netherlands; Daedeok Innopolis, South Korea; Silicon Valley, US; Hsinchu Science Park, Taiwan; and Singapore Science Park. Further information is available on the network website at: www.globalsciencespaces.org

The theoretical impulse for this network derives from Arjun Appadurai's (1996) formative examination of a global cultural economy comprised of multiple 'scapes, or an interrelating framework of global cultural flows. 5 key dimensions are highlighted: ethnoscap (essentially a moving landscape of persons); mediascapes (global media and moving images, information); technoscapes (mobile technologies, in the widest sense); finanscapes (flows of capital); and ideoscapes (mobile images, meanings, and political messages and ideologies). The suffix 'scape denotes the fluidity, dynamism and irregularity of these various dimensions, and importantly their dependence on perspective. 'Scapes are all in constant change: As people move, ethnoscapes change; as technology is moved & invented, technoscapes change; as capital moves, finanscapes change. Crucially, it is within these fluid 'scapes that actors imagine their futures, within their own particular historical context. Appadurai (1995a) stresses that globalizing

and localizing processes ('global homogenization' and 'heterogenization') feed and reinforce each other and he calls explicitly for further study on the 'production of locality', where actors collectively imagine and create new social realities.

This, we suggest, has peculiar resonance with our focus on major science and technology spaces around the world, and highlights the question of how science spaces are imagined, particularly along 3 dimensions:

/ as physical forms, or 'technoscapes', reflecting the global circulation of built environment and real estate formats

/ as science diplomacy, or 'ideoscapes' projecting soft power

/ as patterns of transnational mobility and knowledge transfer, or 'ethnoscapes'

The theoretical keystone of the project, therefore, is the focus on transnational flows and cultural exchange interacting along the 3 dimensions, that is interacting flows of ideas about architecture/built environment, global political economy/diplomacy, and scientific knowledge/labour in creating what we term 'global science 'scapes'. Within this conceptual frame our research aim is to *describe and explain the diversity of global science spaces as hybrid physical, political-ideological and cultural forms*. 3 associated research objectives are established as follows:

1. To explain and characterise the physical form of the respective science spaces

2. To identify the position of global science spaces in constructions of national identity and political-economic strategy

3. To explore how respective global science spaces are viewed and experienced by international labour

In this working paper we focus on a single case-study area – 'Kennispark', in Twente, the Netherlands, and on the first two of our objectives (objective 3 will be presented in a further paper). The material reported here is largely drawn from established sources, some secondary and some from our own previous research. We are guided by a number of sub-questions and themes under our first 2 objectives, as follows:

01/ THE PHYSICAL FORM:

What spatial imaginary(ies) has(ve) emerged and how was this developed/contested at various spatial scales?

How might we characterise the physical form?

Details of the development process and evolution of the area over time.

How have international flows of ideas around architectural form and built environment development processes found distinctive national/local expression?

What is the relationship between the development of the particular science space and broader patterns of urbanization?

02/ POSITION IN NATIONAL IDENTITY & POLITICAL-ECONOMIC STRATEGY:

Has the area been actively cultivated as an explicit political and diplomatic project?

How is it deployed in national-regional political discourse and media/marketing/publicity?

What is the prevailing image/identity? Do perceptions of this vary?

What is the role of the physical environment in constructing/projecting the image of the site?

What are the patterns of ownership and investment? Is the site a national state-project? What is the extent of international ownership and investment?

How and to what extent does the area exert symbolic/soft power at a global scale?

02/ The evolution of Kennispark as science 'scape

KENNISPARK IS A 180-HECTARE SITE located in the Dutch Twente region, close to the German border. It was formally established around 2000, building on the regionally-located University of Twente (UT) and neighbouring Business and Science Park (BSP) constructed in the 1980s. Approximately 8000 people work in Kennispark and more than 700 spin-off firms are rooted in the UT, one of the most entrepreneurial universities among Europe (Karnebeek, 2001).

1/ THE DEVELOPMENT OF THE CAMPUS OVER TIME

While Kennispark *per se* is a relatively recent formulation, its roots lie in a rather more extended history **1**. The development of the Kennispark campus evolved over five phases in the last five decades, which saw an almost pristine country estate evolve into a mixed university/business park/residential/leisure zone at the western edge of the city of Enschede, bringing it close to the eastern edge of the neighbouring city Hengelo. The first phase was the initial development of the university campus (1961-1970), followed by expansion and infill (1970-1982). The third phase involved the development of the business park at the southern side of the main Enschede-Hengelo trunk road, and fourth a major redevelopment and refurbishment of the university site following the campus fire of 1998. The final phase has been the realisation of the Kennispark concept to create a single integrated site, including the removal of the *Viaduct* flyover, the renovation of the Chemical Technology building as The Gallery, and the incorporation of the university campus within the formal planning zoning of the city. Prior to the creation of the university, the Drienerlo estate was the country residence of a local textile magnate who had taken a German wife, and hence acquired German citizenship during WWII, making Drienerlo 'enemy property', confiscated after the war, and then sold for a symbolic guilder to the municipality. It was the availability of this location as a possible site for a technical university that was one of the reasons that Enschede was chosen as home for the Netherlands' third technical university.

As **Figure 1** shows, before development began at the university, the site was characterised by a mix of fields and forests, to the south the main Enschede-Hengelo Road, and just visible in the distance is the edge of the built-up area, the suburb Twekkelerveld, developed in the mid 1950s. The campus represented in the words of one interviewee, a "Tabula Rasa", where the original campus master planners had a high degree of choice in their planning approach. The traditional bocage (the Twente *coulissenlandschap*) setting (see below) was

retained in the campus, with the individual buildings being laid in ways that retained a distinction of the forest and clearings in the new site. Some of the farms on the site were cleared in the campus development, but three farm buildings were retained and renovated, and to this day provide a feeling for the original landscape, in buildings that currently host the Faculty Club, the Employees Club (Boerderij Bosch) and the Estates Department (Erve Holzik). A good example of this retention is that the way that the sports fields have been provided within the lanes infrastructure that avoids them dominating the area, but instead contributing to a landscape that changes every few hundred meters as the natural wooded barriers are passed.

The next step of the development came with the decision to award the third technical university to be created in the Netherlands to Enschede, and with that the launch of the initial build phase. The idea of a campus university was so novel for the Netherlands that a specific enabling law was required (*Machtigingswet*), which provided what was in the first instance called the *Technische Hogeschool Twente* (THT). This law provided the THT with specific exemptions from the general law on higher education and which allowed the realisation of a vision of higher education integrating teaching, research, living and governance. This lasted until a change in the law in 1970 in response to student unrest over a lack of democracy amongst Dutch universities and an occupation of the University of Amsterdam's Maagdenhuis building.

The very idea of the university campus was something alien to the Netherlands before the creation of UT. Although there has been an increasing redevelopment and concentration of universities into single campus locations in recent years, and the development of specific student housing facilities, the UT campus represented an entirely new idea within the Netherlands (De Korte, 2006). The rationale for that was because the atmosphere of Twente as well as the characteristics of the newly attracted staff and students meant that a kind of sequestered cloistering was necessary in order to build the necessary academic skills in an old



FIGURE 1: The Drienerlo Estate before the development of the Campus

1 This section has been developed with reference to the work of De Boer, including De Boer & Drukker (2011)

industrial region. Many overseas visits were made in terms of defining the idea of the Dutch campus university; the master-planning architects Van Tijen and Van Embden visiting Oxford and Cambridge, as well as a number of US campus university (Timmerman, 2011). They also decided to develop the campus following the CIAM principles (functionalism) and develop for each faculty a separate high-rise building. The university planners made visits to the UK and Germany for their inspiration for the necessary development to create effective university communities (campus Nota, 1963). The introduction of a Campanile on the campus was a deliberate reference to the University of California, Berkeley campus and part of building an academic atmosphere, although as with everything developed on Drienerlo in its own modernist vernacular.

One of the critical decisions that Van Tijen and Van Embden made was to use the campus as a showcase for emerging young architects. This meant that the campus also became a proving ground for ideas emerging in architectural academies (mainly at Delft University) at the time. This was a period of a realisation of the limitations to strict functionalism and a desire to inflect modernist buildings with a more structuralist – activity on human scale – organisation. The basis for these ideas was the organisation of space around small-scale community units (e.g. a university department) and then linking these with shared interaction spaces, canteens, and lounges, something that is visible in the Cubicus, Patio and Horst buildings on campus (Timmerman, 2011). The Drienerlo campus became

an embodiment of this wider conflict over the use of space to deliver the ideals of a functional academic community, whether to create well-ordered functionally-separate factories or to build a campus more organically around a series of local groupings. Herman Haan's Patio residence blocks – inspired by African desert settlements, were recognised as national monuments by the Rijksdienst voor het Culturele Erfgoed in 2014, demonstrating the extent to which they have been acknowledged (along with other elements of Haan's oeuvre).

Although the university opened in 1964, as with many campus universities in development across Europe at the time, *ad hoc* arrangements were made for accommodation until the building plans were complete. The first building on the Campus was the Hallen, which provided general accommodation in the eastern campus area, around which the remaining faculty buildings would be developed; only one of the Hallen-units survives to this day ('Hal B') as part of the lecture and office complex around Carre. From 1964 to around 1967 the most recognisable buildings of the campus were developed, with the idea of one large central building for each faculty, along with student accommodation and initial leisure services for students (Horst, 1970, Civil Engineering; Hoge Kamp, 1967, Electrical Engineering; Langezijds, 1970, Chemical Engineering). There was also the building of the Bastille student services building (which until the late 2000s also housed the Mensa, the dining hall), the start of the Piet Blom designed Vrijhof Cultural Centre and a number of shopping units for student use.

