

Light for **Public Space**

A Philips essay on the experience
of light in today's cities

Light for **Public Space**

Susanne Seitinger
Antonia Weiss

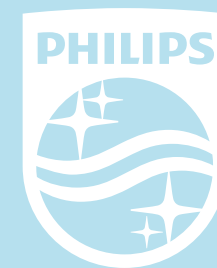


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Foreword

Jeffrey Cassis

Light for Public Space is a must read for anyone working with the public sector as a lighting professional, urban planner, public administrator and as a manufacturer of digital lighting and information technology. Seitinger and Weiss explore fascinating public lighting projects around the world that clearly demonstrate how ambient, dynamic, responsive and interactive lighting can improve the local economy, public health and the well-being of a community.

As a leader of our public connected light programs at Philips Lighting, I have seen first-hand how advancements in connected LED lighting has allowed cities to redefine the use of lighting in public spaces. The authors take you on a journey from when lighting was initially applied to road and street projects for automobiles to examples of interactive lighting applications used to create more livable spaces. They also discuss how projects can provide these values to citizens while reducing global greenhouse gases and energy costs.

Connected digital lighting is becoming an important actor in Smart Cities, especially when combined with a comprehensive urban plan to engage citizens and stakeholders alike. From this vantage point, the authors challenge the status quo in lighting design for public spaces by taking a broad user-centric point of view. They believe that connected lighting is a unique resource that is able to adapt to the unforeseen changes in cities and their patterns of use.

‘Connected digital lighting is becoming an important actor in **Smart Cities**.’

You will surely take away many inspirations and well-developed concepts for your current or future projects and learn how to shape the latter for the best long-term outcomes.

Enjoy the read!

Jeffrey Cassis
General Manager Global Systems

Foreword

Nancy Clanton

Seitinger and Weiss are absolutely right to focus on lighting for the pedestrian. New livable vibrant cities will attract people to walk and bicycle by getting out of their cars. Moving from roadway-centric lighting, we must indeed begin to make light for people. Many of the techniques for interior lighting –such as the creation of multiple layers of light– can now be applied to outdoor spaces.

‘We must indeed begin to make **light for people** – not cars.’

What challenges does this present? Our current standards and recommendations are from a vehicular based vantage point and pedestrians are a second thought. Too often we still think of public lighting’s role as allowing motorists to detect pedestrians. Walking pedestrians and cyclists are more vulnerable; where

they look, what they need in a lighted environment is completely different from motorists. Intuitively, we know that pedestrians need to detect sidewalk hazards, see destinations and attractions, recognize people and generally feel safe. How can we as lighting practitioners understand ambient lighting levels, uniformity, vertical surface illuminance and glare together to address the challenges of lighting public spaces more holistically?

Light for Public Space raises awareness of how lighting for the public realm should be conceived of and designed. Now, we as design practitioners must actively promote further research and change our recommendations to provide guidance on how to apply these new techniques.

Nancy E. Clanton

PE, IALD, FIES, LEED Fellow
President, Clanton & Associates, Inc.

About the Authors

We draw on our backgrounds in architecture, urban planning, design and technology to offer a holistic perspective on contemporary cities and the role of light within them.

Susanne Seitinger, Senior Technologist for Advanced Applications at Philips Color Kinetics, leads the research and strategy around the impact of programmable LED lighting elements to create safe, inviting and responsive urban environments. Her combined background in architecture, urban planning and human-computer interaction is comprised of research and design projects like the Digital Mile in Zaragoza, Spain, and Urban Pixels, wireless LED pixels for ad-hoc media façades. LightBridge, a project in honor of MIT's 150th anniversary in Cambridge, Massachusetts, used

new configurations of low-resolution displays and sensor-activated urban screens to showcase the potential of responsive infrastructures in future urban lighting plans. Seitinger received a BA from Princeton University as well as a PhD, MS and MCP from MIT. Her PhD dissertation—Liberated Pixels: Alternative Narratives for Lighting Future Cities—explored the aesthetic and interactive potentials for future lighting and display infrastructures.

Antonia Weiss, Strategic Designer at Philips Design Lighting, researches and develops future applications of lighting technologies in different spatial contexts, including workspaces, domestic and urban environments. She received a Bachelor degree in architecture from Cambridge University and a Master of Architecture from Princeton University. Her interests concern the changing role of public spaces in a globalizing world, and her master thesis proposed an urban masterplan to rethink the city of Brussels as a transnational capital. Antonia has practiced architecture in the UK and in Switzerland.

Introduction

Today, more than half of the world's population lives in towns and cities. Historically, urban living has been associated with a better quality of life, including better health, higher levels of education and improved access to social, economic and cultural resources. However, the rapid pace and changing character of urbanization is beginning to threaten this age-old promise. In this context, municipalities increasingly look to state of the art technology to enhance the livability of their cities.

Light is swiftly becoming one of the most powerful tools to **breathe new life** into cities and to initiate a new era of urban design.

Simultaneously, citizens are already using technologies like location-based services and social networking tools in new ways to navigate the urban environment and to take ownership of public spaces. The increasing integration of networked technologies into our urban environments also affects the role of light in cities. Light is no longer merely a supporting actor for shaping public spaces. In fact, it is swiftly becoming one of the most powerful tools to breathe new life into cities and to initiate a new era of urban design.

Light impacts human beings on a deeply **personal** and individual level.

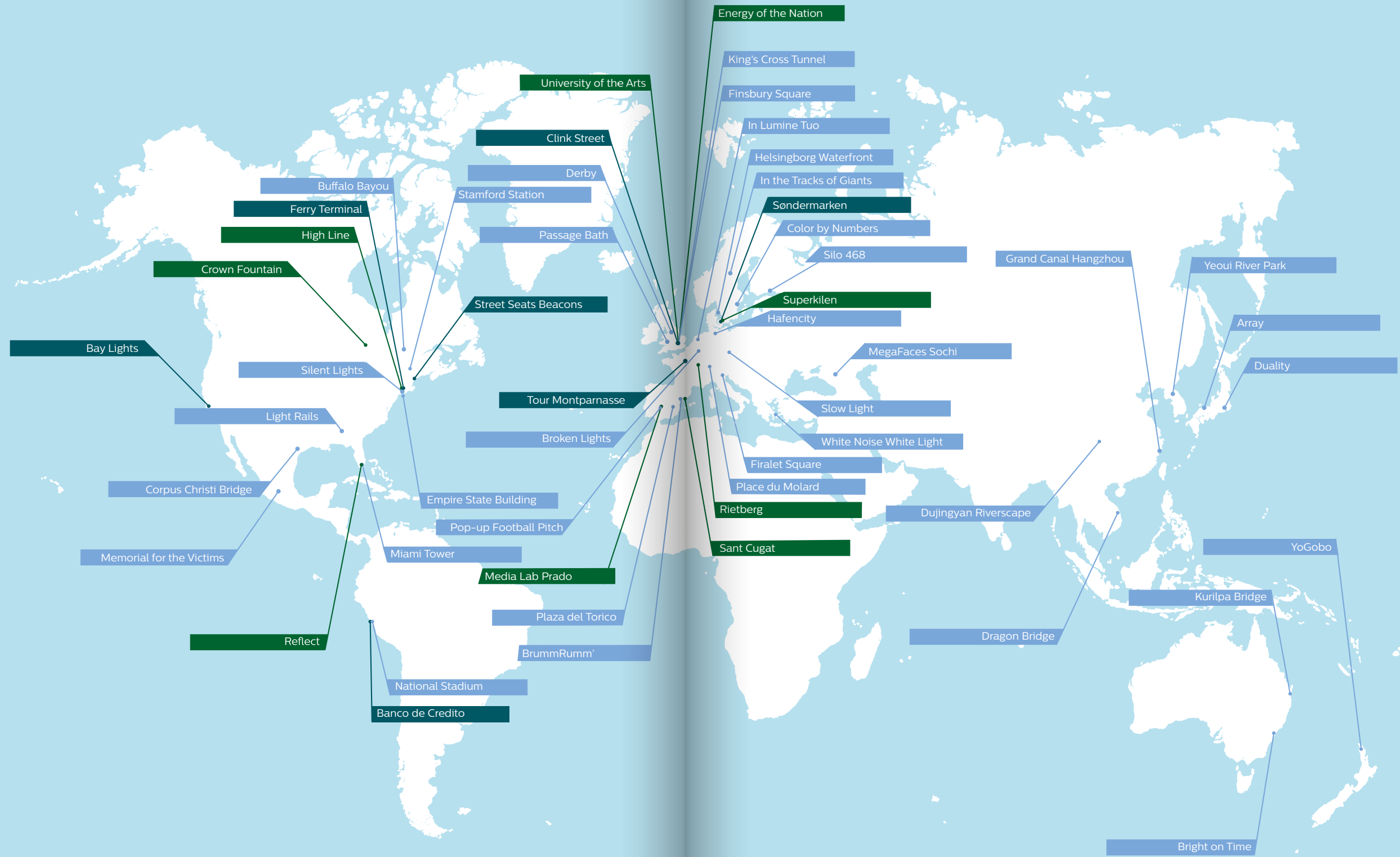
This paper is based on more than 100 case studies from around the world. Though definitely not an exhaustive collection, these diverse projects illustrate the extent to which contemporary technologies such as light-emitting diodes (LEDs) are expanding the possibilities of public lighting.

As municipal officials are beginning to introduce new lighting solutions to their cities, they are not only weighing the benefits of cost-cutting and energy savings, but they are also committed to building neighborhoods that support vibrant urban life and attract new economic activity. On the most basic level, these considerations are linked with the nature of light, which impacts human beings on a deeply personal and individual level. More generally, shared values across a community influence how citizens approach questions of safety and thus access the resources of the city, especially public space at night. Many designers in related professions like urban planning, lighting design, architecture and landscape architecture therefore aspire to incorporate lighting into their toolkit.

This paper is for these creative practitioners as well as local and municipal government stakeholders excited about collaborating with interdisciplinary teams on future urban lighting projects. References range from design, architecture and technology to offer a thought piece that is both reflective and actionable. In acknowledgement of the rapid pace at which the field of lighting is developing, this document is conceived as a living and open-ended project that will change and grow.

