PRINTED ELECTRONICS & EMERGING MACROTRENDS

OPPORTUNITIES AND DESIGN IMPLICATIONS OUTLOOK REPORT 2013







Member of :





OBSERVATORY 2013

Av. d'Ernest Lluch, 36 Parc Científic i de la Innovació TecnoCampus E-08302 Mataró - Barcelona (Spain) T. (34) 93 741 91 00 - Fax (34) 93 741 92 28

cetemmsa@cetemmsa.com twitter @cetemmsa

www.cetemmsa.com

COPYRIGHT CETEMMSA TECHNOLOGICAL CENTRE

a report curated by Laura Clèries, PhD. lauracleries.com

CORPORATE VISION

Building a better future

Our society aims to achieve a balanced economic model, sustainable and equitable.

Printed electronics, far from being a technology with limited applications, offers a great opportunity to revolutionise the integration of conventional electronics in health-related products, containers of everyday consumption items, the way we dress, move about and relate to each other in our cities, etc.

The CETEMMSA technology centre employs a translational research model based on its specialisation in the treatment of flexible surfaces and the creation of tangible value for its client companies and technology and industrial partners, sharing knowledge, resources and ways of reaching reference markets.

The challenge is clear: to drive forward a host of innovations that are still at the laboratory stage and bring them to the point where they can be produced on an industrial scale with a mass uptake. Our society needs examples to believe that a better future is possible.

In CETEMMSA we have the responsibility and privilege to be working for it.

Pere Merino

President of CETEMMSA General Manager of TELSTAR SA





GOVERNMENT BODIES

Board of Trustees

PERE MERINO (President) - TELSTAR SA
JOAN CANALS - AGRUPACIÓN ESPAÑOLA DE GÉNERO DE PUNTO
ADOLFO COMERÓN - UNIVERSITAT POLITÈCNICA DE CATALUNYA
JAUME TEODORO - TECNOCAMPUS MATARÓ-MARESME
ROSER MORÉ - FEDERACIÓ D'ASSOCIACIONS I GREMIS EMPRESARIALS DEL MARESME
ORIOL ALCOBA - ACC1Ó - GENERALITAT DE CATALUNYA
JOAN SERRA - ACC1Ó - GENERALITAT DE CATALUNYA
MIQUEL REY - AJUNTAMENT DE MATARÓ
JOSÉ MANUEL LÓPEZ - CONSELL COMARCAL DEL MARESME
GINÉS ALARCÓN - NAE COMUNICACIONS SL

Executive Council

PERE MERINO - TELSTAR SA GINÉS ALARCÓN - NAE Comunicacions SL LUISA ALEMANY - ESADE Law & Business Schools JOAN ENRIC RICART - IESE Business School JOAN SERRA - ACC1Ó - Generalitat de Catalunya



Adopting breakthrough technologies

Research and Technology institutions face the challenge of continuously transfering industrial knowledge that has been generated in the successive phases of scientific creation and innovation. Being actors of knowledge transfer close to the industry, CETEMIMSA has been one of those pushing new products, processes and new ways to increase business productivity the advancement of society as a whole. In many cases, the difficulty lies in aligning companies with potential business prospects of the potential demand for these new products and innovations, which becomes blocked when the technologies are groundbreaking in themselves and not fit models already established by markets. Moreover, the uncertainty and variability in business cost / benefit structures, where the volumetric factors can accelerate or stop definitely an expectation of certain business benefit, finally becomes as the blocking factor.

Obviously that approach of risk and uncertainty, representing innovation models that are intended to be present and future trend direction, necessary postulate that companies should innovate, accepting risks and mistakes, but doing so in a faster and cheaper manner. But in any case, it seems commonly accepted that some social trends, as such as those that capture the collective behavior, are called to be generators of new demands and consumer needs.

From this challenge in the fall of 2012 the professionals of CETEMIMSA imagined a world where the path is marked by these societal trends, that constantly generates change and where in a permanent rises new requirements and demands, but above all, adopting of those breakthrough technologies. That is why we consider a scenario where our skills, knowledge and competencies were aligned with so called social macro trends that had become the compass of our actions, as best answer in the fulfillment of our mission, which is simply transferring new knowledge to maximize performance for companies through innovation, but ultimately impacting on the benefit to society as a whole.

