Accelerating into an uncharted area

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BG Indoor Systems Software
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About the presentation

- Practical approach in Philips Lighting improvement program

- Theory is nice, real life is what you have to live with

- It's not perfect for you. It is the Philips approach. But it may inspire you to find your own solutions.

- It's about two different business groups: Outdoor and Indoor

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Setting the stage

- Vision changing from product-oriented to system-oriented ("Provide value beyond lighting")

- Culture of high quality products and maturity in lifetime and reliability prediction.

- Product development in "old" organization is mostly hardware / optics oriented instead of software oriented

- Software teams working Agile and use test automation (but software is limited in size).

> **Everyone takes the availability of light
> in the streets and in the office
> for granted.
> There should always be light!**

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Starting the outdoor run

Starting the outdoor run

- Philips Lighting envisioned a large, wireless connected system of streetlights, having central, cloudbased map for remote control and monitoring of each individual streetlight.

- In the beginning, only small, experimental setups were available as proof-of-concepts. (2-5 lightpoints, no central control).

- Customer demo resulted in request to finish in time for 20.000 planned luminaires in London suburb.

   And so we needed to accelerate what we just started…

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Be selective what you will "carry" during your trip.

What is the most important feature of the system?

☐ *For the customer*: Give light during the night

☐ *For Philips*: Minimize effort needed to fix / update the system and make sure factory can start producing

Risk based testing introduced

☐ Focus on out-of-the-factory behavior (lights on at power-up)

☐ Focus on robust wireless software upgrade

Verify other features only when there is sufficient time

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Keep your eyes on the road.

"System test team should prevent issues being detected in the field / by the customer, so (re-)test all"

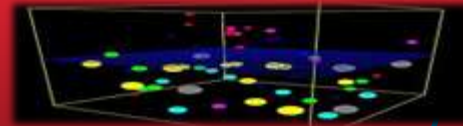"You need to prove that the software will last for at least …"

Organization

"Why not automate all of your tests? This will speed things up!"

"Let's simulate the system to see if it works!"

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Decide on the track to take.

- Promote software through test environments

- Identify weak spots in software
update process by extensive analysis

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Decide on the track to take.
(Promote through test environments)

- Small desktop setups:
  - On tester's desk
  - Allowed maturing of software
    update process

- Large setup:
  - Office setup
  - Allowed insight in network behavior
    (updating multiple nodes at a time)

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Decide on the track to take.
(Promote through test environments)

- Segment size setup:
  - Parking lot
  - Allowed insight in large network behavior and timing
  - Showed unexpected "blind spots" in network and moisture problem

- Large segment setup:
  - Site Philips Healthcare, Best
  - Allowed insight in dynamics of large system (not always obvious network path was taken)

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Decide on the track to take.
(Identify weak spots in wireless software update)

- Use of test design techniques resulted in identification of considerable set of conditions for weak spots

- Pairwise combination of the identified conditions was captured in relatively large set of test cases

- Software update test cases were mandatory part of every regression set

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And rely on the team to win this race.

- In the end, focus could only be kept because of the composition of the System I&V team:
  - Common vocabulary (full ISTQB Advanced)
  - Experienced in large systems;
  - Driven Test Lead;
  - Technically capable System Integrator;
  - Analytical Test Architect;

- System Project management supporting the System I&V team's approach and allowing the change.