In acknowledgement of the **rapid pace** at which the field of lighting is developing, this document is conceived as a living and **open-ended** project that will change and grow.

Case Study Map



We reviewed more than 100 projects across the globe to understand how the role of light in public space is changing. A select few are shown here and discussed in this paper.

Projects **Part 1**
 Projects **Part 2**

Light for **Public Space**

A New Wave of **Public Lighting Designs**

1

Six major areas of change illustrate a new approach to public lighting.

Reflect

Miami – Ivan Toth Depeña + Focus Lighting

MediaLab Prado

Madrid – Langarita Navarro Arquitectos

Rietberg Masterplan

Rietberg – Jürgen Meyer-Brandis

City Hall Square

Sant Cugat – Artec 3

University of the Arts

London – Light Lab + Planet Earth + Fulcrum

High Line

New York City – L'Observatoire International

Superkilen

Copenhagen – BIG + Topotek + Superflux

Crown Fountain

Chicago – Jaime Plensa in collaboration with Schuler Shook

Energy of the Nation

London – Sosolimited

Driven by socio-political changes and technological advances, a new understanding of light's social and urban role is being developed. This refreshing approach to public lighting moves beyond the constraints of roadway and functional lighting to focus on activating public spaces.

Urban lighting projects in recent years have shifted away from longstanding assumptions about public lighting towards a new image of urban nightscapes. This latest wave of projects, ranging from small installations to lighting masterplans, embodies a completely transformed understanding of light's role and distribution in space, of its users, their behavior and their preferences.

These developments are sometimes driven by technological progress in the field of solid-state lighting. Yet, their origins are also more diverse and intertwined with the desire among urban design professionals and city leaders to bring a diverse toolset to bear on questions of revitalization, economic development or urban design. Contributors include cultural changes, developments in the social and natural sciences, as well as broader political and social shifts. Six major areas of change illustrate the breadth of ideas that has been generated and the myriad applications of LED-lighting in public space.

From Roadway-Centric Lighting to **Light for People**

1.1 From Roadway-Centric Lighting to Light for People

In recent years the role of public lighting has changed dramatically. A new generation of designers is using light to make public spaces more attractive to pedestrians and cyclists, contributing to a healthier and more sustainable urban future.



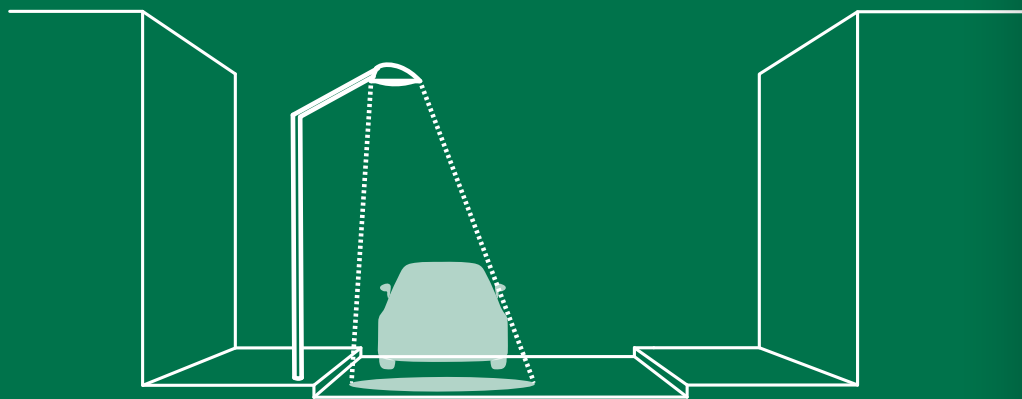
Reflect
Ivan Toth Depeña

From Roadway-Centric Lighting to **Light for People**

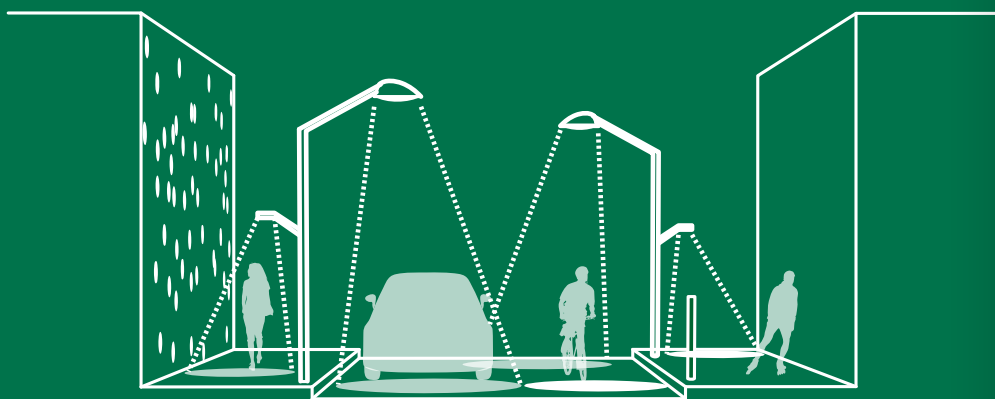
For much of the 20th century, public lighting was considered synonymous with road lighting, its main function to provide optimum visibility to drivers. The result of this belief was a previously unknown uniformity of light across the urban realm. After pedestrians from previous centuries had often witnessed dazzling night scenes interspersed with festive lights and retail lighting, the mid-20th century saw the focus of attention shift towards cars.¹ The needs of pedestrians, who had inspired the introduction of street lighting in the first place, were thus sometimes deprioritized.²

While road safety needs to remain a key focus, recent projects attest to a renewed attentiveness to pedestrians and cyclists alike. Not only is this a direct outcome of global efforts to reduce CO2 emissions and of changing attitudes towards vehicular transportation, it is also an acknowledgement of the countless advantages of walkable cities.³ The latter can contribute to public health, constitute a more inclusive environment, and result in financial and energy savings for both governments and citizens.⁴ It is therefore no surprise that many of the most innovative urban lighting projects of recent years have focused on the pedestrian experience.

Ivan Toth Depeña worked with Focus Lighting to create his *Reflect* installation, which uses LED lights placed behind a diffusing surface to create free-standing vertical panels depicting colorful pixelated patterns. Programmed in combination with cameras placed around a public lobby, these light boxes respond to movement and create an interactive art piece. The imagery is similar to a heat map of the space that fades over time. These visual traces constrained to a few pixels on a vertical wall provide a sense of presence, security, and delight for people hurrying through the lobby of the Stephen P. Clark Government Center MetroRail station in Miami, Florida.



From roadway lighting ...

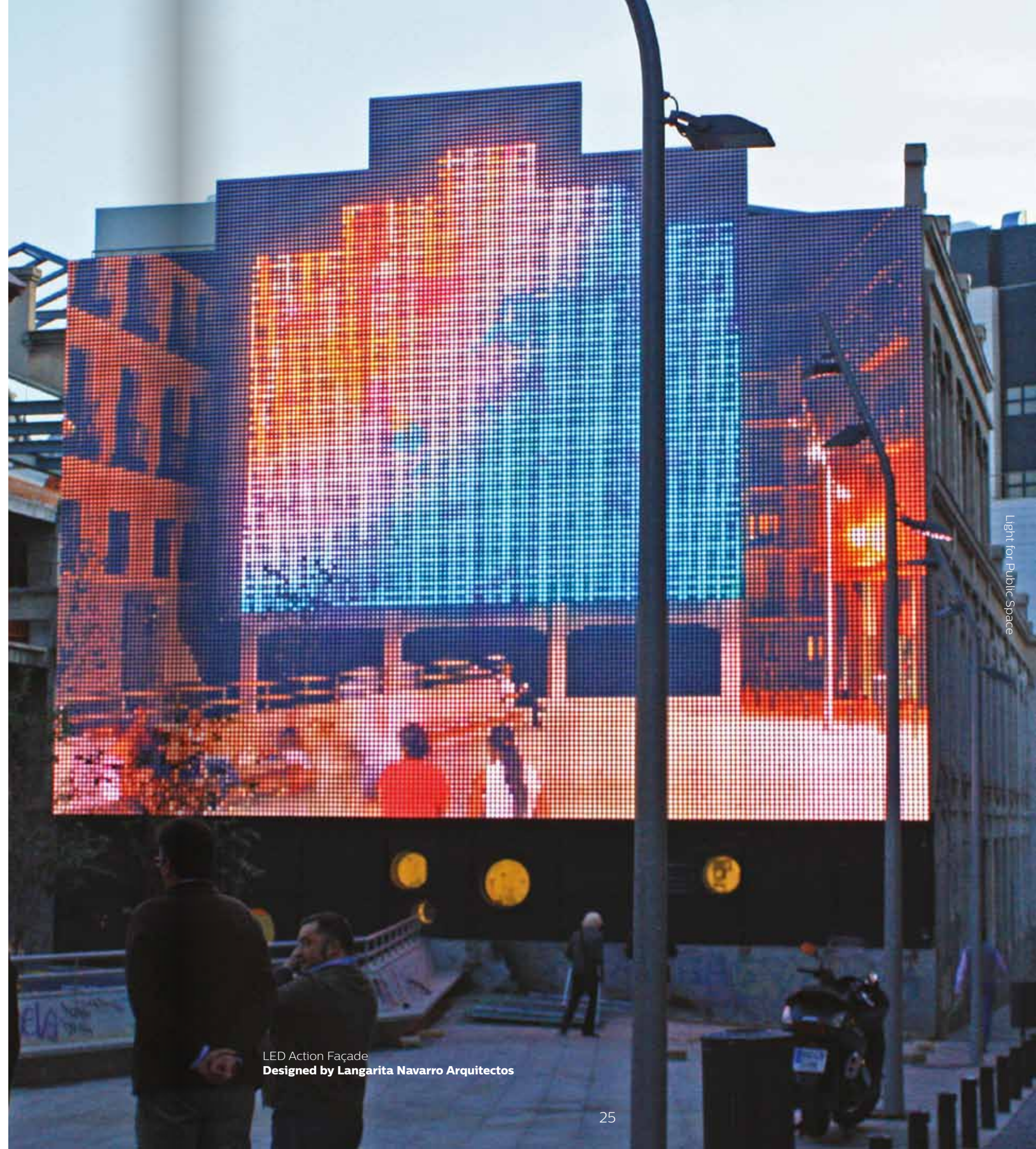


... to light for people



LED Action Façade
Langarita Navarro Arquitectos

Another example is the LED Action Façade of the [MediaLab Prado](#) in Madrid, designed by Langarita Navarro Arquitectos as part of an EU-wide research project on urban screens. Facing a small public square wedged between the MediaLab itself and the public magnet that is the adjacent Caixa Forum, this urban screen provides a focal point for residents and tourists. The installation consists of a grid of more than 35,000 light nodes individually addressable to create a screen surface with the capacity for both simple communication and direct interaction. By offering inspiring imagery and opportunities for engagement to passersby and those who populate the square at night, the project contributes to night life experienced on foot.