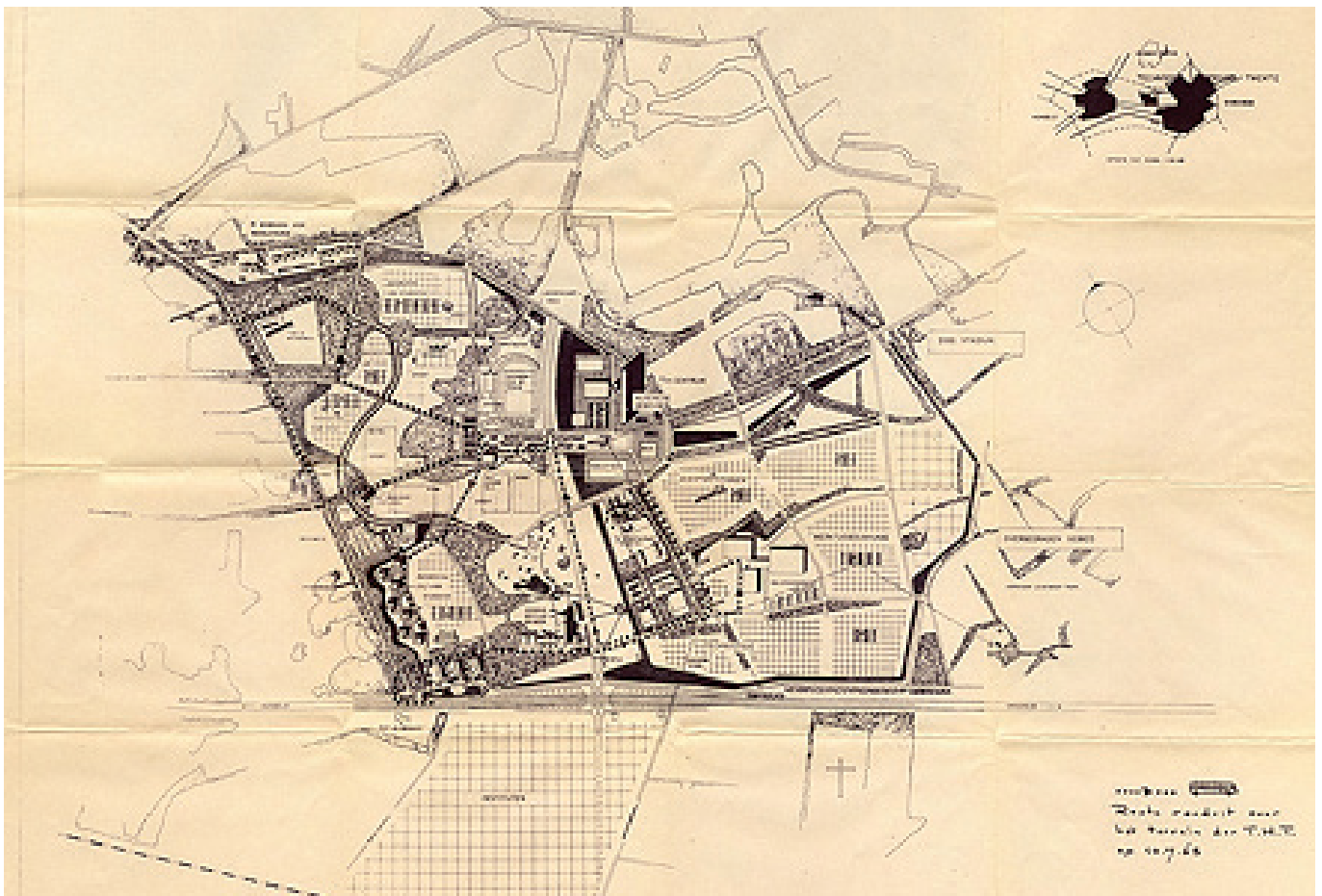


FIGURE 2: The initial plan for the campus showing its critical location between two cities

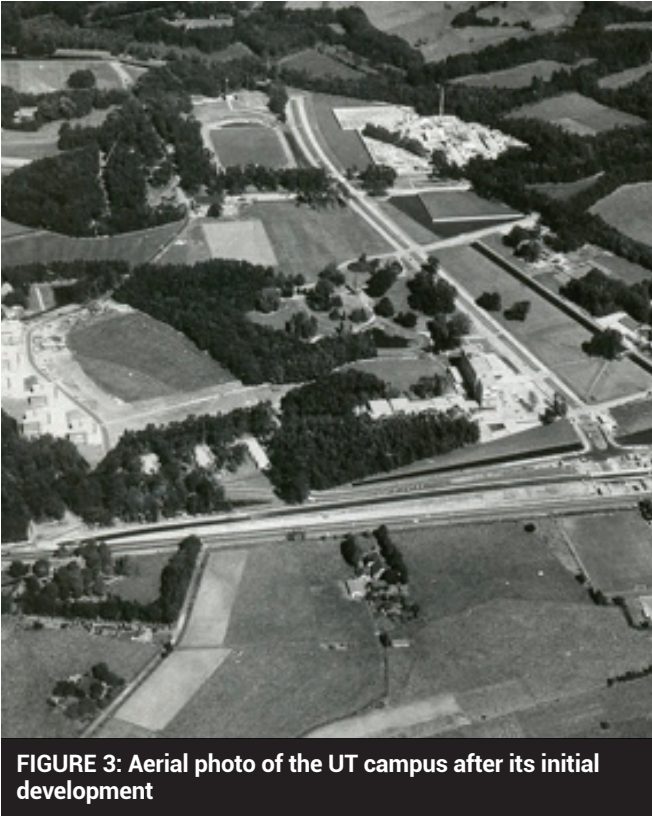


FIGURE 3: Aerial photo of the UT campus after its initial development

The next phase of development came with the in-fill of the campus in the 1970s, a process by which it assumed a structure still recognisable to this day. As a result of the rescinding of the Campus Enabling law, less emphasis was placed on the campus's collective formative function, with the residential requirement terminated in 1973. Although some elements of the campus philosophy had been eroded, the physical effects of the campus structure were, as De Boer (2011) argues, continued through its physical structure (also citing Van Strien, 1972). The further development of the UT campus was affected by the Dutch governmental budget problems of the 1970s, and in particular a substantial cost-reduction/savings package announced for higher education both in terms of recurrent costs as well as numbers of students.

One of the main developments in this period was the 1973 TWRC building, later called Cubicus (the location of the campus fire that led to the fourth phase of development). In this period, the land to the south of the Hengelosestraat remained undeveloped beyond the expansion housing area Twekkelerveld, which had a natural boundary formed by the Western Graveyard, opened in 1951. The University began an intensification of the development of student housing on the campus, including extending the northerly and westerly campus boundaries into the forested area for the pyramid developments. The final element of this is the formation of separate social sciences faculties for public and business administration, courses previously included within the

technical disciplines, and their location in other buildings on the campus (BB and TWRC).

The third phase of development came in the 1980s, when the university underwent a fundamental re-evaluation of its philosophy. In the 1970s, the university had been forced to expand into social sciences to ensure student numbers were sustained at an acceptable level. In the 1980s the university faced a second existential crisis, being forced to confront the disappearance of the local industry which the university had been expected to support, the textiles industry, suggesting the failure of the university as an institution. To this end, the university identified that it had been successful in revitalising the local economy through the impacts of students who had created jobs in emerging technology sectors in the region by establishing their own spin-out companies. The university spent the 1980s reinventing itself as the 'entrepreneurial university', and in 1987 changed its name to the University of Twente, taking that entrepreneurial strapline as its institutional motto. In this period, entrepreneurship was very broadly defined and the university had many experiments not only with staff and student company creation, but also creating a campus hotel, the Drienerburght, to provide hotel and longer term guest accommodation on the campus.

The other substantive development in this period was the opening of the space to the south of the Hengelosestraat as a space for business development. When the university was created this location, north of the Twente canal, was used primarily for water storage and treatment, but there was open space between the railway line and the Hengelosestraat. In 1966, a Fibre Research Institution of TNO was established in this zone, followed by a number of smaller business units. In 1982, a bank with local roots (ABN Amro together with the Province of Overijssel and a US IT company) funded the development of the Business Technology Centre (BTC) immediately to the south of the University administration building in what was to become the BSP. The BTC concept was developed by the Control Development Corporation (CDC) in the US (later part of the Digital Equipment Company), and sought to create a place

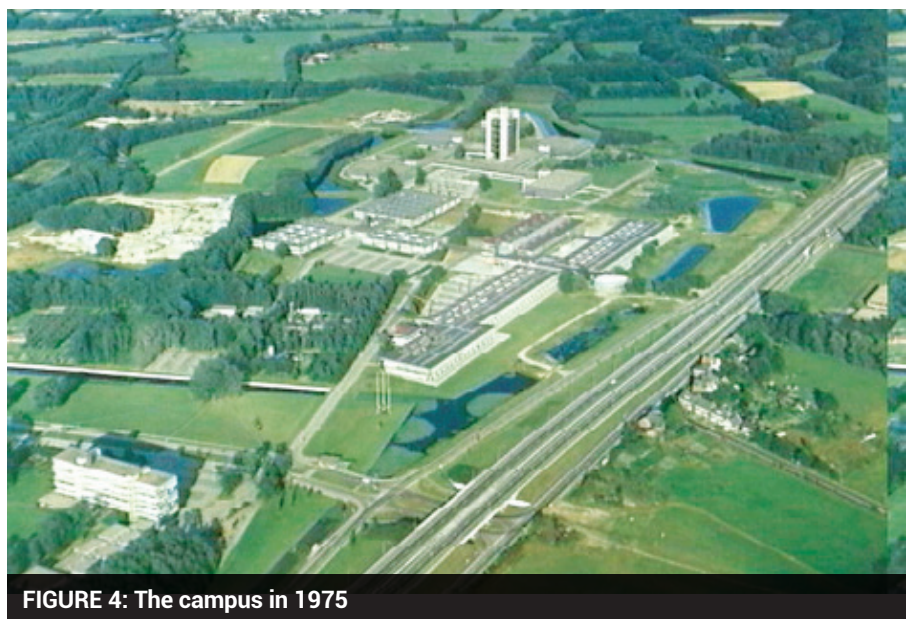


FIGURE 4: The campus in 1975

where new firms could exploit emerging technologies to drive corporate growth:

Each Business and Technology Center (BTC) contains shared laboratory, manufacturing, and office facilities. In addition, computer-based education and training, technology transfer and other services are offered to facilitate the start-up and growth of small businesses. Economies of scale make it possible to provide occupants with needed facilities and services of much higher quality and considerably lower cost than any would be capable of obtaining or providing for itself. Also, each BTC has a Technology and Enterprise Match Room for a continuing interchange of information on technological

possibilities for new business or new products and services for existing enterprises. Faculty members and students from college science, engineering and business schools participate along with engineers and executives from industry. Interchange occurs either through face-to-face meetings or through the use of computer communications. Using the computer terminal is often more effective in some respects than face-to-face communications. Seven BTCs are now in operation, and many more are in the process of being established or planned. The BTC concept is already yielding significant results. For example, the national failure rate for small businesses is 80 percent after five years. At the oldest BTC, which is in Saint Paul, this failure rate has been cut to 14 percent after three years. Although this is not a direct comparison, the trend toward a vastly reduced failure rate is unmistakable. (Norris, 1982)

As part of this, CDC were involved in developing a series of business incubators in the Netherlands, including one at the Enschede site. Three shareholders, the Overijsselse Ontwikkelingsmaatschappij (the regional development agency), the ABN bank and the CDC each invested f.1m and in 1982 raised an f.8m mortgage for the building, secured against rental incomes from the tenants. At the time, the idea was spreading across Europe for business technology centres, and they became particularly popular in the UK in the form of the Business Incubator Centre, the BIC, and then the European Business Incubator Centre (EBN) network was established in 1984 to promote the idea across Europe. Although the BTC was established in portakabins, the mortgage paid for a new building in 1984 and the effect of the BTC developments was to create a site in Twente where incubation services, flexible units, and a concentration of high-technology businesses were located as a means of creating a new community of active entrepreneurs. Although there was no requirement that the entrepreneurs were linked to the university, because of the newly created entrepreneurship promotion scheme - the TOP programme - there was a steady stream (around 20 annually) of

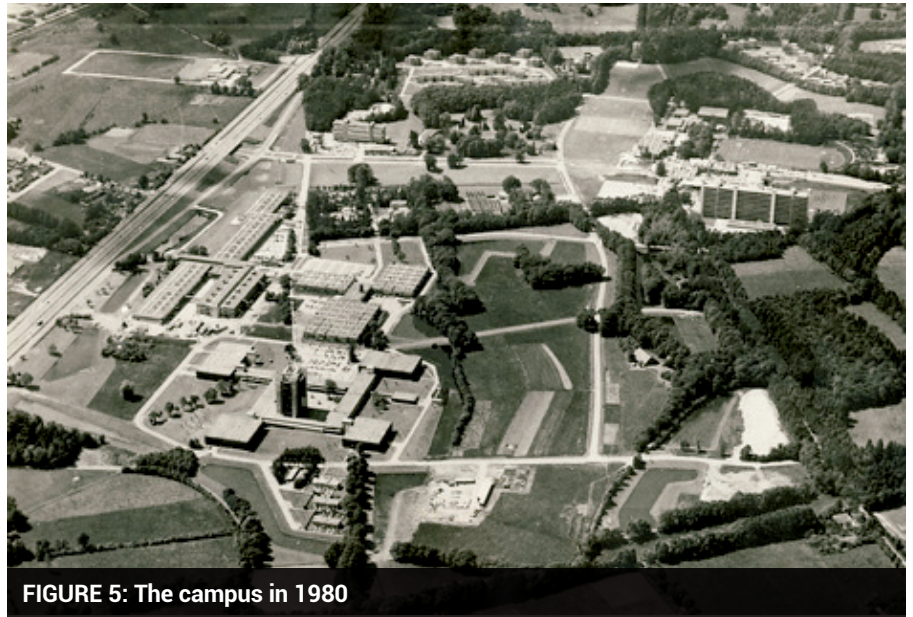


FIGURE 5: The campus in 1980

firms emerging in this period, some of whom ended up located in this BTC. In 1988, the Municipality identified in this land an ideal location for the creation of a new Business and Science Park (BSP), which was launched in 1989 under a ten-year covenant to provide a focus for high-technology employment in the locality as well as space for expanding high-technology university spin-off firms.

The original Local Plan for Drienerlo, amended in 1964 to deal with the arrival of the THT, was further amended in 1994 to allow for the development of the business. There was a preparatory decision in 1985 extended to the original plan allowing 17.5ha development, expanded in 1987 to 22.5, extending completely to the Railway. This was further extended in 1992 to a further 4.5ha on the Western edge of the Science Park ². The plan allowed for a mix of Business and Science functions on the site, permitting non-high technology businesses to use the BSP location as a prestige site. Uptake and development of the BSP site was reasonable and the initially released plots all found occupiers, with further land subsequently being released. From 1999, the municipality began to discuss the future vision for the BSP location, which at that time was physically separated from the university campus site by the presence of the elevated viaduct road. It is at this time that the idea emerged for a single integrated knowledge site spanning both sides of the Hengelosestraat, the University Campus and the BSP, and in the same year this was dubbed Kennispark ('knowledge park'). The Kennispark plans were further affected by a number of developments around the university and Enschede, including the aforementioned campus fire, a disaster in a suburban fireworks factory and the closure of a local military airbase. It is in this fourth phase that the idea emerged that what Kennispark would be was a single planned space that would involve rebuilding the campus and environs to increase interaction with business, and create ten thousand new high-technology jobs in the region. Part of the inspiration for this was a nanotech laboratory (MESA+) in which firms and university researchers worked closely to share facilities, and

² http://www.enschede.nl/ontwikkeling/RuimtPlannen/00001/00012/toelichting_Bosweg1_vaststelling.pdf.pdf/

which was regarded by some as a breeding ground for new high-technology spin-off businesses.

The most recent developments (Phase 5) around the campus have therefore involved the consolidation of the campus into the new Kennispark science space. The direction of travel was set by the 2001 Campus Masterplan which has been gradually implemented, and which marked the final abandonment of the original spatial principles adopted in 1964, in particular bringing business and the university much more directly together. In conceptual terms, the strict functional and faculty separation was ended with the creation of a single Education and Research (O&O) square which included a substantial canteen building (previously located in the leisure area). The area initially occupied by the Hallen opened in the 1960s at least partly out of pragmatism were redeveloped into a series of new high-specification buildings, including the new Nanolab, whilst the former MESA+ building became a dedicated nanotechnology business facility, 'the high-technology factory'. Although the masterplan provided an interactive development of the campus concepts, from functional zones to a dual core, this was more based on a recognition of the incidental changes that had taken place since Van Embden and Van Tijen than an imposition of a new idea on the campus. At the same time, it is possible to see in the Masterplan the influence of ideas emerging on how university campuses should appear, notably for a "flexible and integrated university offering pleasant residential and work environments" (p.2). This idea of flexibility reflects emerging ideas in both higher education and architecture regarding permanence of function, and the demands of flexibility requiring that buildings can be rapidly repurposed and redesigned to meet changing institutional needs.

Also here, The Langezijds building was redeveloped as the 'Gallery' primarily for business and business support functions within Kennispark, representing for the first time a former core university building redeveloped to meet non-private

ii/ KENNISPARK AS PHYSICAL FORM

The physical 'technoscape' of Kennispark therefore reflects the fusion of two distinct elements, the university campus and the adjacent business and science park. Despite the decision in 2001 to physically plan these two spaces as a single site, and in particular to try to integrate them around a single logic, nevertheless a key feature of Kennispark is that it has a number of distinct zones by which it delivers its functions. To its south is an industrial canal and the motorway access, and the motorway link road itself houses two large business parks primarily for logistics businesses, and there is also a sewage processing plant. To the north are a set of protected landscapes, former country estates that are now owned by the regional water company as water reserves and the provincial landscape management agency. Although Enschede is in the East of the Netherlands, water management remains an important concern, and the campus is an important drainage buffer, and has recently been replanned to increase its retention capacity.

Immediately north of the *Twentekanaal* is the former BSP site which sought to replicate the then emerging technopoles in which a relatively high density of activities replicated a degree of urban feel whilst being located at the edge of an urban area. Individual developers were provided with wide latitude to develop buildings with their own particular choice of form, reflecting owners' or tenants' wishes and desire to project particular identities. At the same time, the sites were located relatively close to each other to, although there were few common services such as cafeterias or shops that stimulated interaction between the residents. The desired effect was to create a strong visual impression on travellers arising by train or car of a densely-occupied science park with strong dynamic growth opportunities. However, because of a relative lack of renters for the estate, there was never an overwhelming density, with the overall effect being of a slight messiness in design rather than of creativity and dynamism (Timmerman, 2011) The buildings are all relatively low in height, to a maximum of 4 stories with a mix of construction techniques. The old BSP location hosts a Business and Technology centre dating to 1984, a building that is rapidly showing its age and its key functions are being moved across to the Gallery prior to its demolition and site redevelopment as a car park. The BSP also started to develop to the east of its original limits along the new access that integrates the two former distinct sites, the Hengelosestraat, and there are a number of buildings that host high-technology activities including at least two (former) winners of the Deloitte's fastest fifty. This eastern side of this new BSP segues immediately into one of the city's poorer districts, Twekkelerveld, and

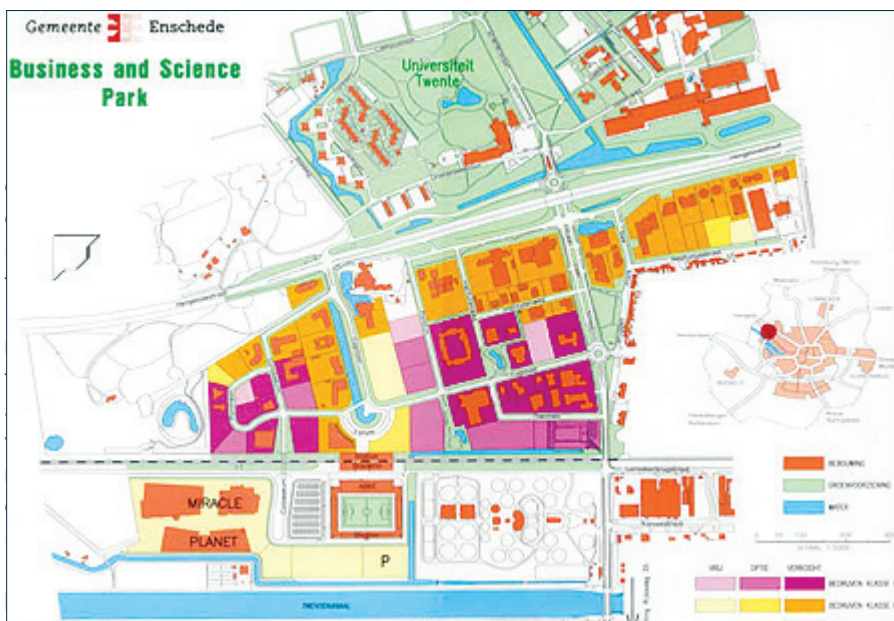


FIGURE 6: The land zoning plan for the business and science park

there have been some tensions although these have mainly come from houses being converted into student bedsits by landlords.

