

Innovation in dynamic public buildings: SchoolVision

Bogdan LUPU
Lighting
September 2015

We enhance life with light, making people safer, happier and more productive

And we're

inspired by you...

By understanding your needs and desires we deliver innovation that matters to you, to your cities, businesses, homes and communities.

A changing worlds needs...



- **more light** – 70% increase in light points by 2050 due to population growth and increasing urbanization
- **more energy-efficient light** – Lighting accounts for 19% of global electricity use
- **more digital light** – 224 million smart homes by 2019, connected lighting everywhere

...and we are changing the game

Our ambition:
Enhancing life
with light



Making a difference in lighting

#1

In LED lighting*

Presence in

60

countries

Hue

sold in **30 countries**,
used in **150**,
with more than **300**
third party apps

Largest

lighting company in the world

#1

in
connected lighting**

55%

of world's top footballs stadiums
use Philips Lighting

262 Philips CityTouch

street
lighting implementations in **31 countries**

5% of sales in R&D,
32% more than
the nearest competitor

* Source: Internal analysis

** Source: Markets and Markets, Global smart
lighting market (2013–18)

PHILIPS

We deliver innovation that matters to you!

"The world we have created is a product of our thinking; it cannot be changed without changing our thinking."

Albert Einstein



Your lighting solutions in **CLUJ NAPOCA**



The right light for **governments**

Lighting can help cities achieve their sustainability goals



Philips works with local, regional and national governments to help them achieve their sustainability goals.

Our public LED lighting systems can provide energy **savings of up to 80%** over conventional systems with flexible options for recycling and financing.

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The right light for **people within cities**

Lighting for safer, cleaner, more livable cities



The right light for **people within cities**

Lighting for safer, cleaner, more livable cities



The right light for **people within cities**

Lighting for safer, cleaner, more livable cities



Philips' CityTouch lighting management system, combined with LED technology, delivers **energy savings of 70%** compared with conventional lighting

It gives city authorities a visual overview of all street lighting and helps simplify and reduce the cost of commissioning maintenance and management

The right light for **offices**

Lighting that lowers energy bills and enables you to control your light



With Philips connected lighting, workers can **control** their office lighting with their smart phone and facility managers can get **real-time information** on energy use and room occupancy

And **Power over Ethernet** means one cabling network for lighting and IT, lowering installation costs and facilitating smarter ways of working such as optimizing cleaning routes, maintenance and planning of the office space

The right light for **industry**

Lighting to keep you safe and productive



Research shows that increasing light levels in industrial environments can **reduce accidents by 52%**, thus improving overall efficiency and safety

Providing the right light that suits the specific task



JUCU

**BOSCH
DELONGHI
ECOLOR**

The right light for **sports**

Lighting to delight players, viewers and fans



Philips ArenaVision LED meets the needs of broadcasters and stadium owners – while at the same time reducing lighting maintenance costs **by more than 33%**

Philips façade lighting is able to transform stadiums and enhances the experience for fans



The right light for **retail**

Lighting that saves energy and gives you a competitive edge



Philips GreenStore offers the benefits of LED lighting without having to invest in additional hardware. This results in **40% energy savings** and excellent color rendering that makes produce look simply irresistible

The right light for **home**

Lighting experiences that you create and control



Served by more than 300 apps, Philips Hue enables people to **experience** light in new and **innovative** ways. Lighting to suit your every mood



Human needs – static or dynamic lighting?