LED Action Façade
Designed by Langarita Navarro Arquitectos

From Uniform Lighting to **Carefully Curated Lightscapes**

1.2 From Uniform Lighting to Carefully Curated Lightscapes

Today's cities are lit by a careful curation of ambient lighting, focal points and colorful accents. Supported by new technological developments, lighting designers now have infinite means to create rich light fields by modulating and orchestrating multiple layers of light at once.



Artec 3
City Hall Square

From Uniform Lighting to Carefully Curated Lightscapes

With a renewed emphasis on pedestrian night life, contemporary lighting projects are also rediscovering the appeal of subtle variations in light distributions. Previous generations of lighting professionals considered uniform light to be a guarantor of safety on both roads and sidewalks. They frequently applied the standards developed for roadway lighting to residential areas and smaller streets with little traffic.

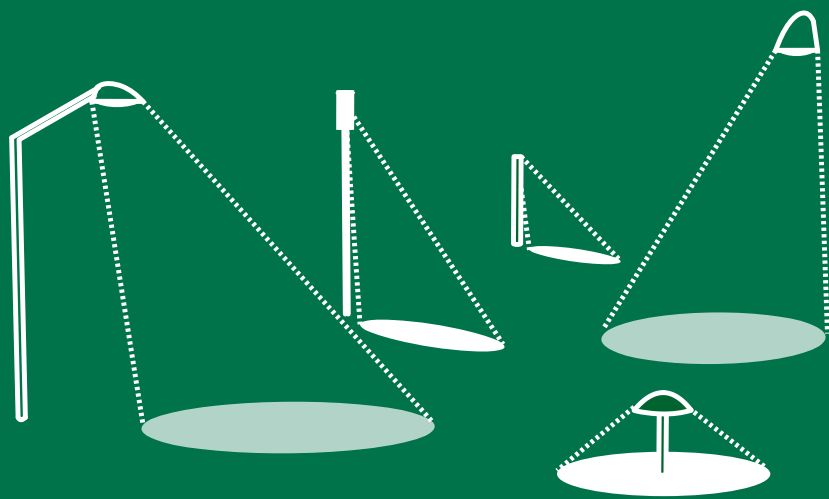


Artec 3
City Hall Square

Lighting expert Wout van Bommel emphasizes that urban areas with higher levels of non-motorized traffic need an entirely different approach to lighting: one which makes use of contrast to simply “make a space more interesting” to its users.⁵ In pursuit of a similar point of view, Nancy Clanton and Ron Gibbons have conducted experiments to challenge the practice of “spraying” uniform light on urban environments. Their studies have shown that lower light levels can provide greater contrast, and that this contrast can actually improve our detection and visibility. In addition, the introduction of LED lighting has given us the ability to precisely focus light on the relevant areas instead of “bathing” a space in light.⁶ As a result of this growing body of knowledge and improved technology, many present-day projects are characterized by a careful curation of ambient lighting, focal glow and accents.



From uniform lighting...



... to carefully curated lightscapes



Philips
Artec 3
City Hall Square

A project by Spanish lighting designers [Artec 3](#) exemplifies this more differentiated approach. Located in the small town of Sant Cugat, the longitudinal [City Hall Square](#) is a central connection point and a meeting place for the town's 60,000 inhabitants. The designers reconciled the need for basic illumination with a desire to offer citizens a stimulating environment. Their design consists of custom-made light fixtures emitting two layers of light, one subtle, consistent and white, the other made of colored patches of light sprinkled across the space to form a rhythmic pattern. The designers programmed these secondary lights to follow a color gradient based on four main hues which vary with the seasons. Each gradient is animated in turn so that individual tints from each gradient travel along the length of the promenade. The visitors' sensation thus changes with their position, the time of year, and their movement across the space. Instead of bathing the square in a homogeneous glow, Artec 3's concept creates a lively atmosphere without compromising on visual comfort or safety.

The introduction of LED lighting has given us the ability to **precisely** focus light on the **relevant** areas instead of “bathing” a space in light.



Rietberg
Jürgen Meyer-Brandis

1.3 From Brighter is Better to a Controlled Use of Contrast

Today many lighting professionals challenge long-held assumptions about the inherent value of bright light in public spaces. In the contemporary city, lighting designs are carefully calibrated to site-specific needs, taking into account the contrast, context and adjacencies of light.

From Brighter is Better to a Controlled Use of Contrast

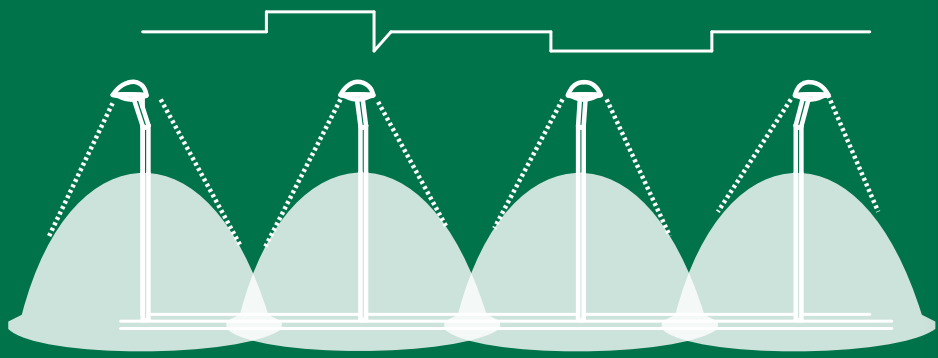
From Brighter is Better to a Controlled Use of Contrast

With the proliferation of lighting technologies in cities, there has also been an increase in the sheer amount of light available at night. Sometimes this trend results in over-lighting of specific spaces – on purpose or through coincidentally overlapping infra-structures. These conditions also sometimes contribute to more extreme contrast.

A recent survey, conducted in the city of Derby by the LSE's Configuring Light group in collaboration with lighting designers Speirs & Major, came to an insightful conclusion: the extremely bright illumination of the city's high street caused citizens to perceive the adjacent more residential areas as unsafe by contrast. In other words, citizens' subjective perception of safety depended a great deal on the nature of the transitions from one lighting zone to another.⁷ A recent study by the TU Eindhoven concluded that people's feeling of safety at night was strongest with only their immediate surroundings brightly lit while the more distant parts of the road ahead of them were kept at lower light levels.⁸

Dynamic street lighting systems which incorporate sensors of all types to create light on demand can help to create these conditions. For example, Philips LumiMotion uses optical sensors and wireless communication to detect movement and switch lights on only when and where they are needed. If activity is detected, the system brightens an area in front and behind the moving person while keeping distant luminaires at lower light levels.

Reduced public budgets and a widespread ambition to create more sustainable cities have further boosted support for a more deliberate control of brightness and contrast. With the possibility to address individual light points through central management platforms, cities can reduce general luminance levels and only increase them during particular parts of the day or in response to specific incidents.



From “brighter is better”...



... to a controlled use of contrast

The precise amount of energy savings resulting from such scheduled and adaptive dimming will depend on the time of day and length of the cycle, but it can increase energy savings by an additional 20-30% when replacing old luminaires with more energy-efficient LED fixtures.⁹ Lastly, a growing body of knowledge about light pollution and about the effect of artificial light on wildlife has motivated designers and engineers to seek more carefully calibrated lighting solutions.¹⁰

One example of a holistic approach to brightness and contrast is the masterplan for the small town of **Rietberg** in Germany, designed by Jürgen Meyer-Brandis. The project uses a City Touch system in combination with LED lights in the form of wall washers, recessed in-ground lighting, and poles to create a state-of-the-art nightscape for the historic town. Since the majority of the lighting is focused on the façade of the bordering buildings, the public spaces are lit at comfortable levels without being obstructed by unnecessary light points or disturbed by excessive brightness. In this manner, Rietberg's night sky remains visible, too. In order to guarantee sufficient visibility for the elderly, a custom-made paving block with integrated LED components was added to the streetscape to form a "light band". It addresses the need for additional guidance using visual as well as acoustic and tactile qualities. The Rietberg project thus demonstrates how a carefully tuned and varied lighting scheme can satisfy basic perceptual needs while enhancing a site's character and atmosphere.



Rietberg
Jürgen Meyer-Brandis



Rietberg
Jürgen Meyer-Brandis

A growing body of knowledge about **light pollution** has motivated designers and engineers to seek more carefully calibrated lighting solutions.



High Line Lighting
L'Observatoire International

1.4 From Overhead Lighting to Enveloping Light

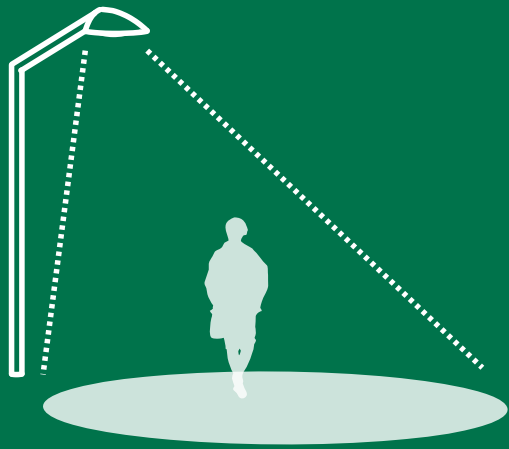
The emergence and rapid development of LED lighting has changed the way public lighting is integrated into the built environment. These days light comes in a myriad of shapes and sizes, is embedded in different materials and can be placed above us, beneath us and everywhere around us.