- *Even more important:*
  Newly hired in organization, bringing in fresh ideas

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Starting the indoor run

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Starting the indoor run
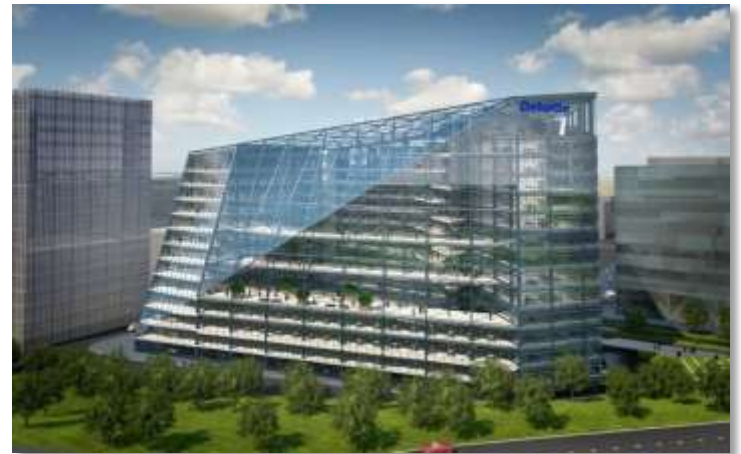
- Philips Lighting envisioned a large, wired connected system for offices that would be PoE powered and that allowed for local control of light and temperature through a smartphone, and central monitor and control of each individual luminaire on energy usage and room occupancy.

- First customer (Deloitte) available from start. Customer started constructing a new building: 14 stories high, requiring around 6400 luminaires, BREEAM Excellent certified (highest grade in "green" building), closed ceiling.

- Request: Deliver systems 3 months earlier as planned (on an original 12 month timeframe) Realization: Luminaires must even be produced earlier than that, so software for new controllers must be finished even earlier.

- Because of open nature of client building, fear for Christmas Tree effect during the night after hand-over to customer.

- Higher number of products in initial phase as in Outdoor run

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Be selective what you will "carry" during your trip.

(Using experience from Outdoor run)

What is the most important feature of the system?

☐ *For the customer*: Dark during the night, light during the day

☐ *For Philips*: Minimize effort needed to fix / update the system and make sure factory can start producing

☐ For Philips: Avoid Christmas tree effect after handover.

Risk based testing introduced

☐ Focus on out-of-the-factory behavior (lights on at power-up, possibility to manually switch off)

☐ Focus on robust network software upgrade

☐ Verify after commissioning done

Verify other features only when there is sufficient time

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Keep your eyes on the road

"Act at one world-wide team"

"I&V will make a system out of it"

"Make sure all customer configurations work"

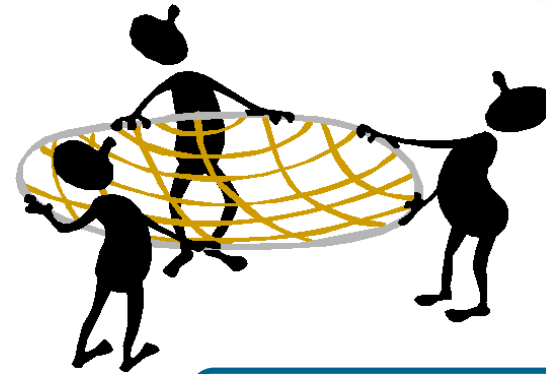"Finish 3 months earlier. Delivery date has shifted"

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Decide on the track to take

Organize one roof on critical moments in project

Safety net for product tests

"Confiscate" new building (opportunity)

Limit the number of configurations

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Decide on the track to take

- Introduce Standardized Test Setups to allow for backwards compatibility = > allowed us to make release using "old" components.

- Thoroughly look at software update mechanism (like done in Outdoor) and make it part of regression. Involve product development team of embedded devices.

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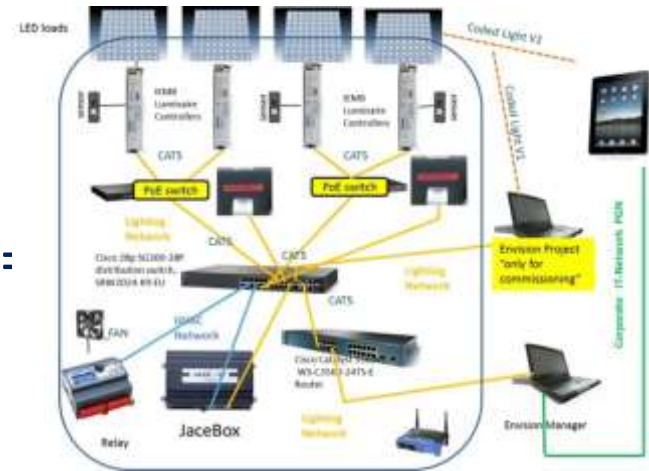
And rely on the team to win the race

- Team preparing for the 1-10-100 strategy. System I&V is regarded as key in release for this.