Visual, Emotional, Biological



VISUAL

Lighting influences the way we perform

Visual comfort
Task recognition
Orientation
Safety



EMOTIONAL

Lighting influences our mood and well-being

Visual ambiance
Social communication
Aesthetics
Human ambience
Atmosphere



BIOLOGICAL

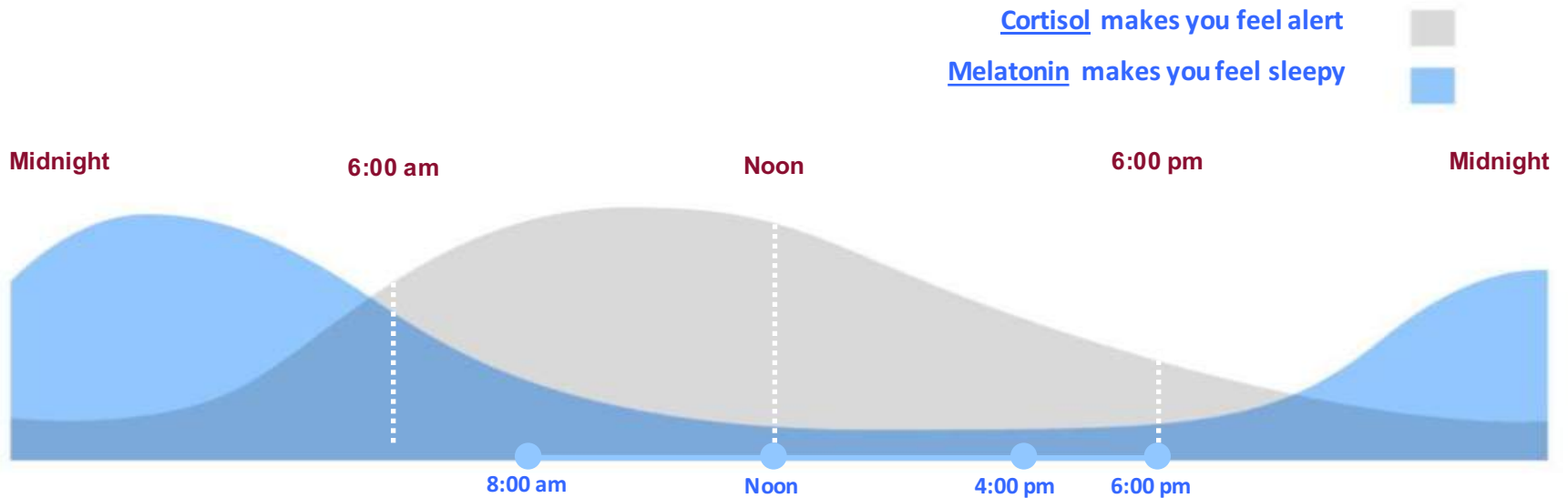
Lighting influences relaxing and health

Health
Concentration
Sleep quality
Alertness

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How lighting affects our body