From Overhead Lighting to Enveloping Light

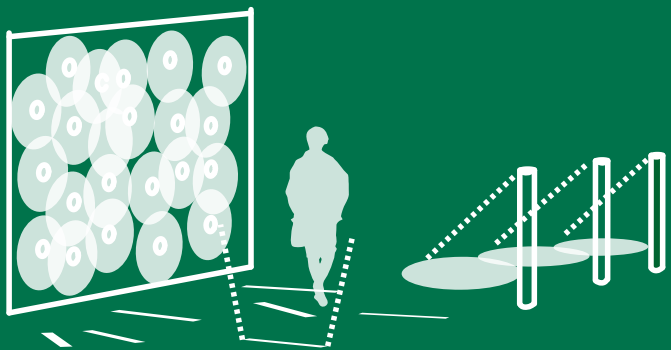
From Overhead Lighting to Enveloping Light

As the Rietberg project indicates, much of the innovation of recent lighting schemes lies in the proliferation of new form factors beyond the pole-mounted light point. Undoubtedly, street lights will continue to exist in their traditional form. Contemporary designs like the Sant Cugat project by Artec 3 show how even street lighting poles can be rethought with the help of new technology. Nonetheless, one of the most liberating aspects of lighting design today is the greater ease with which light can now be embedded or attached to the multiple surfaces forming our physical environment.

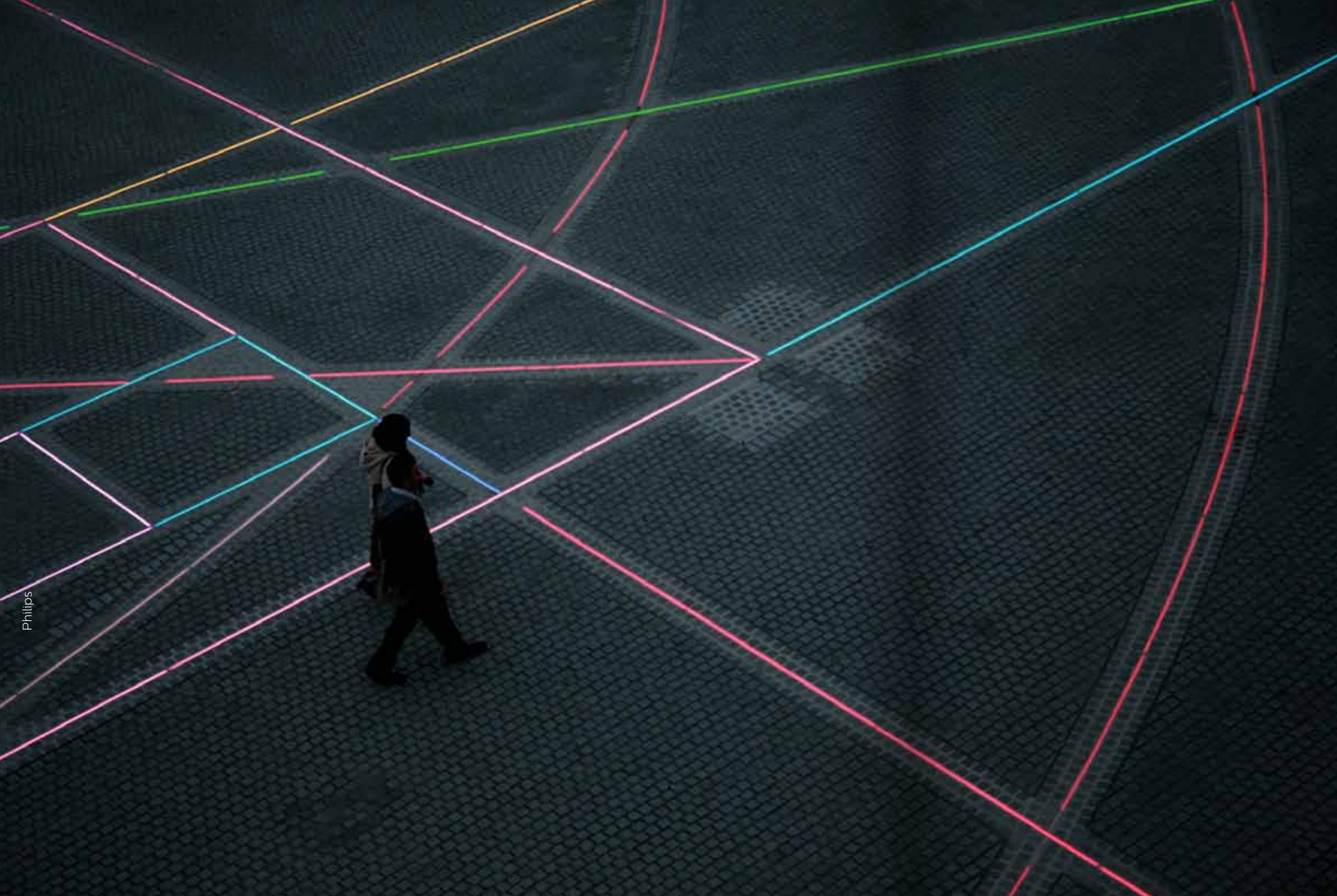
This freedom, of course, largely stems from continuous advances in solid-state lighting with respect to size, efficiency, and longevity. This means the placement of light points is increasingly liberated from traditional concerns. As a consequence, for the first time in history we can now experience artificial light as something enveloping. This new freedom of integrating additional light into the urban setting can be utilized to many different ends. In London for instance, the lighting practice Light Lab placed LED lights right under people's feet. Their design for a square in front of the University of the Arts uses custom-made strips of LED lights to carve an abstract light pattern into the cobbled ground. The designers pre-programmed diverse schemes to create different light effects. They even provided art students with an interface so they could produce their own schemes.¹¹



From overhead lighting...



... to enveloping light



Philips

Light for Public Space

Light Lab
University of the Arts

New lighting form factors have liberated designers to **embed** lighting into our environments, to **employ and shape** light in the manner of a physical material.

A very different approach was taken by Hervé Descottes and his studio L'Observatoire International when commissioned to light the **High Line** in New York. The team placed LED lights on the underside of furniture elements and alongside the perimeter of the former railroad tracks. With all lighting installed below eye level, the team created a glare-free environment. At the same time, the low-level soft light emphasizes the textures and colors of the planting beds while keeping Manhattan's nightscape visible.¹² As these two examples illustrate, new lighting form factors have liberated designers to embed lighting into our environments, to employ and shape light in the manner of a physical material and to create new spatial experiences through it.

From One-Size-Fits-All to a Celebration of Diversity

1.5 From One-Size-Fits-All to a Celebration of Diversity

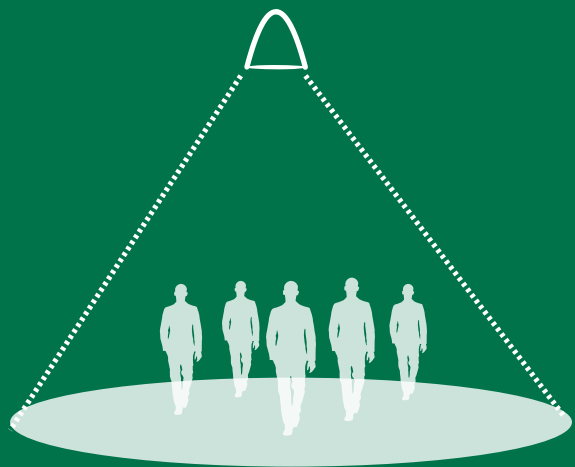
The era of digital lighting promises to deliver a more differentiated user-centric experience than public lighting of the past. As lighting changes from a fixed entity to a tunable medium, lighting designers are able to tailor effects to specific user groups and their individual needs and preferences.

Crown Fountain
Jaume Plensa, Krueck + Sexton
Architects, Schuler Shook

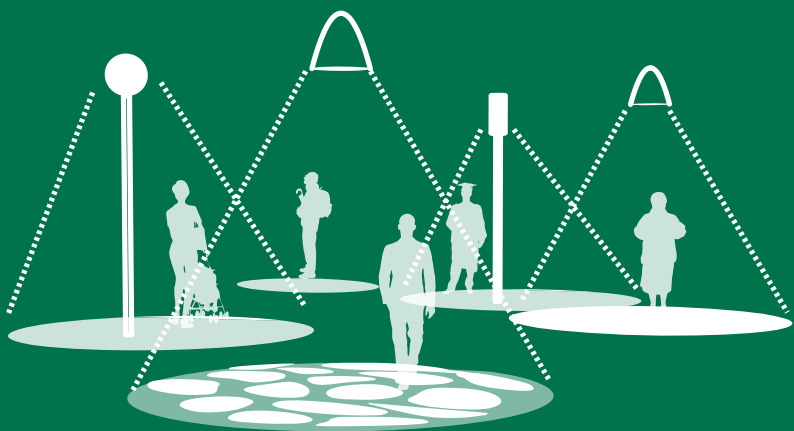
From One-Size-Fits-All to a Celebration of Diversity

Thus far, many of the examples discussed here have shown how designers have begun to exploit the digital nature of LED lighting by including interactive or adaptive functions in their projects. It is evident that with the arrival of LED technology, artificial light in the public realm has been transformed from a fixed entity to a tunable medium. One implication of this newfound versatility is the progress of understanding the lighting needs and preferences of different user groups within the urban realm. While much of recommended practice for street and area lighting has focused on creating quantifiable standards, the era of digital lighting promises to deliver a more differentiated user-centric experience.