This report targets this aim to build bridges among society, technology and trends.

Josep Lluís Checa

Deputy Director of the Presidency





This overview report is generated through the application of current macrotrends analysis to the printed electronics technological sectors in order to be able to identify sector opportunities, define strategic marketing actions and understand its design implications.

The macrotrends have been identified by the analysis of socioeconomic, cultural and design factors, brought about by both industrial drivers and individuals. The technologies covered exhaustively in this report are electroluminescence, electrothermic and electronic sensors, some others appear as satellite technologies.

This report is then to be read as an inspiring manual for R&D, product development, commercial, and marketing strategy departments of companies with an innovation approach.

It includes a brief introduction of the technologies, and then the 5 identified macrotrends, followed by the appendix: summary of sector opportunities and the macrotrends timeline.

The macrotrends are:

AWAKENING - make the familiar strange SWITCH - play smart HERITAGE - make the strange familiar PERFORMANCE - beyond human boundaries NOWTOPIA - Do It Yourself

Each trend covers:

CONTEXT AND MACROTREND TIMELINE where does the trend stand in terms of sectors and timeline.

INSPIRATION AND INSIGHTS

what are the inspiration images and keywords for each trend.

OPPORTUNITIES BY SECTOR

split into the identified sectors, it includes technologies and related products.

REFERENCES What has inspired this trend, including reference books, exhibitions, films, videos, brands, products, etc.

COLOURS AND MATERIALS

What are the implications in terms of design, materials and colours for future products.



ĥ

INDEX

MACROTRENDS:

RONOTAENDO.		PAGE
AWAKENING make the familiar strange	CONTEXT AND MACROTREND TIMELINE INSPIRATION ARCHITECTURAL LIGHTING ARCHITECTURAL HEATING DOMOTICS AUTOMOTIVE-concept cars EMOTIONAL & INTERACTIVE OBJECTS SPA/WELLNESS HEALING THROUGH SKIN HEALING THROUGH SKIN / SMART FOOD WIRELESS HEALTH MONITORING ERGONOMY/ BIOMECHANICS/ORTHOPAEDICS PHARMACEUTICAL PACKAGING & INSTRUCTIONS EXPERIMENTAL FASHION & CONSUMER GOODS REFERENCES COLOURS & MATERIALS	11
SWITCH play smart	CONTEXT AND MACROTREND TIMELINE INSPIRATION ENTERTAINMENT INDUSTRY ADVERTISING/ PROMOTION/ PACKAGING GAMING/ INTERACTION KIDS/ TOYS APPS AUTOMOTIVE-young & city cars RETAIL SIGNALETICS SMART CITIES / CITY TRANSPORT/CITY SIGNALETICS MOBILITY-cycling & small motorbikes DAILY ACTIVEWEAR HEALTH & FITNESS REFERENCES COLOURS & MATERIALS	33
HERITAGE make the strange familiar	CONTEXT AND MACROTREND TIMELINE INSPIRATION HOMES wallpaper & blinds new ambient lamps furniture with integrated lighting decorative embedded electronics & remote control heated indoor & outdoor upholstery; carpets & floor coverings AUTOMOTIVE-family cars & luxe cars OUTDOOR ACTIVITES & LIGHT SPORTS ACTIVE AGEING PRODUCTS CONSUMER GOODS REFERENCES COLOURS & MATERIALS	53
PERFORMANCE beyond human boundaries	CONTEXT AND MACROTREND TIMELINE INSPIRATION AUTOMOTIVE-sports cars, safety cars, trucks MEN @ WORK/SECURITY @ WORK/SECURITY BODIES EXTREME SPORTS & AUTONOMY SURVIVAL, EMERGENCY SERVICES 3D FABRICS-protective, medical, objects AUTHENTICATION & BRAND SECURITY REFERENCES COLOURS & MATERIALS	71
NOWTOPIA Do It Yourself	CONTEXT AND MACROTREND TIMELINE INSPIRATION KITS & WORKSHOPS SELF POWERED & ENERGY HARVESTING A BETTER WORLD design for the other 90% culture-specific developments earth & air REFERENCES COLOURS & MATERIALS	85