Biological clock



Lighting influences

- Well being
- Concentration
- Mood
- Sleep quality
- Alertness

Dynamic Lighting also means **Control**

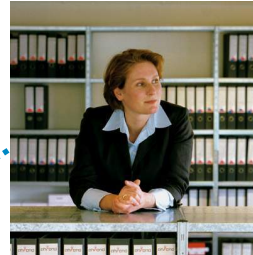
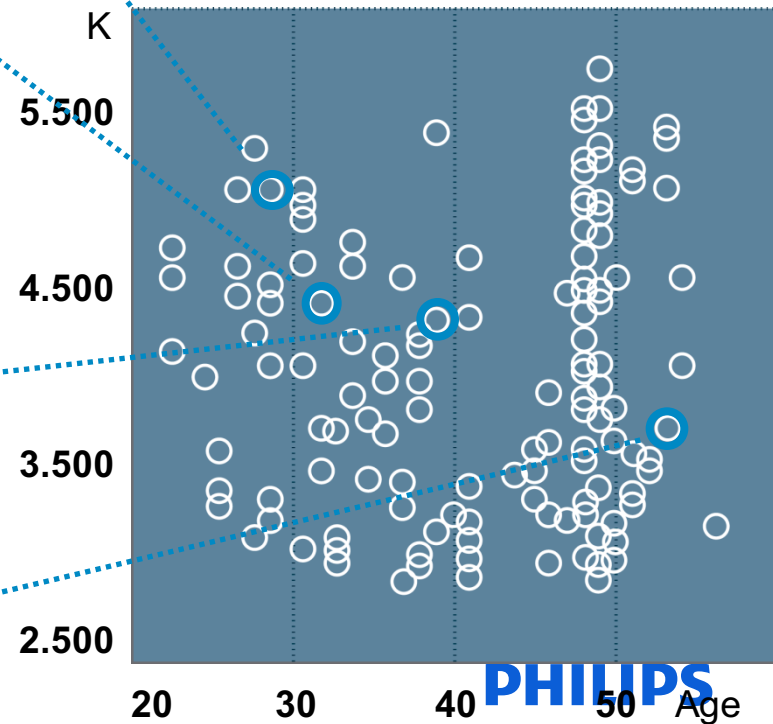
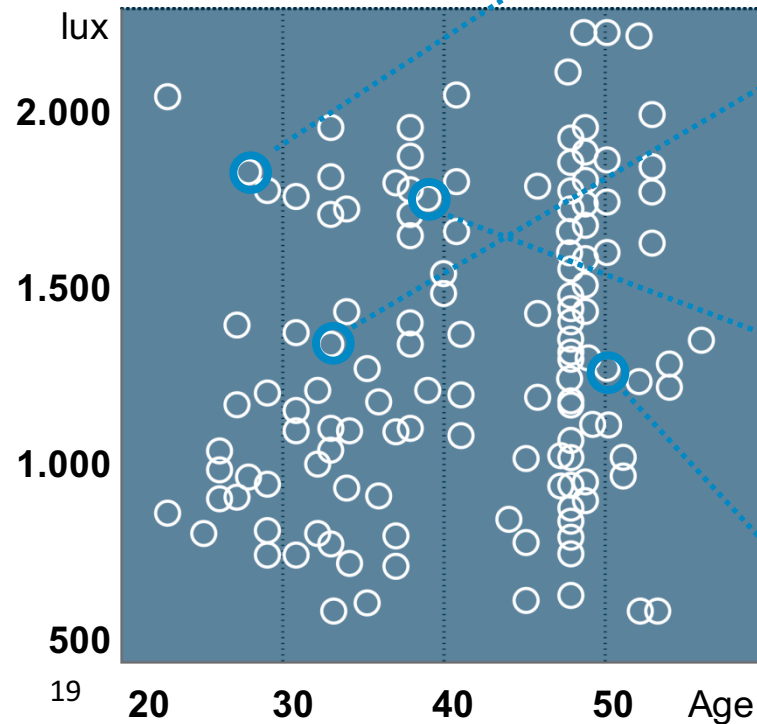
People prefer different settings

different people

different preferences

Lighting level

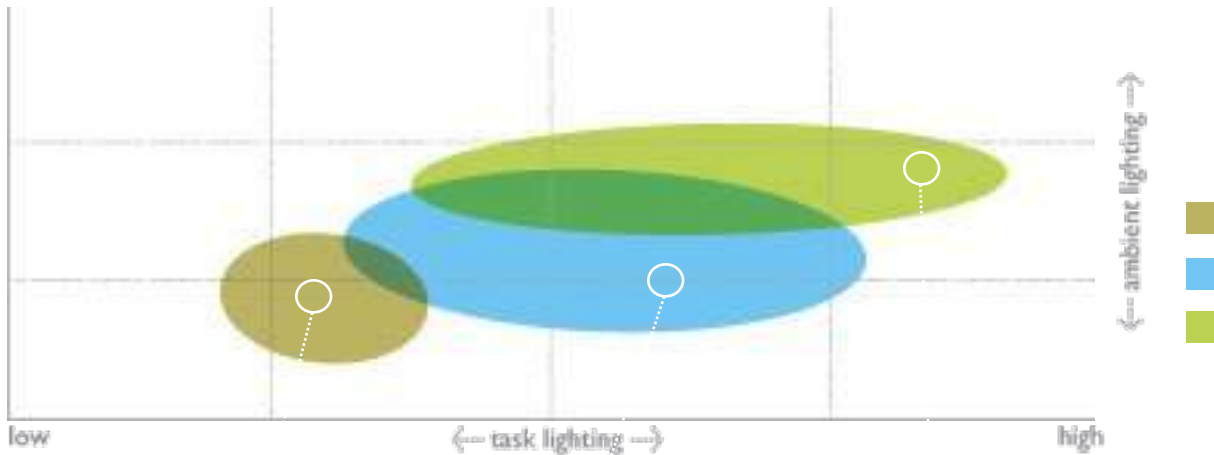
Colour temperature



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Dynamic Lighting also means Control