Creating a meaningful and memorable nighttime experience involves accounting for physiological differences amongst users, such as varying height or sensory impairment. The latter aspect also includes identifying the lighting needs of the aging population. As a result of several physiological changes with increasing age (such as the yellowing of the lens and the decreased agility of the pupil), eyes become more sensitive to glare and require higher uniformity as well as higher illumination levels. In addition, light in certain parts of the color spectrum will be less visible to the aging eye. In times of a growing population of elderly residents, it is imperative that public lighting solutions take these insights into account and design lighting suited to their needs. This might involve balancing the play of contrasts or designing color temperature to fall into the warm yellow rather than the blue spectrum.¹³ Following the principle of “universal design”, such considerations should result in an improved



From one size fits all...



... to a celebration of diversity

overall design quality serving all age groups.¹⁴ Of course, in some specific cases a lighting solution targeted for the elderly might require an additional layer of light to cater to this user group. The [Rietberg](#) masterplan exemplifies this approach with the inclusion of its lit custom-made paving stone. It also illustrates the benefits of integrating lighting with other perceptual triggers to cater to the visually impaired.

Inclusive lighting solutions also demand sensitivity to users' cultural contexts and to the light preferences of different societies. Many recent projects have recognized the symbolic value of light and its ability to create a sense of inclusiveness. The [Superkilen](#) urban park in Copenhagen's Nørrebro district is one such case. The scheme, designed by architects BIG in collaboration with landscape designers Topotek and art consultancy Superflux, seeks to celebrate the ethnic diversity of the neighborhood which is home to more than 60 nationalities. It does so by creating a deliberately eclectic space supported by an assortment of lighting fixtures. Several of the chosen luminaires reference foreign cultures, such as a dentist's sign from Doha, Qatar, a mast-mounted fixture inspired by a design from Berlin Spandau, or other colorful elements representing Russia, the US, China, and Taiwan.¹⁵

In contrast to this use of light as a cultural icon, the [Crown Fountain](#) at Chicago's Millennium Park uses light as a medium to reflect the diversity of the city's population. The artist Jaume Plensa, who designed the lighting for his artwork in collaboration with the firm Schuler Shook and Krueck + Sexton Architects, placed two glass towers at opposite ends of a shallow water pool. The inner faces of the two towers are each equipped with 70 LED units to form two fully dynamic screens. These play a randomly selected sequence of Chicagoans' faces. In this manner, local residents are celebrated in all their diversity through the public artwork.

The era of **digital** lighting promises to deliver a more differentiated **user-centric** experience.

Crown Fountain
Jaume Plensa, Krueck + Sexton Architects,
Schuler Shook

Local residents are
celebrated in all their
diversity through the
public artwork.

From the Brittle to the Resilient City

1.6 From the Brittle to the Resilient City

The shift to digital lighting allows us to create more resilient urban environments which are able to adjust and evolve over time. No longer merely a visual and perceptual tool, lighting becomes an actor in the public realm that mediates between people and the built environment, and engages citizens in new ways.

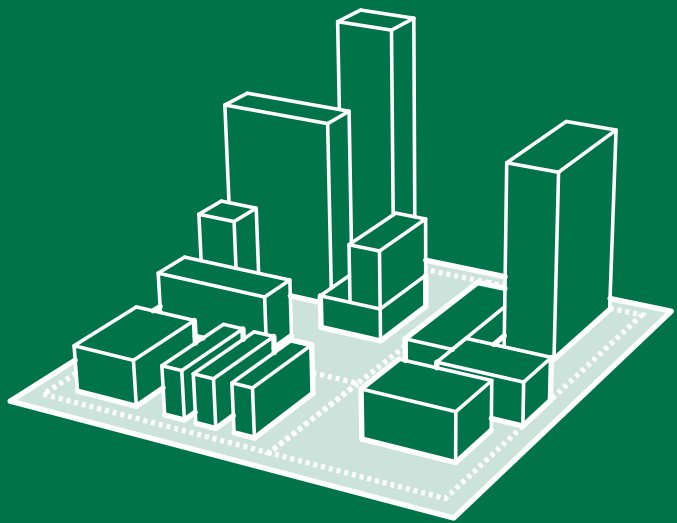
These projects complete a **shift** towards cities designed explicitly with **process** and change over time in mind.

From the Brittle to the Resilient City

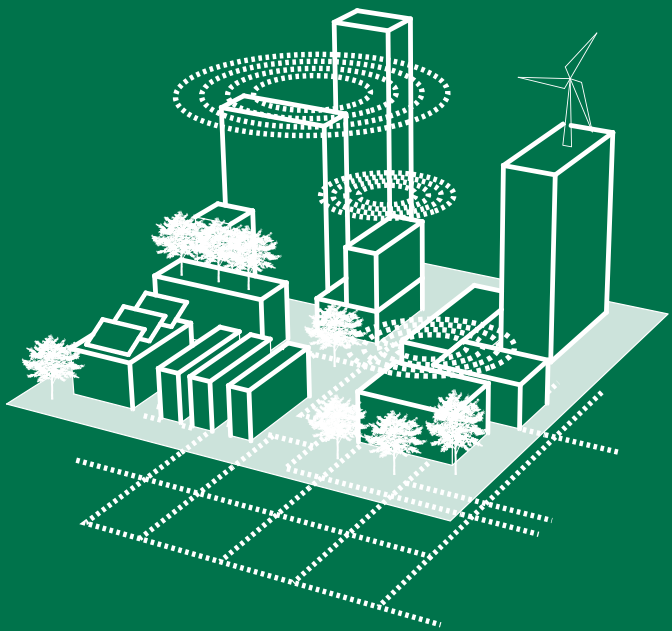
Notwithstanding the diversity of the projects discussed here so far, many of these designs share a specific vision for our cities. In particular, they complete a shift towards cities designed explicitly with process and change over time in mind. According to the sociologist Richard Sennett, these qualities have been explicitly removed from the modern city: “The proliferation of zoning regulations in the twentieth century [...] has disabled local innovation and growth, frozen the city in time. The result of over-determination is what could be called the Brittle City.”¹⁶

With the transition to digital lighting, the field of urban lighting design now has the opportunity to make a significant contribution to our future cities by helping to overcome the “brittleness” of modernist cities and create a more “malleable”¹⁷ and resilient urban environment. In such a context, the countless applications for new public lighting cover everything from social engagement to resource efficiency. Many practitioners have already begun exploring different uses of time-based and programmed lighting. Often, this has meant using light to make hidden processes and information visible in the urban setting.

During the 2012 London Olympics for instance, the installation *Energy of the Nation* by So-solimited sought to reflect the population’s collective mood throughout the games. As a basis for the analysis, the team developed custom software which captured all UK tweets mentioning the Olympics. An algorithm then employed natural language processing to run an analysis on these tweets using a scoring system for different emotional expressions. The result was depicted throughout the day on a screen mounted next to the London Eye. At 9 pm every night, a new light show was generated from the day’s data output and played on the London Eye. In adding this dynamic element to London’s skyline, the designers enabled the city to visibly respond to its inhabitants and their emotions, thereby changing the way Londoners relate to their city.



From the brittle city...



... to the resilient city

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Examples like the dynamic London Eye installation demonstrate the breadth of the solution space available to creative practitioners today. As shown throughout this section, nowadays lighting is employed and utilized in very different ways than in the past. This not only concerns its placement in space and its aesthetic and visual characteristics, but also its relation to the city and its users. It is specifically this latter aspect which deserves our attention because it is likely to have the greatest relevance and impact with regards to our future urban environments. In our future “smart cities”, many challenges of urban life will be addressed via layers of software coupled with specific hardware capabilities. In this context, the role of public lighting moves beyond the visual and perceptual towards the relational. Lighting becomes an actor in the public realm that mediates between people and the built environment, and engages citizens in new ways.

Time-based and **programmed** lighting can make hidden processes and information **visible**.

The role of public lighting moves beyond the perceptual towards the **relational**: light mediates between people and the built environment.

A Framework for People's **Engagement with Light**

2

Lighting reveals the attributes of our surroundings to us; it allows us to perceive texture, color, and form.

Richard-Wagner-Platz

Leipzig - Licht Kunst Licht

Her Secret is Patience

Phoenix- Janet Echelman

Clink Street

London - Halo Lighting

Tour Montparnasse

Paris - Régis Clouzet from L'Agence Lumière

Bay Lights

San Francisco - Leo Villareal

East 34th St. Terminal

New York City - KVA

Street Seats Beacons

Boston - Design Museum Boston

Banco del Credito de Peru

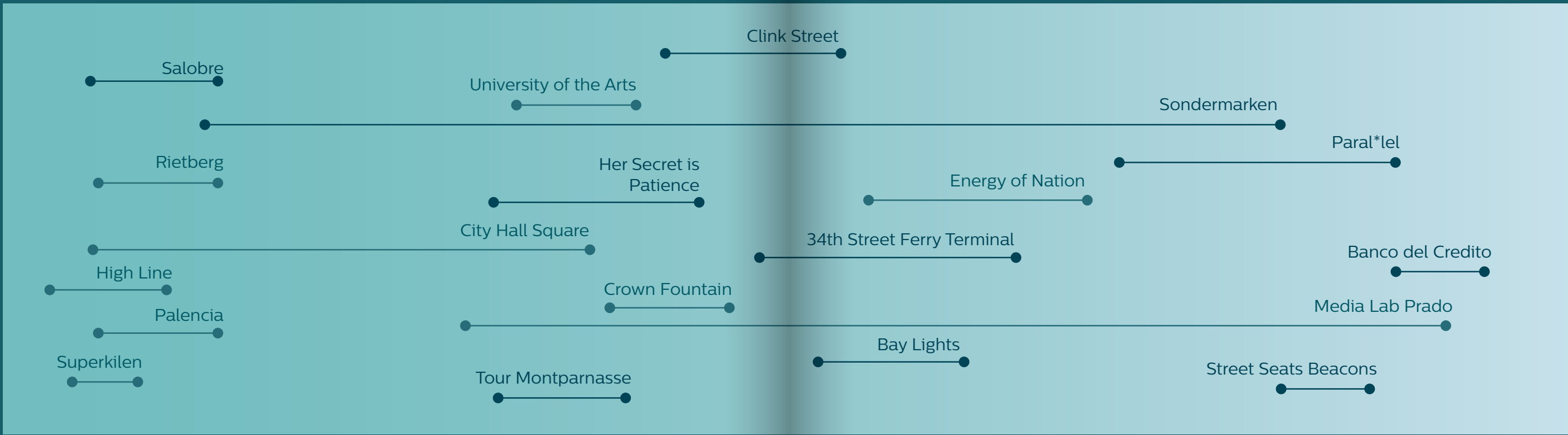
Lima - Claudia Paz

Søndermarken Park

Frederiksberg - B+S architecture and lighting

Digital Lighting Spectrum of Engagement

..... ambient dynamic responsive interactive



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Light for Public Space

Contemporary lighting technology enables a spectrum of public engagement, ranging from designs that subtly support urban life to fully interactive installations.

