



innovative displays and new Media

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11.05.2016

MERCK

HEALTHCARE, LIFE SCIENCE & PERFORMANCE MATERIALS



1668
founded



66
countries



50,000
employees



€1.7 bn
invested in R&D
in 2015



€12.8 bn
sales in 2015

What we do



Prescription medicines to treat, for example, cancer, multiple sclerosis and infertility, **over-the-counter pharmaceuticals** for everyday health protection or to provide fast relief of colds and pain, as well as innovations in the areas of **allergies** and **biosimilars**.



Innovative **tools** and **laboratory supplies** for the life science industry that make **research** and **biotech** production easier, faster and more successful.



A wide range of specialty chemicals, such as **liquid crystals** for displays, **effect pigments** for coatings and cosmetics, or **high-tech materials** for the electronics industry.

Global market and technology leader in liquid crystals displays

Over 2 decades, the technology and relevant applications has defined the modern communication, the work & life styles



Simplified LCD value chain

Materials → (components) → panels → OEMs → consumer electronics companies → consumers

Upstream innovations

Downstream innovations



MERCK

Merck has driven incredible display innovations & new media revolutions



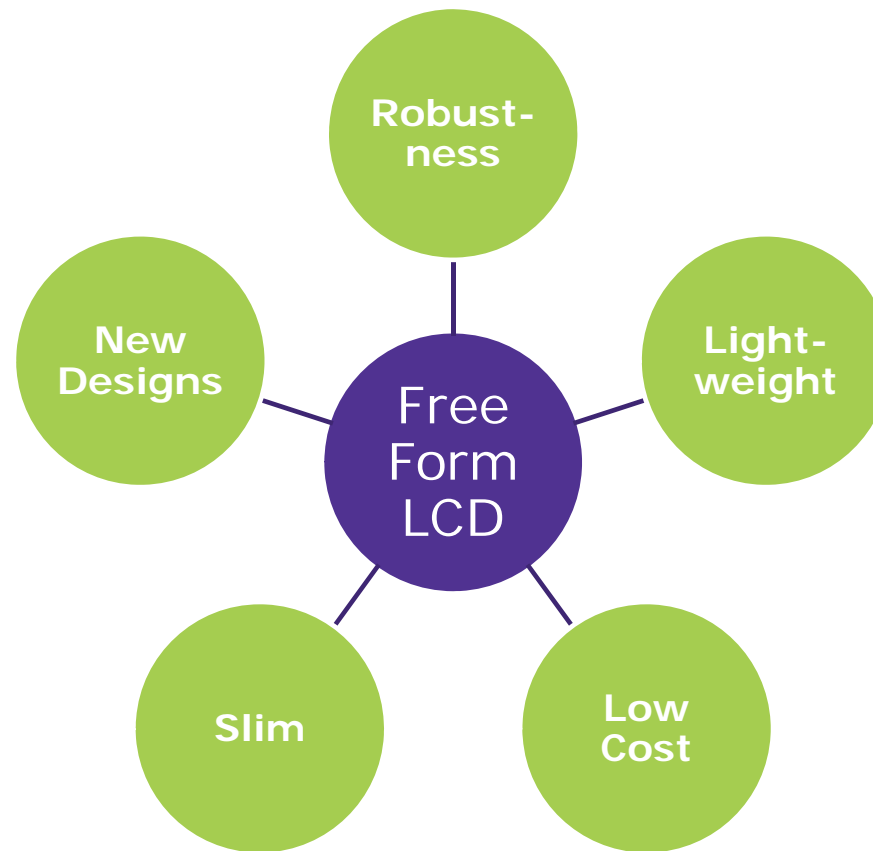
Display Materials



LCD rapidly drives new media interfaces through

- better quality
- bigger displays
- lower cost
- higher capacity

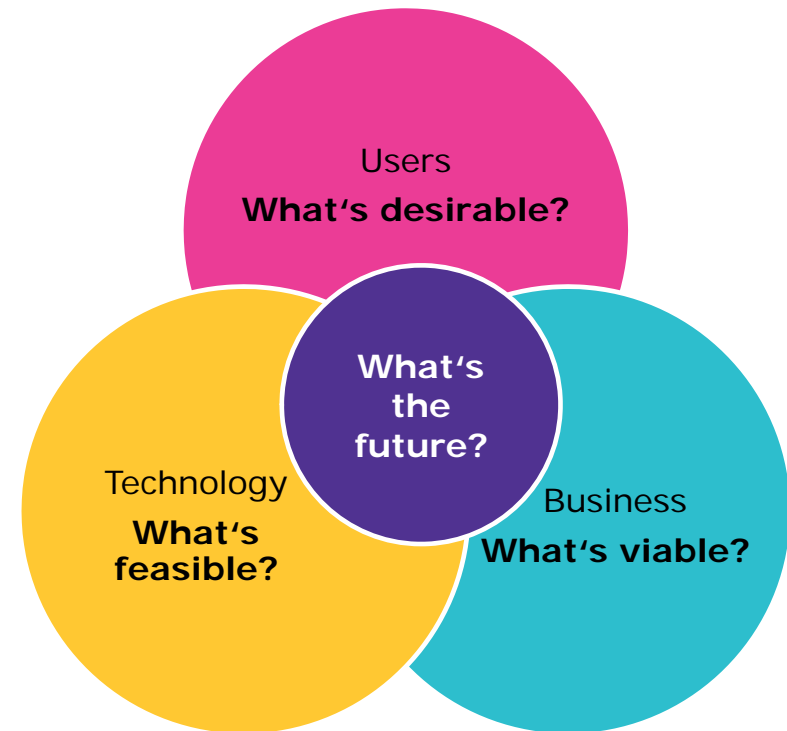
Why free-form LCD?