- Current System I&V team is arranged to be flexible, based on prioritization and decisions of organization. But also: clearly indicating boundaries of what is and what is not possible.

- Again: Management buy-in, based on outdoor experience. But: some development teams have still issues with this.
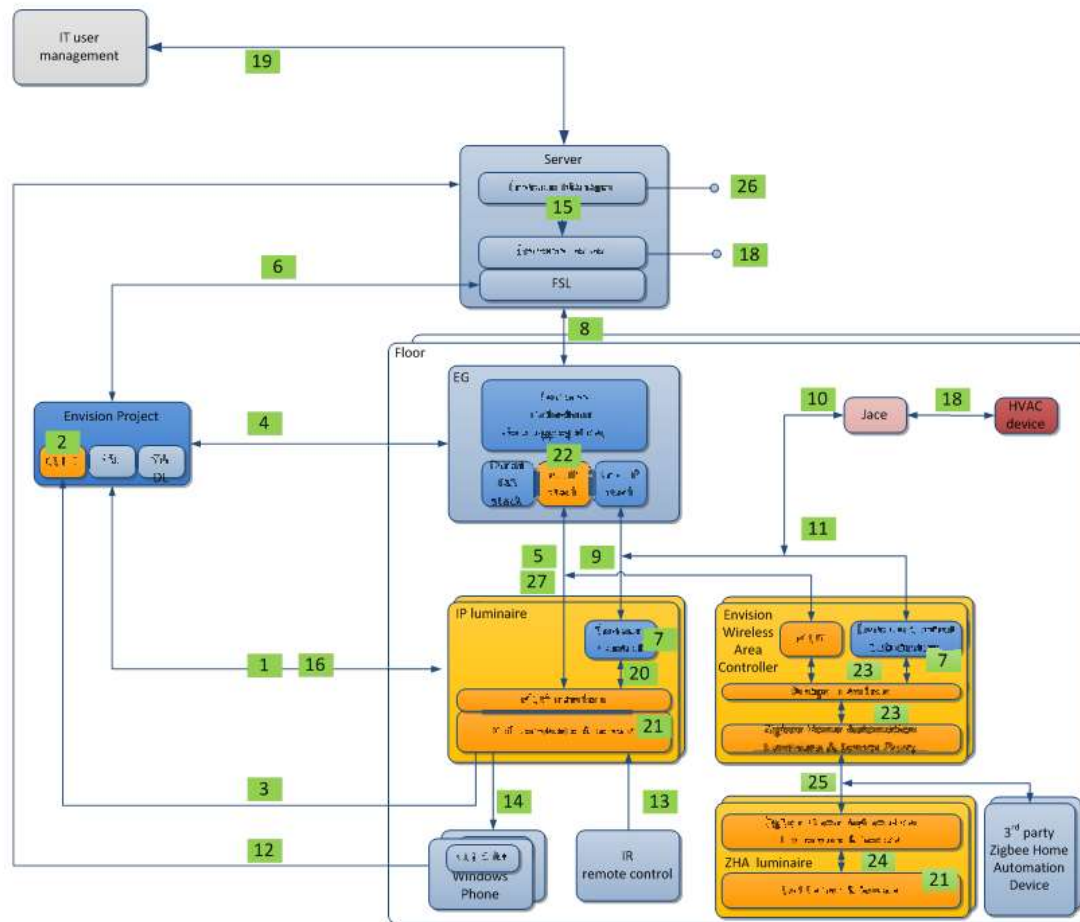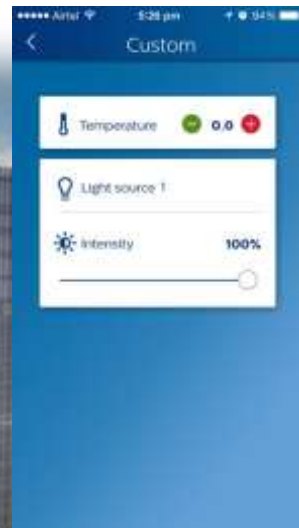
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Questions? Discussion?