One of the major opportunities unlocked by contemporary lighting technologies is an unprecedented ability to engage citizens in new ways. Since the introduction of digital lighting, designers have access to a broad spectrum of tools to create meaningful and lasting connections between cities and their citizens.

Lighting has always fundamentally defined our relationship to our environment and with one another. As such, it has always been an essential means of creating cities that are welcoming, safe, and attractive. In medieval Europe, for example, people were required by law to carry lanterns to communicate their presence to fellow citizens.¹⁸ Today, as in the past, lighting creates cities that convey a sense of belonging for residents and visitors alike. The wide-spread availability of LED lighting in combination with embedded computation allows designers to activate the urban realm in new and enriching ways.

What results from this is a spectrum of public engagement enabled by light, ranging from designs which almost unnoticeably support urban life all the way to fully interactive installations. The following section will discuss a selection of case studies to distinguish four different levels of engagement. Even though these will be discussed as separate categories, the distinctions are not intended to be exclusive, but rather indicative of four defining thresholds across a continuum of possibilities for urban and social engagement.

Ambient Light: Supporting Urban Life, Revealing Identity

2.1 Ambient Light

Ambient light often serves a dual purpose. Firstly, it ensures visibility through basic illumination. Secondly, by accentuating certain aspects of the built environment at night, it also shapes the nighttime identity of any given space.



Ambient Light: Supporting Urban Life, Revealing Identity

Today as in the past, the majority of public lighting illuminates our cities without demanding our explicit attention. Rather, most lighting operates in the background, as a supportive infrastructure, enabling us to perceive our surroundings and to interact with other citizens and the city around us.

The lighting design for [Rietberg](#) for instance uses such ambient lighting to reveal the colors and textures of the historic architecture. At the same time, this also ensures optimum levels of visibility for users of the public space to feel safe and comfortable. In this manner, ambient lighting serves the dual purpose of equipping the town with a distinct nighttime identity as well as enabling its citizens to make full use of the public space at all times of day and night.

Another German city, Leipzig, implemented a new lighting masterplan by [Licht Kunst Licht](#) to reinvent the [Richard-Wagner-Platz](#), a plaza dating back to the 10th century. The square's significance led city leaders to initiate an extensive public consultation process and architectural competition. Buildings from all historical periods line the space, making it important to highlight the outstanding characteristics of old and new while also providing a unifying visual quality using only white light. Subtle material qualities throughout the square, different vertical planes and eye-catching features are lit to create an environment that is easy to navigate, but also delightful and visually interesting. The designers only worked with white light, but used the flexibility of LED lighting technology to direct light precisely.

Ambient Light

Supporting Urban Life, Revealing Identity



Like Leipzig, the Spanish town of **Salobre** modernized its public lighting to create a higher quality public space . Prior to updating its lighting system, inefficient luminaires on roads, in town squares, and along the Salobre River consumed too much electricity and produced lighting levels which were too low for people to feel safe and welcome. In addition, a regulatory mechanism was applied which caused public lighting in some areas to turn off after midnight. With the introduction of a range of new LED lights controlled by a central management system, comfortable lighting levels can now be provided reliably throughout the night. In addition, colourful accents were added to bridges and other focal points to enhance the attractiveness of the public space.



Richard-Wagner-Platz
Licht Kunst Licht AG

Adjustable ambient lighting is open to **unforeseen changes** in cities and their patterns of use.

Dynamic Light: Evolving Connections, Designing Narratives

2.2. Dynamic Light

Dynamic light combines illumination with miniaturized computing that controls the light output. Light effects are pre-programmed and do not make use of sensor equipment, but they rely on predefined patterns and rules to change their appearance over time.



Her Secret is Patience
Janet Echelman

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Dynamic Light: Evolving Connections, Designing Narratives

Besides supporting urban life and revealing the unique features of a city's nightscape, digital lighting also has the capacity to engage citizens by participating in the typical flows of urban life. Such dynamic lighting differs from adjustable ambient systems because it is pre-programmed with patterns in anticipation of particular rhythms or in pursuit of a particular visual effect. The tempo of dynamic installations can vary widely, from seasonal variations to rapid animations.

The artist Janet Echelman for example chose to light her netted sculpture *Her Secret is Patience* in Phoenix, AR, with colors changing gradually through the seasons. With this, she hopes to “provide residents some small climate relief through color, adding cool hues in summer and warm tones in winter.”¹⁹ Five years after its initial installation, her piece is now one of the most important icons of the downtown. In Echelman's installation, dynamic light, tailored to place and seasons, serves as a means of connection between the city and its residents, forming an important social magnet.

In contrast to the slow pace of Echelman's piece, the *Clink Street* project by Halo Lighting uses dynamic effects programmed on a daily cycle to accentuate the transitory nature of the site. Halo's client, London's Cross-River Partnership, had requested for the hitherto uninviting tunnel to be activated as a pedestrian passage so as to unify the neighborhood. Building upon analysis of pedestrian flows, Halo programmed the lighting installation to correspond with the intensity of pedestrian activity in the tunnel. During quiet times, one now observes a twinkling star effect across the ceiling, and in times of increased activity a firework effect builds up momentum. Similar to Janet Echelman, the designers from Halo employ time-specific lighting effects to enhance a site's inherent character and to provide users with a strong connection to the urban setting.

Dynamic Light Evolving Connections, Designing Narratives



Another powerful application of dynamic lighting effects can be the use of narrative sequences which combine several temporal patterns to tell a place-based story. For example, the façade of the [Tour Montparnasse](#) in Paris is animated by a scenography of colored lights which evolve over the hours, days and seasons. In addition, the project's designer, Régis Clouzet from L'Agence Lumière, has created specific sequences for citywide events such as the Fête de la Musique. In this manner, an ever-changing series of effects sets the colossal building in motion, allowing Parisians to identify with a landmark that was criticized and disliked for many decades. The particular context and intention behind a project determines the visual effects and pace of any specific dynamic installation. Yet, the result of successful projects is always likely to be a greater enhancement of place and site and an enhanced vibrancy and liveliness in the urban realm.



Clink Street
Halo Lighting

Clink Street
Halo Lighting



Light for Public Space



Bay Lights
Leo Villareal

Responsive Light: Enhancing Patterns and Cycles

2.3 Responsive Light

Responsive light uses sensor input to affect light output over time. Frequently, this is used to create site-specific installations and effects.

Responsive Light: Enhancing Patterns and Cycles

Whereas dynamic lighting follows pre-programmed sequences, responsive lighting installations link site specific inputs to rule-based outputs in the form of color, movement, and timing. These may be part of a real-time installation or something that is stored over time and optimized to provide a dramatic visual and aesthetic experience. Such short and long feedback loops allow public spaces to be in tune with the city's metabolism. They mediate the interaction between citizens and their environment, allowing ordinary and spectacular moments to alternate seamlessly.

The monumental Bay Lights installation by Leo Villareal derives its origins from this mode of working. The installation consists of 25,000 white LED lights attached to the Bay Bridge's vertical suspension cables. Each of the lights can be set to one of 255 different levels of brightness and is controlled via a piece of software, resulting in a light "canvas" animated by varying content. Hoping to create "something that people can really have a connection with in the same way that they have a connection with clouds or the sunset", Villareal based his light patterns on the kinetic activities around the bridge.²⁰ The oscillations of the bay, the streaming of traffic, and the changing image of the sky provided inspiration for the algorithms which he generated for the piece. The result is a powerful piece of abstract art which is highly situated and specific to its location.

Responsive Light Enhancing Patterns and Cycles



Creating responsiveness in real time with the help of sensors and shorter feedback loops can be a means of amplifying the dynamics of a location and rendering otherwise hidden or forgotten processes visible. The new [East 34th Street Public Ferry Terminal](#) in New York City includes an environmental sensor system which monitors the tide levels, water speed, and current direction of the East River flowing underneath the hovering terminal structure. These movements are signaled with LED lights installed in the roof structure, changing color and direction in response to the observed conditions. Architects KVA describe the effect as a piece of “soft’ infrastructure where architecture, natural eco-systems, and digital networks are integrated by design.”²¹ Both Villareal’s piece and KVA’s design employ digital lighting to enhance natural patterns and thus unlock new potential for public engagement and shared meaning.

Bay Lights
Leo Villareal



The oscillations of the bay, the streaming of traffic, and the changing image of the sky provided **inspiration** for the algorithms which he generated for the piece.

Interactive Light: Play and Participation

2.4 Interactive Light

Interactive light relies on direct input from users who are equipped with controls to consciously affect light output. A variety of interfaces can be used to enable citizens to modulate their urban environment in this way.



Interactive Light: Play and Participation

An ever growing number of projects are taking public engagement to the next level by inviting citizens to consciously affect lighting output. Such interactive lighting requires direct input from users and equips them with means of controlling the lighting via sensors, mobile devices, or other interfaces. Unlike responsive lighting, interactive pieces rely on users to input information and allow them to shape their urban environment.

The *Street Seats Beacons* project was a platform to explore the potential for such technologies in everyday city life. Design Museum Boston installed 18 award-winning designer benches in a 0.5-mile radius in downtown Boston. Each bench was accompanied by an interactive, decorative “Light Beacon”. Citizens used a linked web app to navigate through the exhibition, learn more about each bench, as well as to manipulate the colors of the Light Beacons. In this manner, citizens were given a means of directly affecting their surroundings.