The next element of Kennispark is the Knowledge Boulevard, a road linking the two main cities in the east, Hengelo and Enschede (Kennispark is located precisely in the centre between the two city centres) which brushes the two outskirts of the cities. In the 1970s, a flyover was created to elevate this road section next to the university, with two effects. Firstly, it created a no-man's land of approximately 100m between the university and BSP and acted as a physical barrier between the two communities, with a security gatehouse (officially called 'Checkpoint Charlie') further emphasising the separation between the two communities. Secondly, it reduced the visibility of both sites as viewed from the road, because motorists were elevated in a way that prevented in particular the university's entrance building towering over the motorists. This road was removed in 2011 (at a cost of €170m) and the street has been re-planned as a boulevard with multiple access points to both sides of Kennispark as well as street furniture creating a sense of place for the site rather than emphasising its role as a transit route.

To the north of the Knowledge Boulevard is the university campus site. This has been fundamentally redeveloped since the fire in 1998 and re-planned to cluster university knowledge (teaching and research) activities around the Education and Research Square (ERS) (*Het O&O Plein*) and the Horst Complex. This is where the majority of the university's departments are housed and where the majority of lectures take place. Activities in this area are further subdivided with faculties tending to be grouped together and services moved into vacant sites as they arise. Notable is that the university management are not located in this district, but at the western edge of the campus, in the Mirror building (and its annex), a six story reflective tower located next to the former Checkpoint Charlie site. Little remains in the Education and Research area of the experimental architecture of the 1960s campus construction (see next section). Although the ERS was originally intended to be a meeting point and to stimulate interaction, in reality it is rather a windy square that has been remodelled a number of times in order for it to fulfil its various roles as a thoroughfare, an access point, a water source, and a parking space for bicycles.

There has been a gradual concentration of university leisure and social functions beyond the ERS area into a coherent living zone on the campus, to the North West of the site. The university initially provided accommodation for both staff and students, staff accommodation at the edge of the site and student accommodation more centrally located. The choice to offer staff accommodation reflects the fact that at the time the campus was created (1961-64), Twente was an old industrial region with no tradition or communities of highly educated individuals, and they sought to create a mixed staff-student community distinct from local communities, in part to make it more attractive to professors already working in the historical city of Delft which formed the bulk of the new professoriate. Some of the staff accommodation has developed on campus been completely sold off, whilst the remaining stock is owned

by staff with a minimum service duty with the university able to repurchase the buildings from staff who leave university employment. Student housing was designed to fulfil a desire to build small communities of ten to twenty five students who would form social attachments outside their disciplinary fields, and contribute to a strong social atmosphere on campus (similar to the approach adopted in some of the 1960s and 1970s expansion era universities in the UK). Student accommodation was developed from the earliest days and some of the oldest, in the Patio complex, developed by Hermann Hahn from 1965 onwards were inspired by African communal settlements; this building was listed as a national monument in 2013.

At the heart of this residential area is a services boulevard, housing for Student Union building (the Bastille), the Cultural Centre (Vrijhof), a number of shops (underneath the Sky housing building) as well as the university sports centre. The eastern end of this boulevard has a conference centre and hotel, although plan is to replace the rather dated 1980s concrete box that currently houses the Drienerburgh Conference hotel with the former Electronic Engineering building immediately adjacent. The university has a large sports centre, as well as an outdoor athletics track (recently rebranded the UTrack), indoor and outdoor swimming pools; the athletics track is the finish point of the Batavierenrace where teams from Dutch universities race from the Radboud University, Nijmegen, to the UT campus, annually at the end of April each year. To the north of the outdoor sports facilities is an open air theatre, comprehensively renovated in 2013, a doctor's practice, dentists, childcare and a housing office. The whole campus has been designed to create clear separate districts, with vegetation developed and retained to create clearly framed 'landscape stages' every 100m. The campus – all zones are home to a series of art projects of different vintage - is criss-crossed by a number of public routes for walking and cycling and mountain-biking, and there are many maps and signs to assist publics moving through the space. Whenever FC Twente – the local Eredivisie football club – plays a home game, the campus serves as overflow parking and there are for a few hours park-and-ride services between stadium and campus. To the edge of the campus, there are a series of water pools that serve as fire and storage lakes, as well as some technical depots, a living laboratory for the technology and development group, as well as a rough terrain site that can be used for safety training as well as motocross racing. At the edge of the campus there is some park land regularly used as cattle grazing, as well as an entrance to the Ledeboer park towards the townside, and northward into the Hof Espelo Provincial Park.

iii/ KENNISPARK AS SPATIAL IMAGINARY

The spatial imaginary of Kennispark is very much as a 'black box' or as a goose that lays the golden egg. The value of this black box is that it is high-technology and entrepreneurial, and is able to take knowledge in various kinds of actors, the university, other knowledge institutions and firms, and embody that into spin-outs which are in various ways 'born global'. So these kinds of firms involve knowledge and often IP that has been developed in the course of international collaborative research projects, often spanning the public and private sector. These firms are able to attract a range of investments, often leveraged by local venture capital and debt finance, but also increasingly able to leverage investments from outside the region, both in the The Netherlands, but also with the location of a branch of Cottonwood Investments in Enschede, international and from Silicon Valley. These firms go on to become world leading businesses, such as the internet companies booking.com and Thuisbezorgd.nl (takeaway.com). These firms, knowledge institutions and other public actors such as the municipality and Province ensure that there are positive synergies to create an 'entrepreneurial ecosystem' that supports the further development of other kinds of high-technology firms.

The notion of Kennispark as an entrepreneurial high-tech ecosystem is enrolled and mobilised as 'ideoscape' by a range of actors at different scales and in a number of different ways. The first of these is the university, which positions itself as a beacon of strength in the East of the Netherlands. The university makes frequent reference to Kennispark, and in particular has reinvented itself not only as an entrepreneurial university, but in using high-technology knowledge to create societal benefits. So the university organises an annual prize, the Van den Kroonenburgh prize, for a leading regional entrepreneur; there is an annual lecture associated with this for whom leading *Bekende Nederlanders* (BN-ers) are invited. The university hosted the Prince Friso award in 2015, named after the recently deceased Royal, awarded by the Dutch Royal Society of Engineering (KIVI), with two Princesses, including the former queen, in attendance. The King was invited to open the Gallery building, the new high-technology space and the first of the developments where the BSP, formerly exclusively to the south of the campus, was extended onto the campus site as a means to facilitate linkages between high-tech firms and the university, and consolidate the entrepreneurial ecosystem. The university regularly welcomes senior members of the government who effectively endorse the efforts of the university to create a dynamic entrepreneurial ecosystem in the east of the Netherlands.

Local partners are also active in mobilising Kennispark as part of a wider knowledge infrastructure for Enschede as the leading city, for the city-region (Netwerkstad) and also for the region of Twente, increasingly being replaced by the Province. For these partners, the key issue for the Kennispark is as a motor of economic development and growth, the promise to create 10,000 high technology jobs by 2020 that emerged when the plan was first announced. There was almost no debate about whether this prognosis was possible or realistic;

what debate there has been has been over whether there is a need to create 10,000 high-tech jobs when there is primarily unemployment amongst unskilled and medium skilled people. The extent to which policy-makers unquestioningly believe in what is a figure that is relatively hard to empirically justify is demonstrated by the fact that when politicians in Enschede and the Province wanted to compel other regional partners to support the somewhat contentious airport plan, this was done by creating an investment line that made Kennispark dependent on the continuation of subsidies for the airport. Confusion about the content of the plan is highlighted by the fact that in January 2015, some surprise was expressed by the fact that over €2m from a high-technology fund was being spend to create a parking garage on the Kennispark as an attracting factor for potential future investors.

There has been a change in the way that the national government views Enschede as a result of a wider set of changes to try and simplify spatial governance. Until 2010, there was a national spatial plan and a national spatial economic structure, and a clear role for the east of the Netherlands, as a place where knowledge was exploited. However, from 2010, these plans and structures were abandoned, with these tasks largely being passed to the Provinces (although with no additional funding). What the national government did retain responsibility for in spatial planning terms was for the national trunk knowledge infrastructure, put very simply, to be concentrated around Amsterdam, Rotterdam and Eindhoven. The national economic strategy was replaced with the 'Top Sector' policy, national consortia that invested public and private R&D resources in nine areas deemed by a 'Commission of the Wise' to represent areas of vital national importance. These activities were likewise largely concentrated in the Randstad and Eindhoven, a fact justified by reference to a series of maps generated by the PBL in a 2012 annual report (although that map had an extremely contentious methodology that reinforced the visibility of spatial concentrations. But these spatial imaginaries were not entirely trustworthy, because they omitted the importance of particular agricultural regions for two top sectors, agriculture and horticulture. Thus, another class of regions and clusters emerged that had potential to support the national knowledge trunk infrastructure, and were neither the so-called Mainports (Schiphol, Rotterdam) or Brainport, and this included the Twente region. In this sense Kennispark is an example always of the projection of a national ideoscape and not – as is the case of Brainport – as an example of a successful Dutch high-tech region.