... and different lighting for different tasks



Concentration



Communication



Relaxation

Different tasks,
different lighting

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Needs

Children and students, staff and management needs

Student

Qualitative
aspects

- Lighting must be responsive to the *psychological* and *emotional needs* of learners.
- Lighting should, *stimulate learning*, and *improve behavior*.
- Lighting should provide *glare free lighting environment*.
- Excellent indoor lighting quality means *improved health for everyone!* teachers deserve healthy spaces for teaching.

Quantitative
aspects

- Lighting should *cater/satisfy task reading and writing*, commonly requiring prolonged and close attention.

Cost
aspects

- Lighting should have *optimum initial cost and minimum running cost*.
- Lighting should have *less maintenance*.

Staff &
management

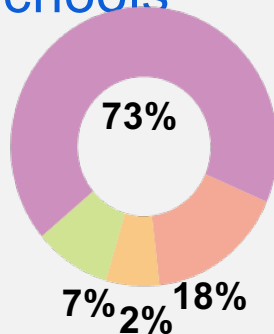
Lighting for education or education for lighting?

Children and students, staff and management needs



How to make our schools
a *nicer place*
for *better learning*
at *optimum cost*

Energy consumption
in primary schools



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The research



Aim of the research : to find out what extent can **lighting conditions positively influence students** in a classroom environment?

- Germany, research performed by the UKHE, primary school
- Germany, UK study 23 yrs old students
- The Netherlands, research by the University of Twente, primary school:
- Austria, research by the UKE
- Singapore: research done in primary school
- USA: research performed together with University of Mississippi

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The study

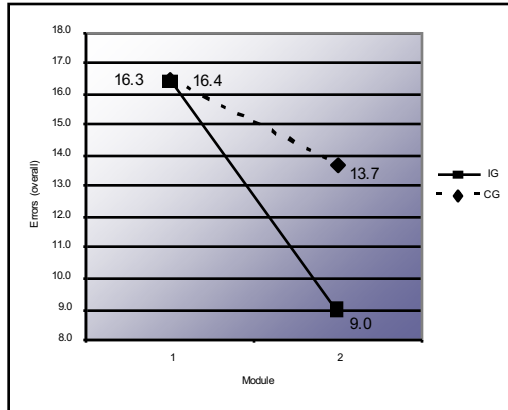


Influence of Dynamic lighting in schools
conducted by 'Universitätsklinikum
Hamburg-Eppendorf', (University clinical
centre for child and youth psychosomatic
research)

- Comprised of **166 students and 18 teachers** over the course of **1 year**
- Students were between 7 and 16 years of age.
- **The Concentration test**
 - D2 test (scientifically proven and accepted method)
 - Repeated every 3 weeks
 - Conducted in:
 - 2 rooms with contribution of day light
 - 2 rooms without contribution of day light
 - 16 lighting scenes created for the test

