# Annex.1 Proposed RTD agenda for displays in intelligent environments in FP7

**Key points** for research and technology development for smart displays in intelligent environments are:

- large area processes and new manufacturing techniques,
- improved materials,
- new device structures,
- for an integrated systems approach
- accompanied by technology platforms for assessment of materials and equipment to foster access of the industry – especially SMEs – to research results, to accelerate the innovation process on the production side and reduce "time-to-market".

This will enable **new displays and applications** including:

- Autostereoscopic and full 3-D multi-user displays
- flexible, large area displays,
- displays with high optical performance, high resolution and low power consumption,
- all-organic displays,
- portable devices with low power consumption and/or autarkic internal power supply,
- organic ICs, RFID-tags
- smart displays, integrating logic, sensors, display, antenna and power supply, organic, inorganic and hybrid.
- large area photovoltaic solar cells

with the prospect to be produced in a sustainable manner on competitive equipment with high yield at low cost.

In the following a list of important **RTD topics** for smart displays and organic electronics is given. This list is to be further completed.

**Processes:**

- large area, high resolution patterning equipment and processes:
  - printing techniques (e.g. ink-jet, flexo, offset, screen)
  - laser patterning
  - mask techniques for vacuum deposition
- roll-to-roll manufacturing, high-throughput processes
- self-assembly systems, enabling further miniaturization, avoiding complicated and expensive patterning techniques

  - new materials
  - new production technologies
- process technology for high resolution displays (up to 300ppi)
- low-cost processes for (flexible) thin film encapsulation
- environmental friendly processes and materials
  - reduction of process chemicals and energy consumption
  - replacement of (heavy) metals by re-usable or easily disposable materials
- flexible production techniques for rapid prototyping and customer specific products
- solution using semiconductor ink composed of inorganic nanoparticles
- thermal transfer of inorganic layer.

**Materials:**

- materials with increased chemical and mechanical stability, lifetime and higher efficiency for
  - LC and OLED displays
  - lighting
  - solar cells
  - organic transistors (esp. enhanced mobility)
- low cost substrates for flexible displays, electronics and solar cells
- material for transparent electronics
- material systems for thin film encapsulation for flexible (OLED) displays and solar cells
- improved LC materials for thin LC layers for high performance displays
- integration of functional layers of LC with silicon technology

**Devices / Design:**

- flexible displays / indicators (LCD, OLED, electrophoretic, electrochrome,..)
- Autostereoscopic and full 3-D displays
  - new materials, new components, new standards and new technology for 3-D (e.g. holographic displays)
  - new 3D transmisison (e.g. TV) standards
- all organic displays
  - organic TFT backplane
  - plastic substrate
  - OLED-display
- new display architectures that no longer refresh all pixels but have local storage and processing

- new display architectures to allow displays to be driven from behind, enabling seamless tiled displays, and displays of "unlimited" size and arbitrary shape
- small projection displays for portable devices
- ultra-low cost displays/indicators
- very low power display drivers
- new device structures and materials for organic thin film transistors with higher performance
- hybrid organic/inorganic electronic devices
  - embedding Si electronics (e-grains) in organic devices
  - improved low-cost interconnect technologies
- organic sensors to increase functionality and performance, e.g.:
  - photo cells
  - humidity, temperature sensors
  - bio sensors,...
- large area (organic) solar cells
  - higher efficiency
  - on flexible substrates

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A major task of the ADRIA network is display technology roadmapping. Other FP6 projects within the organic cluster also address roadmapping in their specific areas. This will give more input to this paper and will help to further develop and update the ideas and strategies addressed here.

***Editors***

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***Disclaimer***

This white paper has been compiled from a very broad range of inputs from a large number of individuals from industry and academia. We have tried our best to include all views and to verify the estimations made. The paper has been reviewed by a number of experts in the field.

However, it is natural, that not all opinions submitted are completely inline with this paper. We have pointed out to all who received the call for participating in this exercise that the European Commission provides online consultation exercises for individual input on the internet.

This paper will go through a more intense discussion than the set timeframe allowed for, in future workshops.