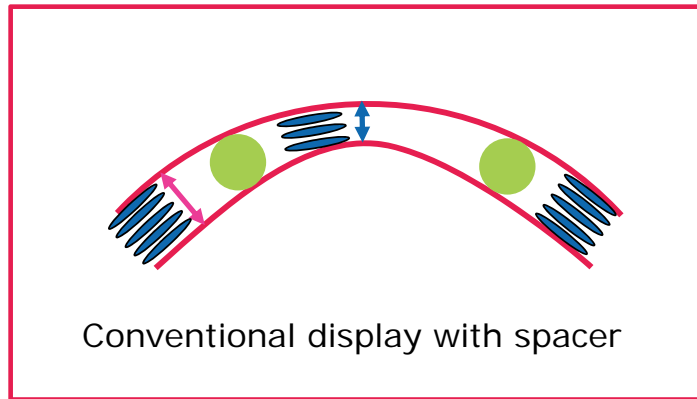
What is the future?

In order to find answers for today's challenges, we need **to leave behind a purely technical thinking**

- Our approach: from **technology-driven** innovation to **issue-driven** innovation
- We turn issues and problems into **opportunities**
- We need to develop solutions for **problems that already exist**

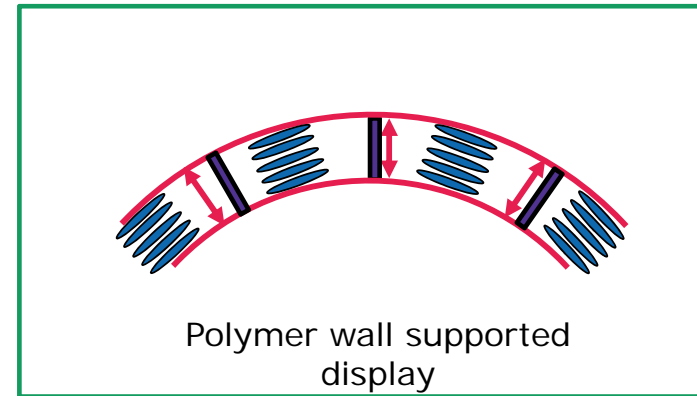


Merck has in-house technical pipelines



Correct cell gap is absolutely critical for the function of the LC display.

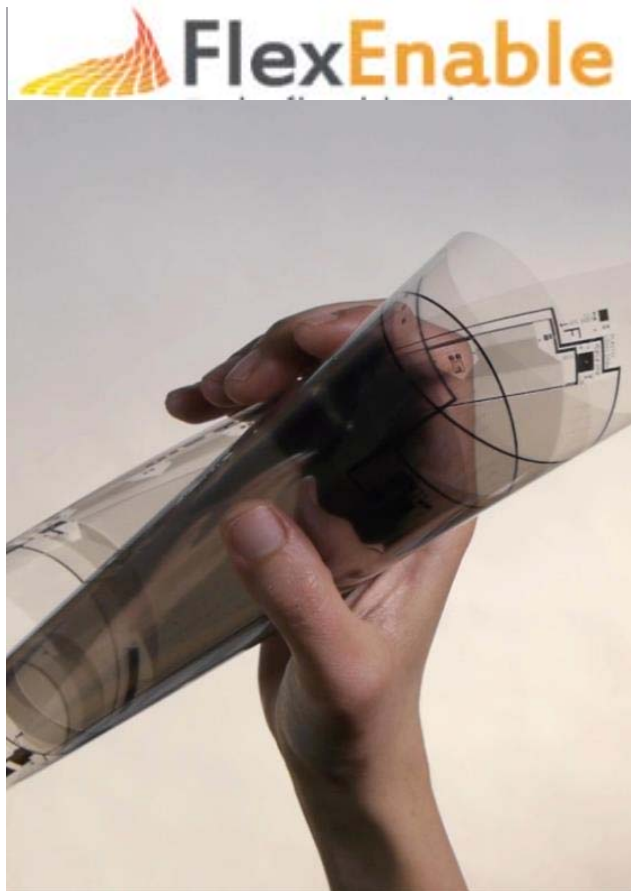
Conventional spacer may not maintain the cell gap.



Polymer wall structures guarantee a constant cell gap of the LC display.