The results of the study

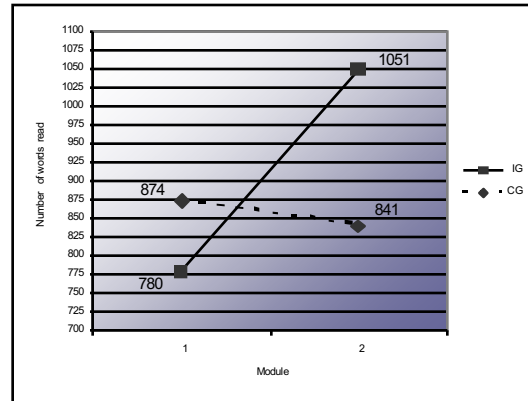
Search results



**Errors relating to
Concentration**



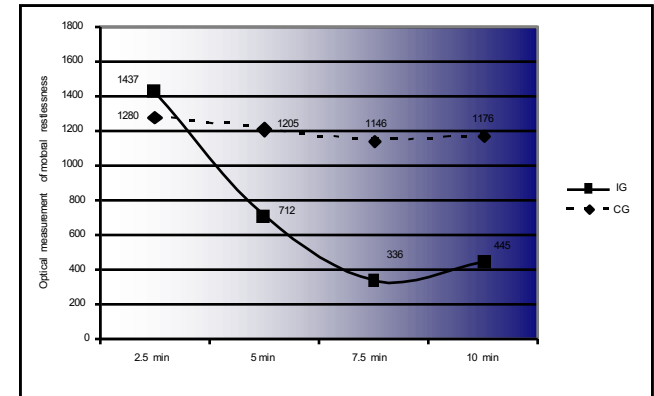
- 44.9%



**Reading
Performance**



+ 34.8%



Restlessness



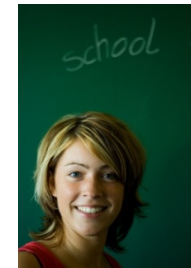
- 76.6%

Student and teacher experiences

Search results



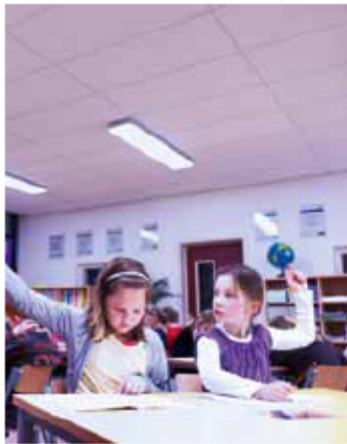
Student: I notice that I make a lot fewer mistakes.
That motivates me.
And, things are a lot quieter now.



Teacher: At first, I was skeptical, but now I can teach my classes more successfully.
The students are much more focused and less distracted.

Research overview

Search results



Energy

What: Higher intensity level,
very cool colour tone

When: Supports a fresh start of
the day (morning) or afternoon
(after lunch)



Normal

What: Standard intensity level,
standard colour tone

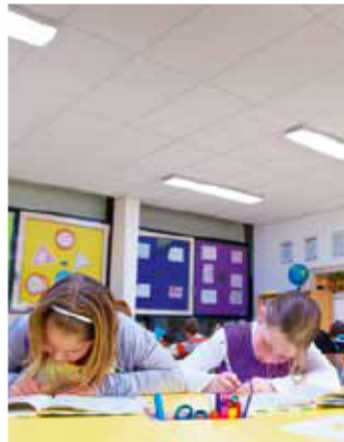
When: Normal class lesson



Calm

What: Standard intensity level,
warm colour tone

When: Supports to calm a class
that is too hyperactive



Focus

What: Highest intensity level,
cool colour tone

When: Supports concentration
for a test

Dynamic lighting
is a system
that allows us
to change
the intensity and
the color of the light