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LightMaster IP
# System Architecture

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LightMaster IP
Personal Control

PCA is the latest control application from Philips. It is a self-configuring application that provides control options for lighting, HVAC from a single point. Using visible light communication or QR code input it can control the pre-commissioned Connected Lighting system. A professionally installed Philips Connected Lighting system is a pre-requisite for use of this app.

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StarSense RF - CityTouch
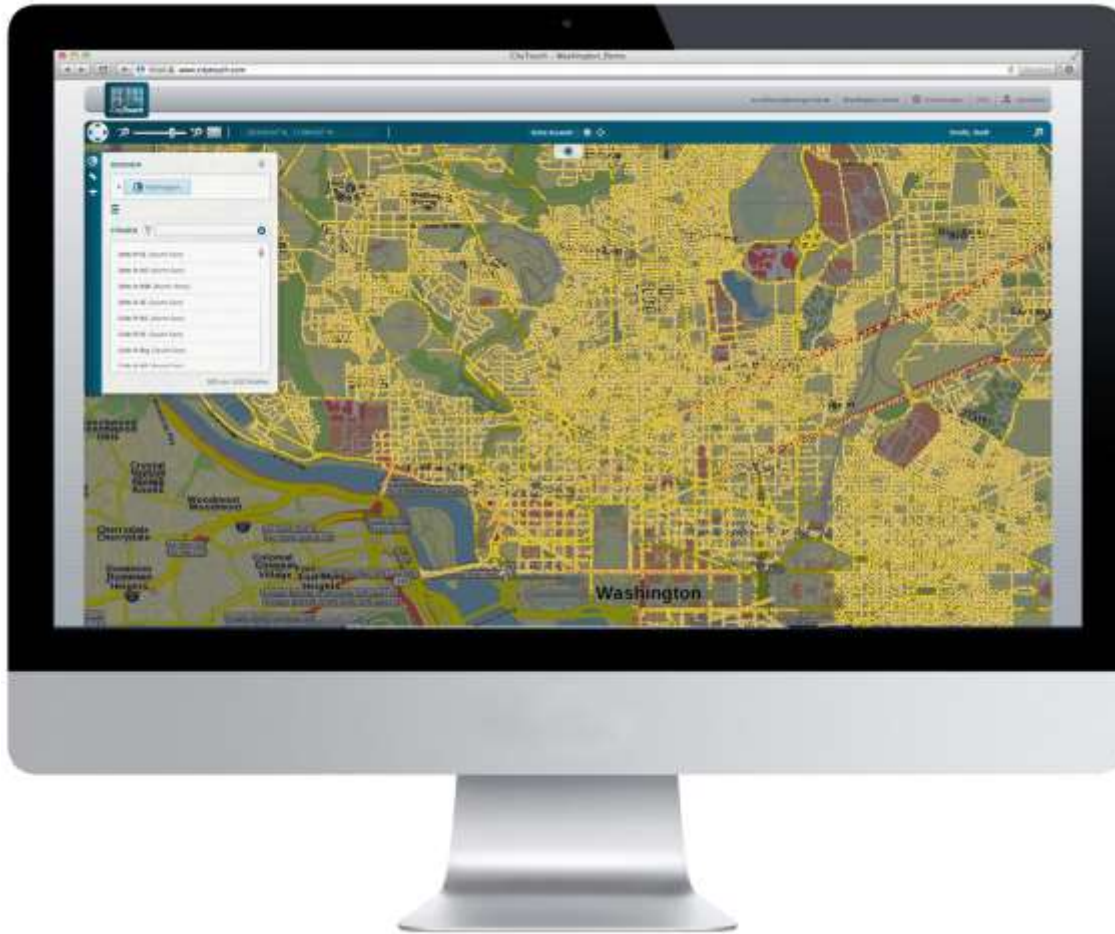
What if lights on your street knew when to stay on longer and when to switch off? What if you could easily check online how much energy street lights are using and which ones need repair? What if your city had full control over its lighting, setting schedules and dimming levels on demand? What if it had access to elaborate data visualization and analytics, to make better decisions?

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