APPENDIX 1: SUMMARY OF SECTOR OPPORTUNITIES APPENDIX 2: MACROTRENDS TIMELINE APPENDIX 3: PRINTED ELECTRONICS ROADMAPS

99 100 102

CETEMMSA

CETEMMSA is a technological centre doing research in the field of Printed Electronics and transfers its knowledge to companies wanting to innovate with differentiated products with a high added value. Its specialisation is within printed, flexible and flat electronics, as alternative to traditional silicon electronics, which allows for the addition of new functionalities to different surfaces (textiles, plastics, paper, polymeric films,...). It is possible now to emit light, gather energy and physical or biological data or interacting with objects and people in a different and innovative way. CETEMMSA does it thanks to its integrated chain which scopes from applied research to engineering and product industrialisation.

These devices are bound to be applied to various strategic sectors such as health and wellbeing, automotive and transportation, professional sports, packaging, architecture and construction, and technical textiles.





Getting smarter through technology

Since the beginning, we professionals at CETEMMSA have worked to align ourselves with the aim to improve and to strengthen the companies' competitiveness through our technology.

The journey towards Innovation is a critical factor in ensuring the future. Channelling knowledge through joint projects with innovative companies creates value and reinforces our organization as research centre.

The generation of new business concepts becomes Innovation when the results lead to an unequivocal increase in the value of the products and processes, thus providing a competitive advantage.

This is our mission and what will drive all our efforts.

Anna Escoda General Manager



TECHNOLOGIES

PRINTING TECHNOLOGIES: the new revolution?

In the past years, 3D printing technology for objects has evolved from a merely prototyping tool to commercial product manufacturing. In the same way, research & development of other sectors such as food and medical is going in the same directon. One can now find concepts and protoypes of printed foods and printed organs. Therefore, 3D rapid manufacturing, food printers, and bioprinting technologies are expected to have a boom in the coming years.



Heikki Naulapää's rapid prototype model of his Aprilla Ram concept



Philips probe design "food for thought"



Anthony Atala, MD: Printing A Human Kidney, as seen at TED talks

PRINTED ELECTRONICS

The same goes for printed electronics. We are experiencing a new electronic revolution which can be compared to the analogic towards the digital revolution. The printing, materials, paper and chemical companies of today will be the new electronic giants of tomorrow. At this point, the companies involved (more than 1,000 have entered the market) have primarily been developing the technology and now it is time to find all the ways it can be applied to specific markets and applications.

We are talking about printed versus analog devices, with all the advantages that this can imply. Printed electronics products offer many new possibilities because they can be flexible, stretchable, rollable, wash resistant, edible, low cost enough to be disposable, improve existing electronics such as displays, be integrated with fabrics, be more environmental, and improve safety, etc. Essentially we are minimising the bulkiness of electronics and therefore we can enable the manufacturing of extremely light and extraordinarily flexible products, and on top of that, and wireless ones.



Conventional and Lithographically printed circuit boards for telephone assembly by Cleaner Electronics Research Group

We will be able then to print light, photovoltaic cells, electronic commands, and biosensors onto a variety of grounds, from paper to fabric, nearly as simply as printing a document. The products will be thin, without wires, flexible, waterproof, shock resistant, low energy, solar rechargable and recyclable. Objects will wear the technology instead of carrying it.





macrotrend 1: AWAKENING



"make the familiar strange"

"Combining technology, fashion, art and urban habits gives rise to products that are radically provocative, that do not fall into any intermediate or mass consumer goods categories. These are minority products ready to conquer benchmark niche markets. Belonging to such minority groups is an option reserved for the most innovative companies; Firms seeking a special distinction. "

Dr. Paul Lacharmoise Project Manager CETEMMSA Technological Centre



transparent iPhone (mock up) from iphone-news.org

CONTEXT AND MACROTREND TIMELINE

"Awakening" means a new beginning, a will to embrace new technologies and adopt them in a new unexpected way. It is the most innovative trend, and its applications depend on the advancement of existing technologies: larger scale (architectural lighting and heating), wireless connected and interactive interiors & objects (domotics), better health preventive measures (remote health & biomechanics monitoring), latest automotive and mobility concepts, and new costumer-product interaction.