At the European level, Twente is less visible in the area of high-technology entrepreneurship. The University of Twente has been very successful in winning European funding in its various areas of technology in both the Framework and European Research Council programmes. However, Kennispark has not been able to establish itself as a hub within the European Institute of Technology, the key valorisation arm of the Horizon 2020 programme, which perhaps reflects its less developed international profile. Eindhoven has been able to secure activities in all three of the first KICs (the Knowledge and Innovation Communities) that are central to the activities of the EIT. However, the Twente region does perform well in

terms of the production of companies in the Deloitte's Fastest Fifty sample, and Fastest 500, the list of the fastest growing companies in Benelux and NW Europe, despite a population of only 625,000 (c.4% of the Netherlands' population). With reference to the European Commission's Regional Innovation Scoreboard the Province of Overijssel scores as an Innovation Follower, but the province is more than Twente or Kennispark alone, and where data is available for Twente it is clear that its innovation performance is far higher than these other regions, and also the Provincial average, suggesting that its relative European invisibility is a result of an unfair framing.

Thus we see here the heart of the contestation within Kennispark's spatial imaginary. The closer one is to Kennispark tends to emphasise its position as a locally rooted strength, while conversely, at the higher levels it is a peripheral node in a wider knowledge trunk infrastructure. There are not really strong business champions ³ for Twente as an innovative region, in the way that Philips and its spin-offs are clearly cheer-leaders for Eindhoven and Brainport, although Ten Cate (a high-tech textiles firm) has been able to attract a number of innovative firms to locate some R&D activities in the region (e.g. Boeing for flame-retardant aerospace textiles). Kennispark itself has tried to build (and publicise) linkages with external high-technology R&D leaders as well as benchmarking itself against other technology regions, particularly Palo Alto. The University of Twente is a member of the European Consortium of Innovative Universities, all technology universities in potential growth regions and the ECIU has started in the last two years to place more emphasis on the regional engagement and development activities of its members. Local policy-makers at all levels – from municipality to the province – have actively tried to lobby nationally to recognise Kennispark as something special (and ideally as worthy of the trunk infrastructure investment received by Mainport-Brainport). However, Den Haag has been particularly resistant to these efforts and has tended to deal with Kennispark-Twente-Overijssel in the same way as other regions.

³ At the time of writing, regional partners had just opened a Twente 'Embassy' in the Grachtengordel area of Amsterdam as a means of increasing the visibility and name recognition of regional in the west of the Netherlands.

03/ Kennispark: Identity and Image

i/ KENNISPARK AS POLITICAL PROJECT

THE NETHERLANDS HAS LATTERLY BECOME highly interested in trying to portray itself as a high-technology, high-growth country offering good prospects for inward investors and new entrepreneurs, an example of this being the Startup Delta project. The notion behind Startup Delta is depicting the Netherlands as an entrepreneurial ecosystem, containing all the elements necessary for entrepreneurs to be able to create and grow technology businesses, as well as a range of intermediaries helping to navigate between those elements. It has been funded by the Ministry of Economic Affairs as a promotional brand specifically to attract outside investors and entrepreneurs to settle in the Netherlands, and make the case that the various elements of the ecosystem are greater

than the sum of its parts. In this portrayal, Twente is one of the ten partners comprising the 'Dutch entrepreneurial ecosystem', although differing from the other nine places in using the name of the region (Twente) rather than the name of the city or province where the hub activity is located. The Startup Delta project is more an attempt to retrospectively create a brand from a range of different activities that had been going on, supported in different ways by different kinds of funds, rather than a specific programme or set of projects. The content for the Startup Delta site describing Twente refers the reader quickly through to the Kennispark website, and there is a rather strange location of the Twente hub on the map, not corresponding to any of the population centres or innovation-promotion activities but to a rural area with poor mobile phone reception.

The Startup Delta project is part of the Dutch government's Action Plan for Ambitious Entrepreneurship, which in turn embraced at the top political level the idea of the innovation ecosystem, in part underpinned by the Advisory Council for Science and Technology Policy (AWT's) 2014 report "Brilliant businesses: effective ecosystems for innovative entrepreneurs" (in Dutch). This report was commissioned by the Ministry of Economic Affairs to understand the ways in which entrepreneurship could contribute to solving problems



FIGURE 7: A national promotional image of High Technology Holland – featuring Twente

http://www.startupdelta.org/why_holland (Accessed 28th September 2015).

of rising structural unemployment. This led to the Action Plan, which specified 43 concrete actions, one being to open up the Netherlands to foreign entrepreneurs, both in terms of introducing a special visa regime for entrepreneurs but also to provide more information for foreign entrepreneurs. It is this that led to the idea of Startup Delta, and Kennispark is part of the efforts to create information about the Netherlands; it is in this capacity that for EU Commissioner Neelie Kroes has been working as the Startup Delta Special Envoy. On occasion Kennispark has featured as part of the narrative she was trying to mobilise regarding the fertility and munificence of the entrepreneurial environment of the Netherlands as a whole. Part of this was related to her delivery of the Annual Innovation Speech at the University of Twente, and she used the occasion to also engage with the Kennispark activities, including participating in the launch of a student investment fund and holding a round table with a number of the key actors in the Kennispark 'ecosystem'.



FIGURE 8: Building profile in the EU

The main role for Kennispark as an explicit political project, however, has been *within* the Netherlands rather than globally, and in particular as a means of contradicting a national economic development narrative which sees the east of the Netherlands as being a 'backward place'. The internal politics of economic development in the Netherlands saw particularly adverse consequences of deindustrialisation for a number of outlying regions distant from the Randstad in the 1990s. Each of these regions acquired its own regional development agency (at the level of the province, or in the case of the northern regions, between the three provinces of Friesland, Drenthe and Groningen). At the same time, a national spatial planning imaginary emerged claiming that the success of Netherlands as an internationally competitive trading partner was built on two pillars, the North and the South wings of the Randstad, corresponding to the two Mainports (sic) of Amsterdam Schiphol Airport and the Rotterdam Shipping Harbour (Van Duinen, 2004). The Mainports concept embodied a range of ideas, and captured the planning imaginary to the

point of completely dominating the fourth spatial plan by the 1990s. This made it extremely difficult for the peripheral regions to define their own strengths, and as the liberal government shifted towards a more supply-side economic policy, peripheral regions faced a threat of being defined as costs for the Netherlands in contrast to the benefits brought by Amsterdam and Rotterdam.

One region was able to successfully challenge this positioning, and this was Brabant, in particular around the site of the Philips factory in Eindhoven. The province of Brabant had created a regional development agency in the 1970s in response to deindustrialisation and rapidly rising unemployment, and even by the Fourth National Spatial plan was seen as being a site of 'national' importance, less important than Enschede or Maastricht which were 'Euregional' (Enschede being the site of the first "Euregio" organisation in 1958).

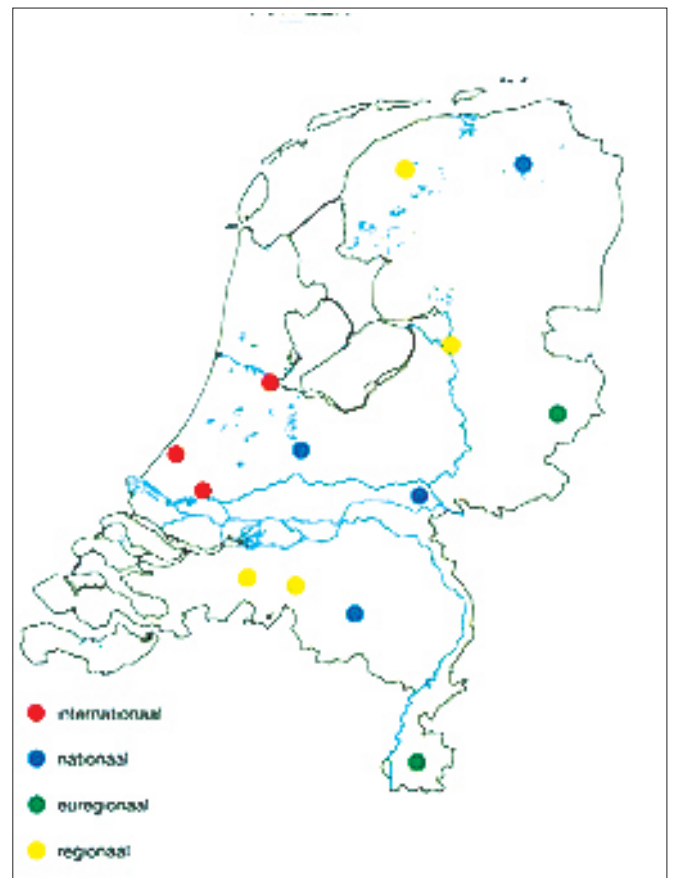


FIGURE 9: The key connections and growth centres in the Netherlands in the Fourth National Spatial Plan

Source: http://wiemaaktnederland.nl/wp-content/uploads/2014/07/Gecomprimeerd_Vierde-Nota-RO-Extra-deel-3-kabinetsstandpunt.pdf

But by the time of the national spatial economic development plan "Peaks in the Delta" (2004) the Eindhoven region had managed to reinvent itself as a 'brainport' (arguably as *the* 'brainport'), corresponding to a single gateway point for competitive knowledge in the Netherlands. This label brought with it the recognition of Brainport as an infrastructure of strategic national importance and deserving of additional national investment, something acknowledged in the Netherlands' latest strategic infrastructure investment plan (the SVIR, 2011). The basis for the Brainport emergence as a strategic science site related to changes within the Philips electronics business.