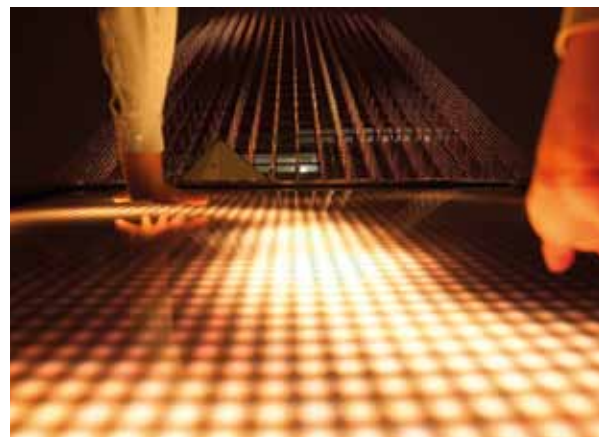
A lighting project designed by Claudia Paz for the headquarters of the *Banco del Credito de Peru* employs a similar principle on a larger scale. The installation consists of 26,000 individually addressable light points attached to the building’s existing façade, arranged in two distinct grids mounted on poles to create a three-dimensional light canvas. Below the façade Paz and her team installed a custom-made interface: an LED panel with integrated multi-touch sensors models the façade on a smaller scale and allows passersby to modify the light content with the movements of their own hands. Users choose from eight types of content (such as fireworks or rain) and then interact with these dynamics on screen as if stroking across water. The sensors integrated into the panel register the user’s touch and translate this data into live input for the BCP’s light canvas. In this way, the individual gesture of each user is magnified across the façade, allowing citizens to shape the image of their city in real time.

Interactive Light Play and Participation



In addition to employing light as a playful medium, interactive pieces can also respond to the specific needs of citizens at any one time. *The Paral*lel project* for the city of Barcelona, which is currently in the final phases of development, is exploring a novel approach to participatory urbanism. A collaborative effort by Philips, Cisco, and the city of Barcelona, the project combines functional lighting, architectural lighting, and control applications to allow citizens to customize public spaces in different ways. It envisions lighting as a publicly accessible resource and foresees several use-cases, all activated by a shared app-based interface. For instance, using this tool citizens will be able to add colored lighting to public squares to support performances by street artists. They will also be able to use the same interface to create on-demand football pitches defined through lines of projected light.

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Banco del Credito
Claudia Paz



Light For Public Space

Street Seats Beacons
Design Museum Boston

The **individual gesture** of each user is magnified across the façade, allowing citizens to **shape** the image of their city in real time.

Allowing citizens to **modify** public spaces to their own needs is a very effective means of **connecting** people to their cities and can increase the liveliness and vibrancy of public spaces.



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Through its combination of ambient and dynamic features, the Søndermarken project illustrates the advantages of **integrating** different types of lighting to deliver multiple benefits at once.

Søndermarken Park
B+S architecture and lighting

Allowing citizens to modify public spaces to meet their own needs is a very effective means of connecting people to their cities and can increase the liveliness and vibrancy of public spaces. The municipality of Frederiksberg in Denmark has demonstrated how these same mechanisms can even be used to foster the health of citizens. Under the direction of lighting design firm B+S architecture and lighting, Frederiksberg's Søndermarken Park was equipped with low-level light poles combining ambient lighting with a custom-made lighting feature for runners. Upon entering the park, runners use an app-based interface to choose a desired pace and direction for their run. This activates a specific light mechanism along the path. Colored lights mounted within the poles help runners keep their pace by only switching on for 3 seconds each after which the subsequent pole is activated. Through its combination of ambient and interactive and dynamic features, the Søndermarken project illustrates the advantages of integrating different types of lighting to deliver multiple benefits at once.

Light for Public Space



Søndermarken Park
B+S architecture and lighting

In complementing the **unpredictable** and surprising nature of urban life, networked lighting can **enhance** exactly those aspects of cities that make them such great places to live.

From Engagement to Resilience

Whether ambient, dynamic, responsive or interactive, the appeal of digital lighting projects for public spaces often stems from their close relation to the cycles, rhythms, and patterns of urban life.

In complementing the often unpredictable and surprising nature of urban life, networked lighting can enhance exactly those aspects of cities that make them such great places to live.²² Moreover, as indicated before, any type of adjustable lighting solution can contribute to the creation of a more “malleable”, and by implication resilient, urban environment. In fact, central to any concept of a flexible or “smart” urban environment is the capacity for cities to live, grow, and breathe in sync with unforeseen events, gradual changes and repeating cycles. Therefore, in order to deliver meaningful solutions to future cities, the field of lighting design and the lighting industry must continue to embrace dynamism and change.

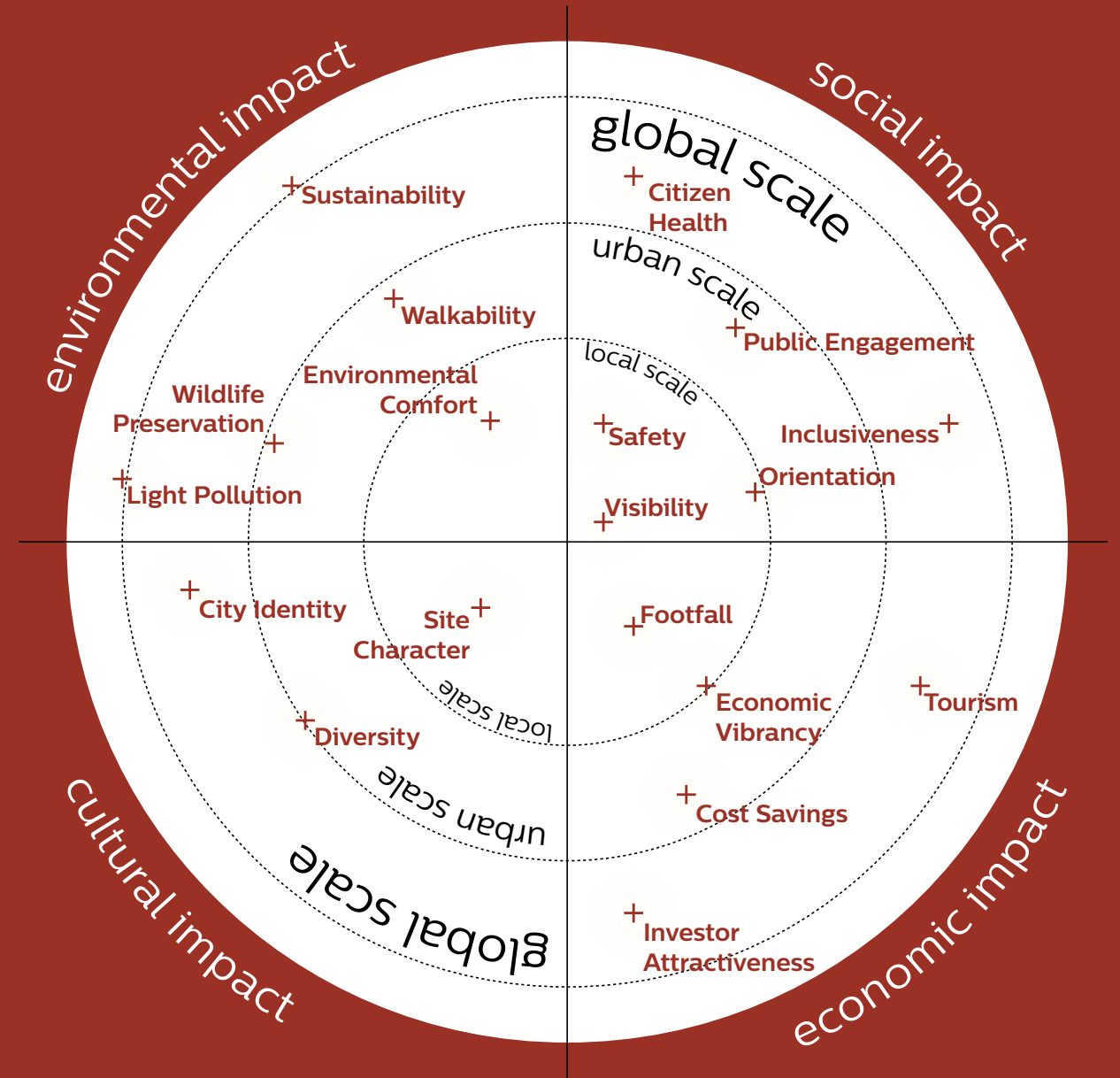
As the planner and writer Anthony Townsend puts it “think long-term in real time.”²³ With cities and technology evolving at an ever accelerating speed, openness must be built into designs if the latter are to be of value in the future. As the array of projects cited here shows, this flexibility is already attainable. Whether they are large-scale infrastructural pieces, small-scale interventions, or they use dynamic or interactive effects, contemporary lighting solutions display the sort of adaptability, which if mobilized at multiple scales and evolved iteratively, can enable a city to live and grow at any speed of change.

Light as a Resource for Cities and Citizens

3

More holistic approaches to public lighting require new ways of constructing meaning and assessing value over time.

Public Lighting Scales of Impact



In defining the site-specific role of light, stakeholders have an opportunity to identify the spectrum of benefits associated with digital and networked lighting. It includes economic, environmental, as well as social and cultural aspects.

From Identifying Meaning to Assessing Impact

Value definitions are expanding as new opportunities arise to link light with other aspects of urban life. As digital lighting assumes a more prominent place in our urban environment it offers practitioners a glimpse into how a connected and digitally-driven city could be a more humane, inclusive and sustainable place to live.

Over the coming years as the applications of digital lighting are further explored, our understanding of its associated benefits will continue to evolve and deepen. However, as the projects discussed above illustrate, we can already detect a diverse spectrum of improvements and benefits which contemporary lighting projects can bring to city stakeholders. In order to deliver effective solutions to city managers and inhabitants alike, it is paramount to define lighting's specific benefits and to understand its unique role in the smart cities many communities aspire to be in the future.