_{year} 2020			2030
			medi-home
			smart bodies
	3D objects printing manufa	cturing	humanised and "alive" materials
	connected homes and home appliances	bio- and non-woven couture	medi-food
	biosensors	e-skin	digital food and food grown in transit
	home diagnostics	wellthy concepts (health+comfort+spa)	seed and DNA archives
	holistic health	new architectural materials	spatial commercial aviation



AWAKENING

INSPIRATION



1/ Inflatable teahouse by Kengo Kuma.
 2/ The ghost of a chair by Valentina Gonzalez Wohlers .
 3/ Installation at Heimtextil 2010 trendsforum.
 4/ Quilt armchair by Bouroullec brothers design.

INSIGHTS

- a desire to humanise and integrate technology into everyday life
- away from mass manufactured products
- supracomfort
- health awareness
- beyond spa
- health+comfort+spa=wellthy
- biosensors
- smart skin
- wellness
- self check-up
- lounge
- technogym
- hospitals

- pollution sensitive
- digital bodies
- e-skin
- i-thing
- food design: superfoods
- youth liberator
- between nature & artificial
- new notions of beauty
- modern alchemists
- blend real & unreal
- laboratory
- magical experiments
- holistic health
- technovictims



ARCHITECTURAL LIGHTING **OPPORTUNITIES BY SECTOR**

Electroluminescent panels when produced in larger scale can provide solutions in many architectural areas. From combining or integrating electroluminiscent foils with other relatively new construction materials (i.e. Corian, a ceramic-like material that is shaped as a plastic), or wrapping around complex architectural shapes thanks to its flexibility; to external signaling through windows or even lighted separation panels. It is interesting at this stage to foster its future use through training, seminars and hand-on demonstrations to professionals.



Corian and EL wire showroom, Milan 2011



Blumen wall installation by Loop Ph



Tile Light by Naoto Fukasawa



Troika installation by Elumin8



m&I light separation panel by mmm (maria laura méndez martén)



LightForm by Francesca Rogers and Daniele Gualeni Design Studio for ILIDE

ARCHITECTURAL HEATING **OPPORTUNITIES BY SECTOR**

In a period in which homes become smaller, space-saving heating elements are key. Walls, floors (and floor coverings) and ceilings with integrated heating systems are an asset since they could replace traditional and bulky hot water radiators. Decisive properties of electrothermic surfaces are that they are lightweight, bendable, portable and can also act as decorative elements (through the embroidery, weave or print). They can also be energetically efficient, cost effective and easily integrated into construction, such as in below images.



"The very fabric of architecture" by architonic.com See also "Fabric architecture" book



Visualisation of a conventional electric heat ceiling panel as seen at Saturn Resource Management



Textiles integrated into concrete by Tactility Factory





As seen in the "A sustainable future" Microsoft campaign, we notice the importance of connected home appliances, of sustainable managing of home energies, and of energy autonomy. Future systems that are bound to be further developed are those that monitor energy consumptions (Cisco Home control), that give an extra help to ease our lifes (Smart manager LG fridge), that make the home more independent from central energy power (solar), and that ensure safety in its general form (fire, presence sensors...)



Microsoft. A sustainable future. (youtube)

Allante -





Smart Manager fridge by LG



AWAKENING

AUTOMOTIVE - Concept and new developments in transport **OPPORTUNITIES BY SECTOR**

Flexible, cost-effective and lightweight electroluminescent or electrothermic technologies can be of interest to future transport. Applications could range from dashboard and moodlighting (both outer and inner transport shell, that could change its appearance/colour depending on external environments); thermal comfort through flexible thin surfaces; to safety systems (keyless entry through fingerprint or through a printed electronic code on the windowpane-see T-ink.com). Automotive, trains, boats, airplanes, the new transport is lighter, connected and more sustainable.



Mercedes-benz Blitzenbenz concept car Daimler Smart Forvision





Renault Zoe Concept car



iMove



Australian High Speed Vehicle Project Hassel Studio



Waterstudio.nl. Book FLOAT!