Part of this was that Philips created a number of highly successful new business areas which spun-out to create large high-technology businesses which themselves became world-leading players in their field, including semi-conductors (NXP) and semiconductor fabrication machinery (ASML). Another element came with Philips' decision to move out of half of its flagship R&D site ('Natlab) and at the same time to vocally embrace open innovation concepts, inviting other businesses and research activities to co-locate on its site, the 'High-Tech Campus' (confusingly, the Brainport campus is a separate development from the High-Tech Campus). A third element was the mobilisation of the vision of a dynamic cross-border 'innovation triangle, an imaginary space between the three high-technology centres (each with technical universities) of Eindhoven, Leuven, and Aachen, and tying this to a growing policy interest in cross-border knowledge spaces such as Öresund.

Against this background a key element of the Kennispark project has been an attempt to position the Twente region and the Enschede functional region (a conurbation which in practice extends far beyond the municipality boundaries) as a strategic national intellectual infrastructure, similar to Brainport and therefore suitable for strategic infrastructure investment. The various elements that contributed to the Brainport narrative are also present in different ways in the Kennispark narrative: Firstly, the university has a long track record (over thirty years) in creating large numbers of spin-off companies in emerging high-technology fields, particularly ICT and materials science; secondly, it is a physical location where business and research comes together to interact and grow, with a clear narrative as an entrepreneurial ecosystem; thirdly, there is an explicit flow dimension - it is a place where people come to exploit their knowledge, with companies from outside the region and the Netherlands active in contributing to growth and development.

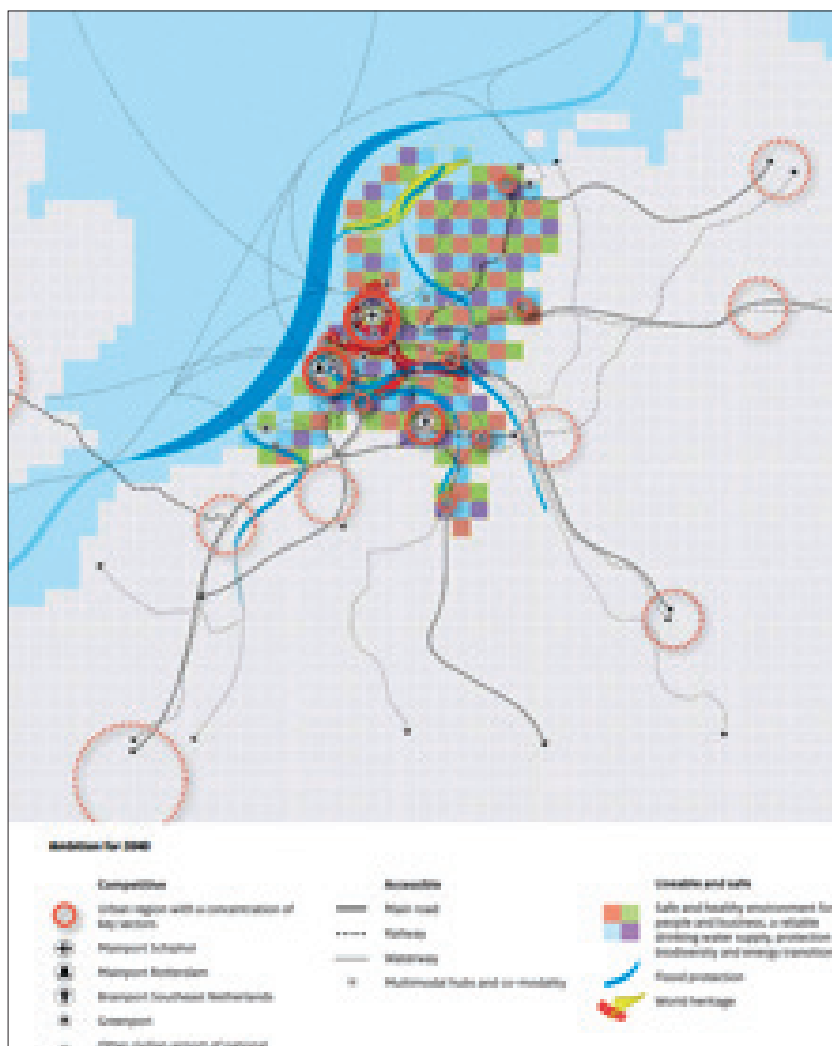


FIGURE 10: The Dutch vision for connected, balanced, competitive growth in 2040

Source: <https://www.government.nl/binaries/government/documents/publications/2013/07/24/summary-national-policy-strategy-for-infrastructure-and-spatial-planning/summary-national-policy-strategy-for-infrastructure-and-spatial-planning.pdf>

To some extent Kennispark has been successful in positioning itself within the national policy discourse as part of the Dutch national knowledge infrastructure, although this has remained at the level of particular investments (such as from the Nanonext research investment fund). In that sense it differs from Brainport in not having a structural advantage expressed through the SIVR which allocates central government infrastructure funding, leaving investments in Kennispark primarily the concern of the province and local municipalities. Part of this improved position comes from central government recognition of the value of these activities, and in 2013 and 2014, the Ministry of Economic Affairs commissioned consultants to produce a map of the Dutch knowledge infrastructure landscape. As part of this, Buck Consulting produced a four-way classification of science campus developments in the Netherlands (associated with either higher education or business research activities). Of the 33 campuses, 6 were designated as Mature (including Kennispark, Brainport, but also Wageningen UR, Amsterdam, Delft and the Chemelot campus). Possibly interesting here is that Wageningen is closely associated with the 'Greenport' concept ⁵, and Chemelot was formed at the site of the DSM chemicals plant, formerly the national mining company and later life sciences business. Of these 6 mature campuses, Kennispark is the only one that does not have an immediate obvious claim to be part of a bigger national infrastructure (Mainport – Delft/ Amsterdam, Brainport – Eindhoven, Greenport-Wageningen and DSM – Chemelot) and yet has managed to position itself as a Mature campus.

⁵ The greenport concept emerged as an expression of the world leading position of the Netherlands in horticulture and agriculture, and argues that this world-leading strength is based around 6 local clusters: Westland-Oostland (greenhouses), Venlo (flowers, food & logistics), Alsmeer (cut flowers), Duin- en Bollenstreek (bulbs and flowers), Boskoop (trees and bushes), and Enkhuizen (seeds and breeding).

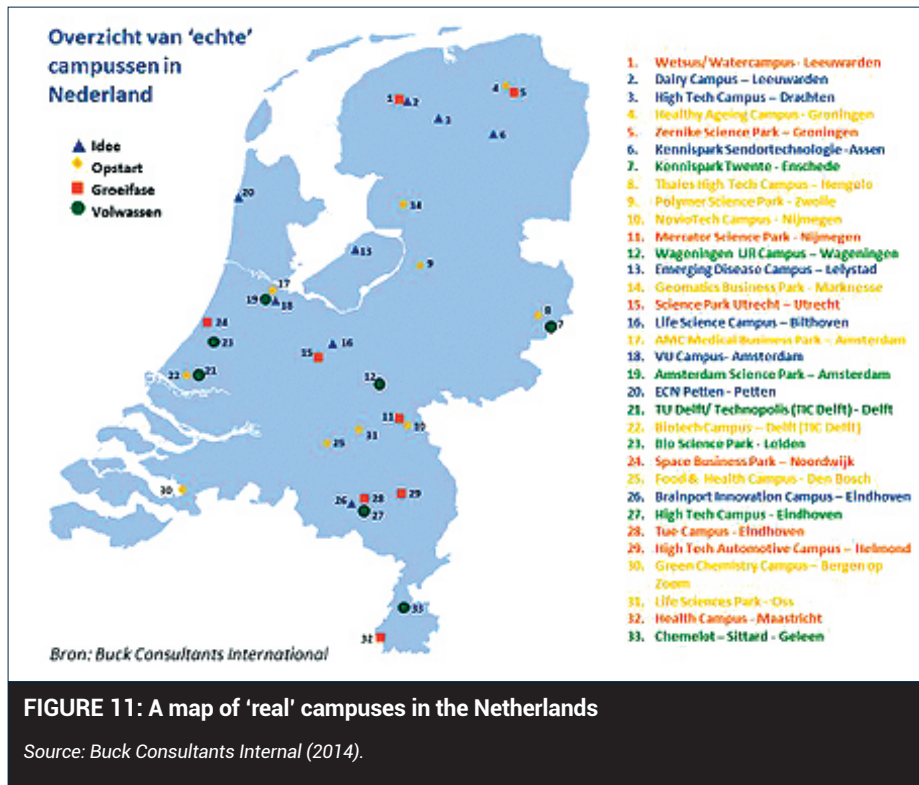


FIGURE 11: A map of 'real' campuses in the Netherlands

Source: Buck Consultants Internal (2014).

ii/ KENNISPARK AS IMAGE

There are two depictions by the Kennispark partners of the site, first as an innovation ecosystem and secondly as a high-technology space, the Innovation Campus Twente, with the two related by the latter, the campus, being an anchor for an innovation ecosystem that extends into the wider region. Kennispark has enthusiastically adopted the language of the innovation ecosystem as a metaphor to explain the long-standing interaction and partnerships within the region. The ecosystem image is shown below, and is an attempt to code the key elements of Kennispark into something with visual appeal that can be enthusiastically embraced and reproduced. The image is reproduced below.