Polymer wall structures allow the realization of LCDs with added functionalities (form factors, light performance, touch function)

Technical partnerships with FlexEnable



Innovative displays and new media



0.25mm

Transistor bend radius
Wraps around a
matchstick



25µm

Substrate thickness
As thin as a human hair



Low Cost

**Lowest cost for all
areas and surfaces**



100gsm

Weight per area
As light as a sheet of
paper



60 Hz OLED/LCD

**Better performance than
a-Si**



< 100°C

**Lowest transistor
manufacturing temperature**

Applications ask for free-form displays



Education

- e-boards
- tablets
- e-readers



Transportation

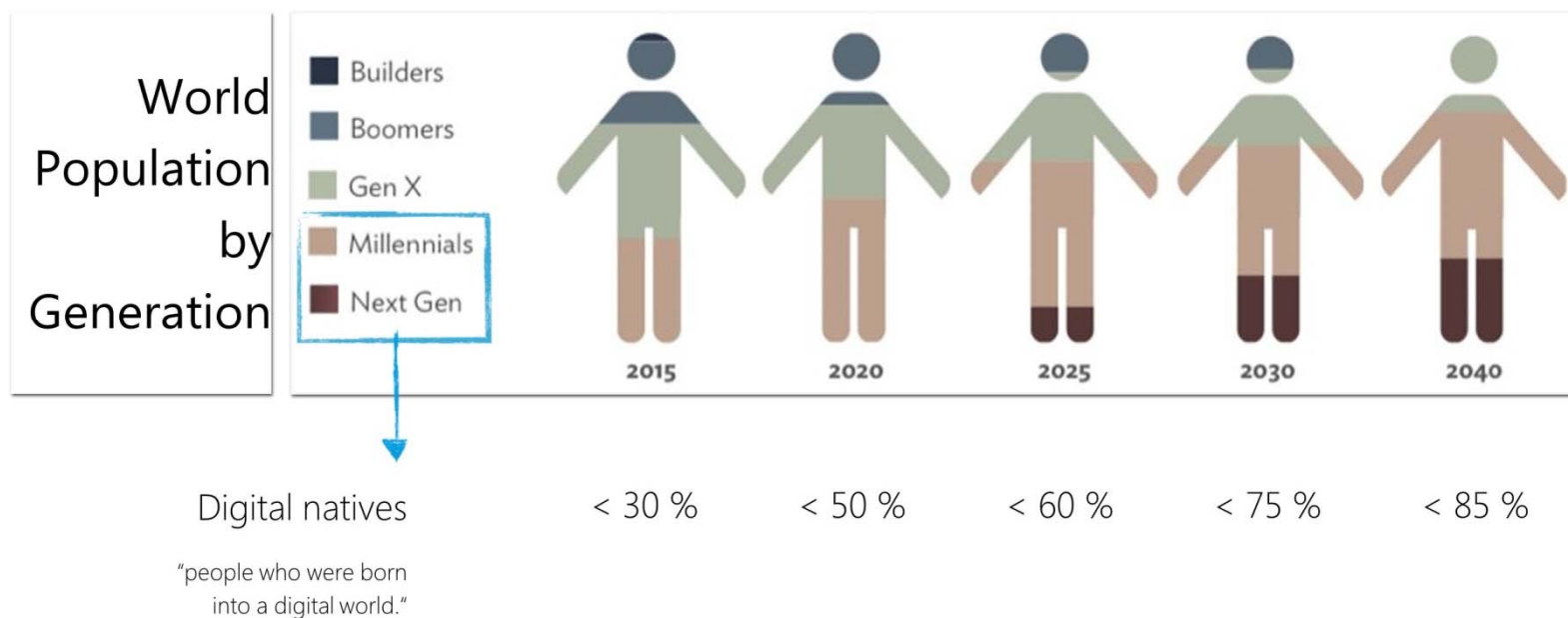
- car head up display
- train window
- airplane cockpit



Digital Signage

- shelf labels
- billboards
- bus shelters

The world of digital natives accelerates the changes



In 5 years, digital native will be doubled.
In 2025, millennials will occupy 75% of global work force.

Display is the key interface migrating “cars to mobility, product to service”



- Real-time information to optimise mobility activities and synchronise with others
- Change mobility habits according to needs “now”
- Use the fastest, cheapest and most sustainable mobility solution while being on the go
- “Where you are is who you are”

Free-form LCD for automotive interior

Trends & pain points:

- interactivity, connectivity, communication, entertainment
- larger displays, touchscreens
- extension of after sales business: added value services
- customization
- design of driver's workplace
- strengthening of brand experience

Market estimates:

- Annual number of cars produced: 100 million by 2017
- Estimated size of display in the F015 Mercedes: 3 sqm



Smart cities and digitalisation

- Global urbanization trend will create many new applications in cities
- People want to be constantly connected with information and entertainment
- Innovative displays become
→ “strategic assets”

We aim to be the catalysts for innovations

- Innovative displays are key interfaces for new media applications
- Merck is developing the technical solutions and working across the ecosystems
- Partnerships with agile start-ups accelerate the development and enhance impacts