Research overview

Search results

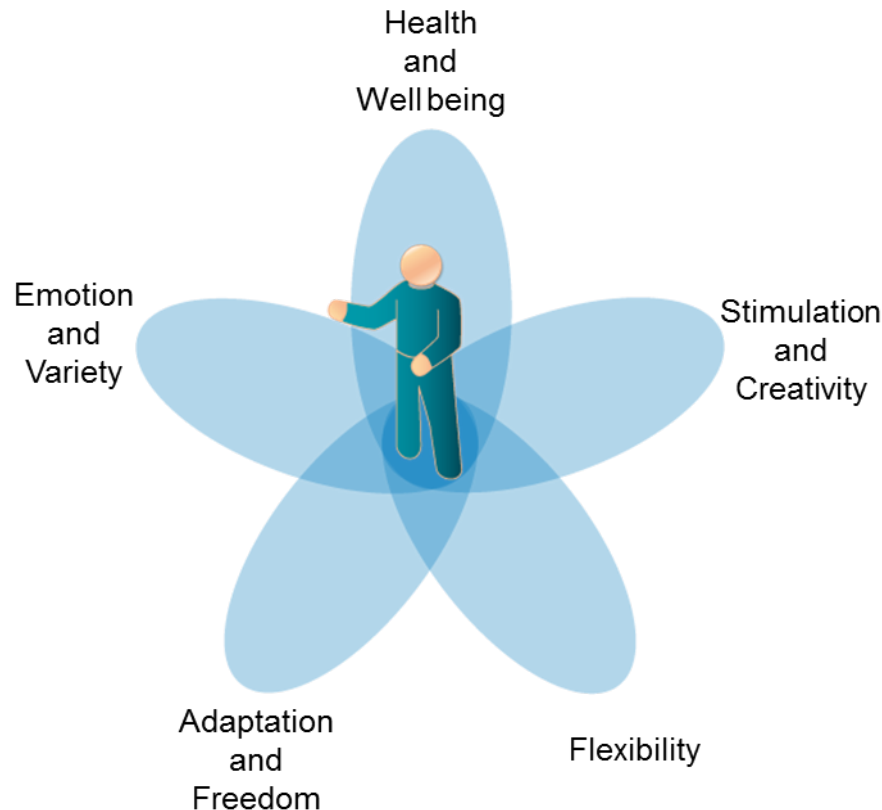
- <http://www.utwente.nl/en/news/!/2010/10/117972/the-effects-of-light-on-primary-school-learning>
- https://www.youtube.com/watch?v=MkzFs_MivdY
- <https://www.city.ac.uk/news/2011/apr/school-pupils-concentration-levels-improve-with-new-classroom-lighting-system>
- <http://www.cofely-gdfsuez.nl/nl/nieuwsbericht/st-medardus-primary-school-in-wessem-first-to-use-philips-schoolvision.html>
- <http://www.prnewswire.com/news-releases/study-from-philips-and-university-of-mississippi-shows-positive-impact-of-higher-quality-classroom-light-on-reading-competency-of-us-students-129442743.html>
- <http://blog.pegasuslighting.com/2011/08/classroom-lighting-impacts-learning-research-study/>
- http://www.lighting.philips.com/pwc/li/gb/en/application_areas/school/CaseStudy_Epsom_and_Ewell_High_School_UK.pdf

The Hamburg study documents a reading speed increase of 35%, concentration improves, thereby reducing errors 45% and classroom hyperactivity is reduced by 76%. “Our study makes it clear that adjusted Dynamic Lighting in classrooms has an extremely positive effect on children’s learning behavior”, said Professor Schulte-Markwort, director of the Clinic for Child and Youth Psychology at the University Hospital in Hamburg-Eppendorf, responsible for the study.

[Source: Schulte-Markworth,M., Barkmann,C. & Wessolowski,N. Effect of Light in Schools. CIE x035:2010: Proceedings of CIE 2010 "Lighting Quality and Energy Efficiency" 14-17 March 2010, Vienna, Austria. 2010. ISBN 978 3 901906 83 1.]

Sustainable future for public buildings

Lighting can make the difference



Lighting affects more than what we see.

It influences **how we feel, how we behave,** and **helps us to concentrate.**

It has also a major say on our **energy consumption.**

Connected lighting is the present and the future.

Lighting Academy – continuous learning

Your free tools that you can use starting today



Newsletter

<http://www.lighting.philips.com/main/forms/plu-newsletter.html>

Webinar and Light Bites

<http://www.lighting.philips.com/main/education/lighting-academy/lighting-academy-browser/webinar/light-and-health-implications-for-hospitality/>

Learning for Students

http://www.lighting.philips.com/main/connect/Lighting_University/lighting_design_student.wpd

http://www.lighting.philips.com/main/connect/lighting_university/student_program.wpd