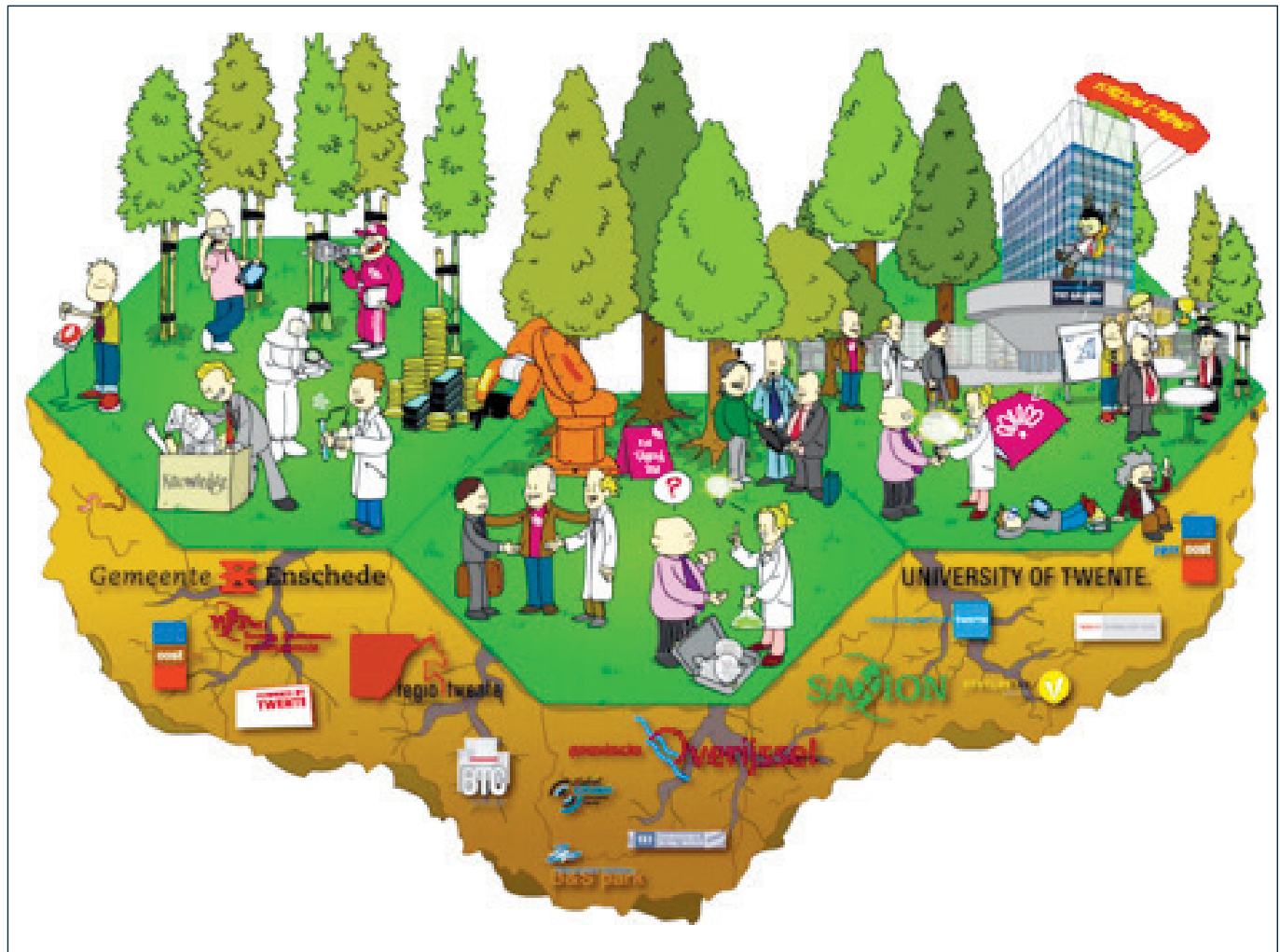


FIGURE 12: The Kennispark knowledge ecosystem imagery in practice'

It is worth highlighting some of the themes that appear to be encoded into this image. The first is of **partnership** between a range of different kind of actors, whether the public sector (municipality, region, province), knowledge institutes (Saxion, UT), and business support and valorization activities (Powered by Twente, the Business & Science Park, BTC, the and Twente innovators' network (TKT)). Secondly is the **interaction** between scientists and entrepreneurs (with the large pile of money in the first heaxagon along with the scientists in white coats throughout the picture), shaking hands, asking questions, explaining, winning awards, reading papers. Thirdly is the identifiable **physical space** of the campus, depicting literally the 'experiment in the forest', and the iconic buildings of Spiegel and the Gallery. Fourthly is the **organic nature**, emphasising that it represents an ecosystem where niches exist for entrepreneurs to succeed and grow, more than the sum of its parts, and with the potential for future growth. Fifthly, it is **deeply rooted**, alluding to the long-standing history of co-operation and the gradual evolution of these arrangements through the creation of the BTC, the BSP, the TKT, with Kennispark as the next natural step of its evolution. There are different versions of this image in circulation, and figure 6 below presents a version displayed on the walls of the Kennispark offices at the time of writing, different but with similar kinds of elements plus an imagery of **forward movement** (with the 'road to market' and the 'singposting' functions demonstrated quite clearly, and entrepreneurs visible without necessarily having a pile of cash lying about.



FIGURE 13: The Kennispark knowledge ecosystem imagery in practice

The second element of the imagery used to depict Kennispark is as a high-technology space, the Innovation Campus Twente, and indeed this imagery can be seen on the way that the Startup Delta website portrays Kennispark, which carries a number of key elements of the Kennispark story. The first is of **density** with a conglomeration of buildings near to each other, providing a critical mass of activity, stimulating interaction. The second is of the **newness** of the location, with modern architecture – the irregular quadrilateral of Carre, the two wings of Ravelijn and the red of the Nanolab – conveying Kennispark's location at the forefront of ideas. The third is the **bounding** of the site by nature, fields and water, creating a tranquil environment where ideas can slowly come to fruition, echoing the campus environment of other business and science parks, the kinds of non-place where a global community assemble and carry out their activities, giving it a kind of familiarity to the observer. The

fourth is **tangibility**, taking the rather dense, complicated idea of an entrepreneurial ecosystem and making it immediate and obvious for the viewer; related to this is the role that it plays as a scenery for particular kinds of tangible image construction, such as the visit of royal family members and Dutch government ministers to the university, again underlining the centrality of the Kennispark space to the Dutch knowledge infrastructure.



FIGURE 14: Kennispark as Innovation Campus

The images of Kennispark are clean and clinical, as laboratories and office spaces that are carrying out their own discrete functions, creating the new high-technology products as the basis for the Twente's role as an innovative entrepreneurial ecosystem. The involvement of these national figures, making the long journey to the remote East of the Netherlands together with the cleanliness of the images, helps to reinforce the sense that it is this aspect of Twente (high-technology entrepreneurship) that the region is valued for at a national level.

A third image associated with Kennispark is as the backdrop to VIP visits. Kennispark has hosted in the last year visits from the Dutch Prime Minister, the King, the former Queen, Ministers of Education and Economic Affairs and the Chair of the Influential Social-Economic Council. These events have been associated with different activities, whether the annual Innovation Lecture (Draaijer), the Opening of the Academic Year (Plasterk), the award of the Van der Kronenbergh prize for entrepreneurship, or the official opening of the Nanolab (Rutte) and Gallery (HM Willem-Alexander). These events often include meeting with (and sometimes awarding prizes) with highly promising individuals, whether starters or students, and creating an image of Kennispark as a place where the future is being made.



FIGURE 15: The Prime Minister at the opening of the new Nanolab, 6th April 2011

Photo by Eric Brinkhorst.

iii/ THE RELATIONSHIP OF PHYSICAL ENVIRONMENT AND IMAGE

The various kinds of image that Kennispark tries to construct are in line with the way that Gallent et al. describe science parks more generally, as identikit, tasteful, landscaped campuses (p 40), bringing them into the category of Augé's class of 'non-places':

"a space which cannot be defined as relational, or historical or concerned with identity". (1995, p.78)

At the same time, this involves an extremely restrictive reading of the physical environment around the Kennispark, and the imposition of a uniform functional arrangement onto what is clearly a functionality differentiated site. As described above, the image of Kennispark is new, dense, bounded and tangible and whilst that might be a reasonable description of the way that the former Business and Science Park location functions, it is simply not a good way to characterise much of the Kennispark site, or indeed Kennispark as a whole. The former BSP location was developed without an internal structure – the land was divided into plots, the plots were sold, buildings developed with no overall masterplan, although with relatively strict requirements for the kinds of activities located there. In that sense, the BSP does indeed lack a connection with local history or identity, with the possible exception of the former cash depot of the De Nederlandse Bank on the Auke Vlierstraat, which was taken over by the university and then became the location for an ultramodern internet exchange. But the image conveyed of Kennispark is of precisely this familiar kind of non-place, with more density than a traditional suburban science park but at the same time still relatively sanitised, controlled and ordered, a distinct entity separated from the immediate environment within which it nestles.

Part of the issue here is that there is not a strong demand for images of the Kennispark because the region is peripheral, both in physical terms but also in terms of the national imagined innovation agenda. When Kennispark appears in the media, it tends to be for set piece events where there is a specifically choreographed image produced of the visit, for which the Kennispark is merely a backdrop. If one looks at the provincial broadcaster (RTV Oost) or regional newspaper (*Tubantia*) as indicative of the kinds of images that Kennispark is producing and that would achieve wider traction if there were greater interest, then we see that the main use of the physical environment is in the Gallery building as an iconic marker, and indeed particularly focused on the flying-saucer-esque former lecture theatre. The Administration building, Spiegel, occurs a number of times to indicate the university playing a role in Kennispark (for example in stories about Twente's competitive position, UT organising exchanges with students from Singapore, and a Twente student entrepreneur being nominated for best student entrepreneur in the Netherlands). A final image that emerges is of the banners for Kennispark, whether at the entrance to Gallery or elsewhere, that succinctly sum up the desired Kennispark image.



FIGURE 16: A banner at the entrance to the Gallery Car Park

Source: authors' own photo archive.