The fact that lighting can deliver both qualitative and quantitative benefits makes it a powerful but complex feature of urban planning and design. Often a site-specific analysis is needed to understand how lighting can play its part in introducing a beneficial cycle of growth and renewal to a city. In some cases, this analysis may also lead to using lighting as a tool for presaging future urban development. For example, in Boston, the design team for the Convention Center extension led by Sasaki Associates is using light to activate public spaces that are under construction. A variety of methods can be utilized to provide a site-specific analysis, ranging from traditional design tools to quantitative data analytics and visualization to other qualitative methods.²⁴ London School of Economics' "Configuring Light" group has recently begun to adapt social science methods to the design of public lighting. During their work in Derby, the team conducted stakeholder interviews and mapped user journeys to gain insight into the particular meaning and potential role of lighting for Derby's citizens. From this research, they were able to draw conclusions as to the particular needs of the involved parties and support lighting designers Speirs & Major in the formation of their lighting plan for the city.²⁵

In defining the site-specific meaning of light and anticipating its impact, stakeholders have an opportunity to identify the impressive spectrum of benefits associated with digital and networked lighting. It includes both economic and environmental, as well as social and cultural aspects. In the historic city of Palencia, Spain for instance, the introduction of LED lighting reduced energy consumption by 75% compared to their conventional, previous lighting system. Associated with these environmental benefits are substantial cost savings for the city of €2 million. While energy and cost savings are measurable parameters, other benefits can

be more difficult to quantify. With a safer, more comfortable, and welcoming nightscape citizens and tourists can spend the after dark hours outside amidst the many historic sites and monuments. Thus creating a more walkable, attractive and inviting city which contributes to tourism, the local economy, public health, and well-being.

Often a **site-specific** analysis is needed to understand how lighting can play its part in introducing a **beneficial cycle** of growth and renewal to a city.

Therefore, it is important to consider the overall effect of a project and acknowledge that its impact will not be limited to the site of intervention. This is also emphasized by the far-reaching success of the Bay Lights project in San Francisco. After the project was originally conceived as a means of raising awareness for the 75th anniversary of the Bay Bridge, the installation quickly took on a much larger significance. When it opened in 2013, an economic impact study had already predicted that Leo Villareal's piece would add \$97 million to the local economy. These preliminary estimates have been confirmed in the months since with tourism on the rise based on the cafes, restaurants, and hotels that offer a view of the bridge seeing much larger numbers of clients. In this manner, previously neglected parts of the Bay Area have received new attention as visitors of the installation seek out ever new vantage points of the bridge.

In addition to the far-reaching concrete economic development impact, the social and cultural benefits at the center of the initiator's and artist's interest from the beginning have truly reached beyond the immediate vicinity of the project. The artist Leo Villareal sought for the installation to provide every one of the estimated 50 million visitors with a distinctive experience while uniting them in one shared focal point.²⁶ This concept is rather aptly reflected in the project's online presence which includes a selection of the thousands of Instagram photos posted by visitors.²⁷ As a total collection these pictures taken from near and far not only reveal the perceptual richness of the piece, they also testify to the high degree of public engagement which the project has achieved. Many argue that the project's success has paved the way for other large-scale public art projects in the area around San Francisco. With a possible extension of the project already on the roadmap, it is evident that Villareal's 25,000 LED lights have raised the profile of the wider Bay Area for good.

With a possible extension of the project until 2026 already on the roadmap, it is evident that Villareal's 25,000 LED lights have **raised the profile** of the wider Bay Area for good.

When it opened in 2013, an **economic impact** study had already predicted that Leo Villareal's piece would add \$97 million to the local economy.

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Light for Public Space



The recent generation of lighting designs demonstrates that connected lighting can engender benefits both through its direct **impact on people** as well as its ability to be **precise, programmed, and controlled.**

More and more, defining the role and value of public lighting means understanding lighting's particular contribution in the context of cities that have more sophisticated "smarter" infrastructures in the broadest sense. As our lives become increasingly connected and digital, it is inevitable that this too will impact our cities and how we live together in them. IDC predicts that the worldwide Internet of Things will grow from \$1.9 trillion in 2013 to \$7.1 trillion by 2020.²⁸ Plenty of thought has already been devoted to how this will affect our urban environments as theories, ideas, critiques, and designs for smart cities have multiplied in recent years.²⁹ As a collective body of work, the projects discussed in this paper have hinted at many of the most pleasurable aspects of a technologically enhanced urban life. With their focus on the pedestrian experience for instance, these designs anticipate walkable cities which foster health, equality and accessibility. A similar desire for urban inclusiveness is also reflected in the engaging user-centric and culture-specific interventions which have recently been produced. Equally, in creating more diverse and enveloping lighting conditions, the designs underline the importance of the human scale in designing future urban environments.

Collectively, the recent generation of lighting designs demonstrates that digital lighting can engender benefits both through its direct impact on people as well as its ability to be precise, programmed, and controlled. With many cities facing the dual challenge of improving their operational efficiency whilst also enhancing the attractiveness of their location, LED lighting is in a strong place to deliver on both fronts. If supported by digital lighting systems, smart cities can reconcile sociability and public engagement with efficient operations and control. The question of how to deploy technology to deliver value to cities beyond efficiency and cost-cutting is one of the pressing issues of today's discourse on smart cities.

Smarter Lighting for Smarter Cities

The urbanist Adam Greenfield for instance disapproves that “[The smart city rhetoric] is almost exclusively a discourse about the instrumentation of the urban fabric and the quantification of municipal processes, specifically for ease of management.”³⁰ This is echoed by Anthony Townsend, who in his most recent book advocates for “smart cities that are human-centered, inclusive and resilient”.³¹ Similarly, Richard Sennett reminds us that efficiency is not a value which in itself improves the attractiveness of cities: “[...] the prospect of an orderly city has not been a lure for voluntary migration, neither to European cities in the past nor today to the sprawling cities of South America and Asia. If they have a choice, people want a more open, indeterminate city in which to make their way [...]”³²

Multi-faceted infrastructures like lighting have the ability to connect the orderly vision of infrastructure with the layered richness that makes public spaces great. To deliver on the vision of a smart city that meets the needs of various users and stakeholders, professionals in the field of lighting need to approach their own field in unconventional ways. In search of more holistic lighting solutions, we will see a greater number of joint efforts between roadway and architectural lighting. Equally, we might witness a softening of distinctions between permanent installation and temporary intervention. Lighting professionals from across various sectors and interest groups certainly have much to gain from exploring their shared creativity and expertise. Similarly, synergies with fields such as interface design should be exploited further to integrate lighting design with the emerging field of ambient media.³³

Beyond the need to pool resources and align design intentions, the requirements for collaboration and co-creation also extend to the technical and operational level. As Barcelona’s interactive lighting concepts presage, future urban development is likely to be driven by a demand for open and inclusive solutions. Taken to the scale of city operations, this requires networked infrastructures to interlock at the appropriate levels to enable resilient systems rather than single, centrally structured platforms. There are multiple synergies across domains, such as between mobility, transport, and lighting. Nowadays, exchange of data across these different verticals can be enabled with software-based links rather than hard-wired connections. Hence, it is important that new infrastructures are designed with the relevant components in place to allow for these interconnections.

Future cities will require lighting projects developed in a spirit of **co-creation** and **co-operation**.

Whether it concerns the sharing of knowledge and insights or the transfer of data, future cities will require lighting projects developed in a spirit of co-creation and co-operation. Such an approach will be the only way to ensure that the solutions we develop today deliver immediate value to a wide range of users and stakeholders and will continue to do so as the city evolves.

Lighting professionals from across various sectors and interest groups certainly have much to gain from exploring their **shared creativity** and expertise.

Outlook

We refer to case studies from across the globe in order to paint a picture of the state of public lighting today, and to speculate on its future. The projects show that lighting is already making large contributions to the public realm and is changing our nighttime experience of urban environments. Oftentimes the particular impact of lighting is best understood through a combination of quantitative and qualitative factors.

Professionals from design practice, research and the public sector need to **collaborate** on evaluating the physical and socio-economic **benefits** of lighting for public space.

Understanding and defining these benefits remains one of the crucial tasks for the coming years as this will ensure that we can deploy lighting with even greater purpose and precision. Different professionals from design practice, research and the public sector need to collaborate on better tools and approaches to physical and socio-economic evaluation of lighting for public space.

Our cities need professional and **citizen-driven** dialog about how nighttime lighting should be incorporated into future spaces.

Diverse examples from understated masterplans such as Rietberg, Germany to monumental light sculptures like the Bay Lights in San Francisco, CA demonstrate how quickly notions of light for public space are evolving – and that this proliferation of ideas and innovation is bound to continue and grow exponentially. Our cities need professional and citizen-driven dialog about how nighttime lighting should be incorporated into future spaces.

Join the dialogue and **contribute** towards the creation of a more holistic nighttime experience, designed for the **lasting benefit** of today's and tomorrow's citizens.

A key aspect of this work includes creating a location-specific, thoughtful visual language that delights, but also provides contrast and calm. The spectacular and the everyday go hand in hand making it essential for communities to consider software for control of light and content, interfaces for time- or activity-based sequences, and much more.

Whether you are an urban designer, architect, planner, software engineer, user interface designer or lighting professional, you have a stake in shaping the 24-hour city. We invite you to join the dialogue and contribute towards the creation of a more holistic nighttime experience, designed for the lasting benefit of today's and tomorrow's citizens.

Notes

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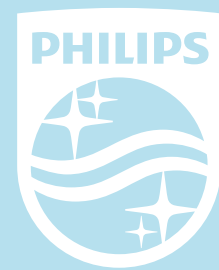
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In recent years there has been a proliferation of creative urban lighting projects for public spaces. They range vastly in scale, longevity and dynamism and push the boundaries of digital lighting technologies. As a collective body of work, these projects demonstrate a growing desire among practitioners and city stakeholders alike to exploit the full breadth of lighting's potential. This article draws on case studies from around the world to illustrate the state of public lighting today and to speculate on its future. Light is no longer merely a supporting actor for shaping public spaces. It is swiftly becoming one of the most powerful tools to breathe new life into cities.



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