YouTube

<https://www.youtube.com/channel/UCQ4lMI20Rffpa4m6XzpPJ-A>

Courses & Certifications

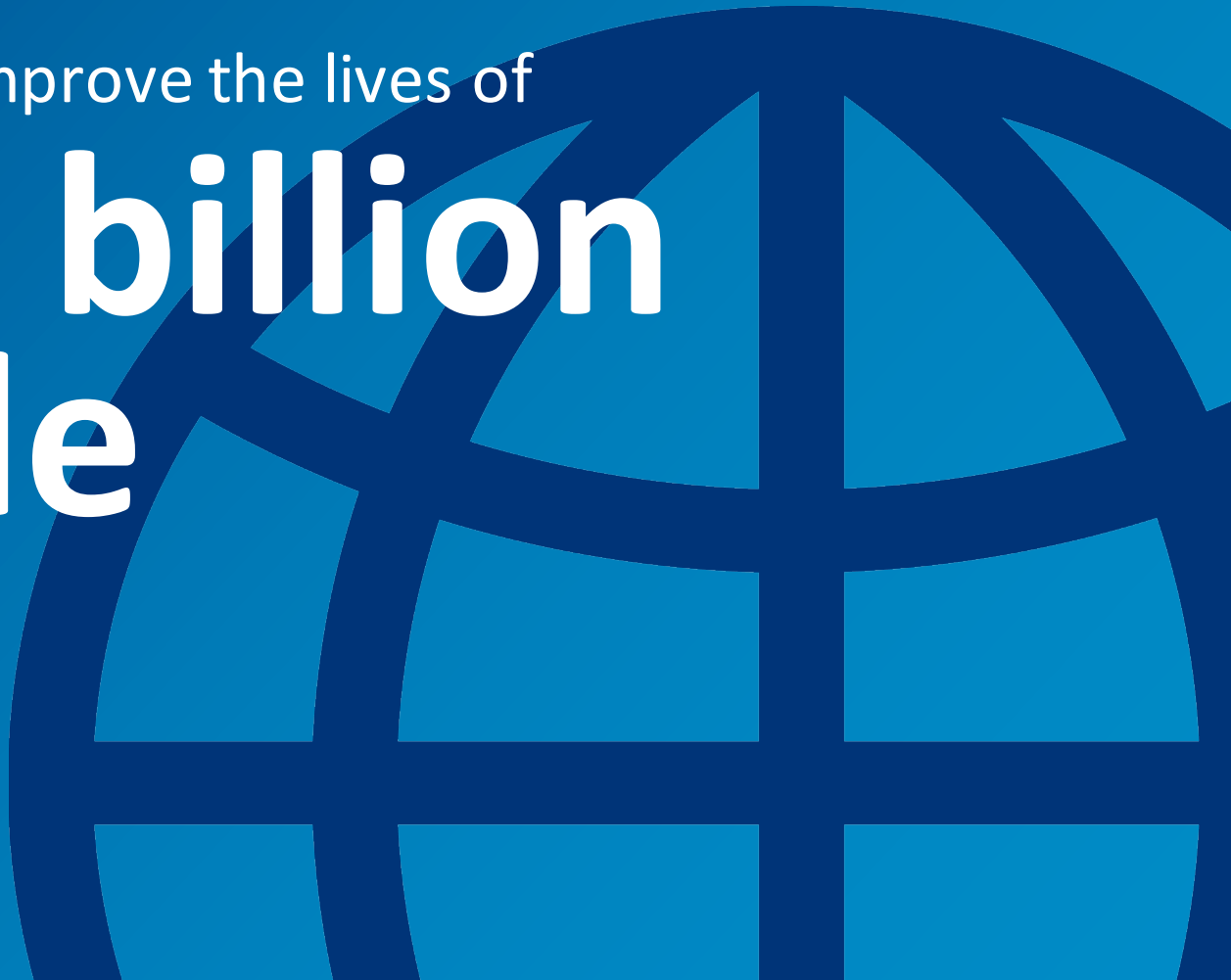
<http://www.lighting.philips.com/main/education/lighting-academy/lighting-academy-browser.html#page=1&filters=Type%2FCourse%2C>

We strive to make the world healthier and
more sustainable through innovation

We're aiming to improve the lives of

**three billion
people**

a year by 2025



MULTUMESC
THANK YOU