The element of the landscape and environment that are coded into the images produced for external consumption in relation to the campus as a whole, particularly when consideration is made of the university areas, which have a completely different spatial logic and appearance that is not reflected in this "Flagship Innovation Campus" image. An absolutely key element of the physical environment in the Kennispark is the division between the north and south estate areas, between the university mixed work, residential and recreational functions, and the business park primarily work activities. There are very slight hints of this when the surrounding forests are alluded to in the images, whether physically to the north side of Carré in the cover photo for the Kennispark website or in the various cartoon images produced for the entrepreneurial ecosystem diagram. The images that emerge of Kennispark for outside consumption tend to focus on the critical mass of buildings developed around the central education square, that currently form the heart of the university and an access point into business through the Gallery.

iv/ OWNERSHIP & INVESTMENT IN KENNISPARK

There are two kinds of land owners involved in the management of Kennispark. On the university part of the site, the university is owner and responsible for the development of almost own the buildings, whilst on the Business and Science Park, the municipality created the site and then released the plots for sales to private owners and developers. The biggest change in this pattern recently came with the development of both the Gallery building and the High Technology Factory. In the case of the Gallery, a group of private investors came together as The Gallery BV to raise €3.5m, guaranteed and secured a €9m bank loan with the promise of a core income stream from what became Design Laboratory, and developed the first phase. The owners of the Gallery BV included the University, the Business and Technology Centre, the VolkerWessels construction business, and Reggeborgh Groep, a private property investment company with regional roots. In the second phase, which was awarded a Provincial Innovation Grant in January 2015, a new investor is being sought with more experience of managing a high-technology space; the plan for phase 2 is to develop this and decant out current residents of the BTC, demolish the BTC and use that area to provide new parking for Kennispark.

Because of the problems with the university estate since 1998, the university has been actively seeking partners to redevelop the campus, and part of that has been trying to attract investment funds from the national state. The MESA+ Laboratory, and now the Nanolab, have served to anchor the university's position and were funded generously from a series of Dutch national knowledge infrastructure investments in the nanotechnology sector, funded by profits from the Dutch oil funds, the aardgasbaten (Microned, Nanoned and Nanonext). The university has sought to receive investments for the campus by portraying itself as a project of critical importance to the national state, although it has not received the structural funding that this would have implied, with a lot of funding in the 2000s coming on the basis of annual innovation funds from the Ministry of Economic Affairs. Prior to 2010, Kennispark was awarded €7.4m national funds for the High Technology Factory Project, to convert the former MESA+ clean room buildings into a pilot and upscaling facility for nanotechnology businesses. In 2015, the Ministry of Infrastructure implicitly acknowledged that its strategic vision and investment programme offered relatively little to regions outside the immediate core, and designated six regions as regions of national importance for key elements of the Dutch economy (the Top Sectors).

04/ Conclusions: Kennispark as technoscape and ideoscape

IN CONTRAST TO THE NATIONAL ECONOMIC PROJECTS and diplomatic ideoscapes which underpin certain global science 'scapes, Kennispark was conceived as a localised entrepreneurial high-tech ecosystem within the wider knowledge- and innovation-infrastructure of the Netherlands. A local technoscape built up in the course of the 1990s as an inadvertent consequence of attempts to create science assets that would support entrepreneurship as a means of building support for the university as it struggled to secure its survival in the increasingly competitive Dutch higher education landscape. This was by no means the only experiment that the university attempted – it developed new courses such as informatics driven by the same kind of survivalist instinct. But it was the development of the local technoscape that was to become increasingly prominent in the life of the university, of its local stakeholders and then later a much wider set of network partners and contacts internationally.

At the heart of the local technoscape were local attempts to build technology specialities for the university and a research infrastructure to support those activities. Because of the ways those investments were financed, and also because of past experiments in entrepreneurship, these nanotechnology research activities started to create a new kind of spin-off company around the university, that was very different to those which inhabited the existing entrepreneurship infrastructure (oriented towards consultancy rather than mechatronics manufacturing companies). Some of these companies grew and began to construct their own physical space, other companies started to place new kinds of demands on the universities and regional research infrastructure funders, and over approximately a decade a new physical infrastructure emerged that increasingly came to define not just the nanotechnology sector, but what the university was and what it aimed to do. In this period, the effects were spread through local and regional policy makers' construction of the idea of Kennispark to the science park opposite the university (originally created to host consultancy business, but from the mid 2000s increasingly been seen as being the cradle for a high technology systems and materials cluster). It is possible to see that the technoscape emerged spontaneously or at least unselfconsciously, and then as it became more self-conscious, mobilised the associated Kennispark ideoscape as a way of building the necessarily support coalitions to sustain the necessary investment to continue to develop the technological infrastructure and to sustain the position of the technoscape as a leading world location.

The technoscape has evolved to validate itself by creating correspondences to different kinds of ideoscape, often closely related to particularly popular ideas of the time. How else to see its brief diversion in the late 1990s into the notion as a cradle of dot.com activity before that bubble burst, styling itself as a 'Silicon Valley on the Dinkel', and developing new buildings attracting short-lived new investments from ill-fated dot.com activities. That idea burst as quickly as the underlying bubble, quickly attaching itself to the Ministry of Economic Affairs' national economic development policy in the mid 2000s and then attempting to position itself as a physical location for the Top Sectors after that became national policy in 2010. But it is not just the national policy ideologies and beliefs which have permeated into the ideoscape of Kennispark, rather it is possible to see other (international) academic ideas influencing developments and achieving some kind of physical representation in the overall physical form of Kennispark. We can point to at least three main ways in which different kinds of ideological projects have led to physical landscape developments that have had strengthening and interactive effects more generally on the technoscape, and its ability to portray itself as a location for 'serious' elite sciences attractive to outside partners.

Perhaps prominent in that is that it is an *innovation ecosystem*, physically depicted in the project offices of the Kennispark secretariat and depicted in **Figure 12**, the idea emerging in the late 2000s in response to a dissatisfaction with more systemic approaches to regional innovation policy that see putting the right ingredients into place as being sufficient for a regional economy to succeed. The ecosystem approach emphasises the interaction between the actors. Those interactions are something that have been implicit in the technoscape as early as 19996 with the development of the MESA+ location where masters students could work with corporate technicians on shared equipment to solve mutually interesting problems. The ideology of interaction has more recently been manifested in the creation of the Education and Research Square between the university and new Kennispark incubator space (Gallery, 2007), as well as the removal of the viaduct to eliminate the physical barriers to interaction between the university and business sides of the Kennispark site (2011). More recently, the argument has emerged to physically replan the site to incentivise more interaction across the street that remains between them, with cycling bridges, tunnels, a light rail connection and other ideas being fleetingly mentioned as physical attempts to deliver the interactive ideology.

A second form of ideoscape that has had clear resonances for the technoscape has been that of the "living laboratory" idea, related to the notion of entrepreneurial innovation ecosystems, but in that the Kennispark site is itself an experiment from which lessons can be learned and activities can be studied in high-technology societies. The university has therefore sought to play up its origins as an experimental institution, with all kinds of freedoms to innovate educationally, and reinvent that for the 21st century in which universities' contributions are seen increasingly in the way that their research becomes embedded through entrepreneurship into societal transformations. The origins of the physical manifestation of this experimentality lie in the Technoscape, and the construction at the university

in the late 1990s of an incredibly fast internet network around the university and city, to be seen in the physical infrastructure of the NDIX. The university attracted a number of firms who were interested in working on this infrastructure, working at the university as an interesting location to see how complex heterogeneous communities used these new infrastructures. The university has invested in two new physical sites to promote living laboratory approaches to science, the Design Lab and the Medical Testing Ground. The university has for the last two years adopted a strategic priority of the Living Smart Campus in which staff, students and other stakeholders can submit proposals for practical and academic experiments in using university infrastructure and the campus to create new knowledge as well as to create a lively and liveable campus.

The third form of ideoscape that has taken root in this time is that of entrepreneurial science, and that has been in particular important to external investors in the site, in that the Kennispark location is a profitable place to invest in science, technology and innovation in ways that bring about public benefits. At a European level, the creation of a European Institute of Technology was seen as an attempt to transform European science investment programmes from investing in existing companies and research groups, to stimulating new entrepreneurial innovations with the capacities for widespread societal transformation. Kennispark in the Netherlands should have been well-positioned to profile itself within this emerging idea of entrepreneurial science because of its longstanding experiences in stimulating academic entrepreneurship. The Technical University at Eindhoven, fortuitously collocated with Philips and already working strategically with the very entrepreneurial Leuven and Aachen universities, managed to assume the mantle of the Netherlands' innovative location (Brainport). Much of what Kennispark has been seeking to do is to escape from its overshadowing, developing unique physical technological assets that position itself as a leading location, and to increase the recognition it achieves via participation in projects such as the EIT but also in more applied research activities from the Dutch Applied Science Research Council (now part of the Research Council). One notable effort here is developing the Twente Safety campus on the site of the former military airbase as a location for security and drone research – complementing existing entrepreneurial activity related to drones such as the lauded Clear Flight Solutions spin-off company.

Gradually, then, a fundamental re-imagining of the university and its changing regional role has been the ideoscape motivating the development of the area, as the initial rationale for a form of campus-based sequestered cloistering of newly attracted staff and students in an old industrial region gave way to a regionally-oriented entrepreneurial project, informed by various strands of thought around high-tech development including business incubation, wider technopole-formation, more flexible campus master-planning, and high-value business property development. A key element of the Kennispark project has been an attempt locally to position the Twente region and the Enschede functional region as a strategic national intellectual infrastructure suitable for strategic infrastructure investment, thereby casting Kennispark as an explicit political project within the Netherlands, in particular as a means of

contradicting a national economic development narrative which sees the east of the Netherlands as being a 'backward place'. To some extent Kennispark has been successful in positioning itself within the national policy discourse as part of the Dutch national knowledge infrastructure, though the central state in the Netherlands has generally been resistant to these efforts to recognise Kennispark as something special and distinct from other Dutch regions. Thus the various ways in which Kennispark has been imagined – physically, economically and politically – generate a very particular context for high-tech development in this part of the Netherlands.

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ADDITIONAL READING

- Although these resources have not been cited in the text, they have contributed to the background knowledge that has fed into this working paper and the authors would like to acknowledge their contribution.
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