EMOTIONAL & SMART OBJECTS **OPPORTUNITIES BY SECTOR**

Emotional wear and objects rely on the interaction of external environments with the human self or on expressing human emotions in the form of light or sound. Featured examples of affective applications of electronics are the Embrace me hoodie, which lights up when hugging someone; the Whispiral, which is a new kind of emotive gift in form of a sensual scarf that records and replays recorded messages of friends and beloved ones; or the Sensoree hood that displays affective colours of the user by means of sensors that read excitement levels. Important to note here is how emotions are expressed into a certain "affective" colour.

Interactive remote or distant objects that react to presence or to pressure can also be considered in this category: for instance, the Re-form interactive pillow, that illuminates when another user embraces his pillow (information is sent wirelessly) or the Affinity chair, which changes from transparent to mirror surface and lights up when the user is in proximity to the chair.



Embrace me Hoodie by Studio 5050



Whispiral beloved ones messages by Elena Corchero



Sensoree emotional wear



Re-form interactive pillow as seen at the Swedish Interactive Institute



Affinity chair, interactive furniture, by Ben Alun-Jones



Stress-free environments for health and emotional healing are gaining popularity, like the Life Medicine Resort near Wien. Thermal and visual comfort technologies can be easily envisaged for spa and wellness purposes: electrothermically heated accessories or massage matresses, dim colour changing lights.



Life medicine resort hotel, Das Kurhaus, Austria



Elizabeth Arden conventional Hot/Cold Shoulder Wrap



Trump Hotel Spa





FEEDING THROUGH SKIN / SMART FOOD SMART PACKAGING / WELLBEING OPPORTUNITIES BY SECTOR

We are experiencing a different approach to food, and grow we eat, generated by various factors: partly because there is a need to stay healthy, partly because food design and food genetics are right now emerging disciplines, and partly because we can now grow our own vegetables, in shared spaces, in an eco-conscious way (organic food). Nutrients and food ingredients then become an important issue and can be a marketshare for new technologies. Some of the concepts that arise are, for example, considering food/nutrients as medicinal pills (see Sterotype packaging); concepts of Superfoods (that feed directly on cellular scale), and new genetically and microwave induced meat-growth devices (Electrolux Cocoon).

In terms of applications of printed electronics, we find the Salinity monitor spoon and the Smart spoon. Both devices monitor either temperature, weight or salt content of the dish. This could be put forward into other applications: precise drug delivery measurement, sugar or other nutrients content or dietetic remote monitoring. Another existing printed electronics technology is that of disposable timers for food safety monitoring (Timestrip).



Sterotype packaging by Daizi Zheng



Electrolux Cocoon meat growing concept



Superfoods by PSaging



Smart spoon by VTT



Salinity monitor spoon by Compact Impact



TimestripPLUS by Timestrip

HEALING THROUGH SKIN / MEDICAL DEVICES OPPORTUNITIES BY SECTOR

Biosensors, iontophoresis, temperature sensors, stretchable electronics,...Due to the thinness and stretchable properties of printed electronics, new applications in the form of patches for drugs, cosmetics, tattoo or dietetics purposes are emerging. In terms of top-level range cosmetics, we find the Power correcting patch from Estée lauder, which is based on the ionthoporesis technology (efficiency of the cosmetic active is increased by applying an imperceptible power discharge) or the Vyteris smart patch drug delivery, working on the same technique. Temporal release of drugs is also possible through timers.

What is important in this sector is the shape and material of the device that is going to be directly in contact with human skin. For instance, Philips presented electronic skin in form of jewelry pieces; or the E-skin is an stretchable electronic device as easy to apply as an adhesive tattoo.

With this idea in mind, we can think of new potential applications such as electronic stimulation of skin (for regenerative purposes), devices that can monitor one's health vital signs (see next chapters) or a baby's vital signs (for pregnant women), or other devices that induce muscle contractions or those that help people with laringeal disease talk. See next sections for further developments of health monitoring.



Estée Lauder Power iontophoretic correcting patch



lontophoretic smart patch drug delivery by Vyteris



Drug delivery patch by Soligie



i-Load by Schoeller



Electronic skin sensing jewelry by Philips

AWAKENING



E-skin by University of Illinois



• E - HEALTH / M - HEALTH OPPORTUNITIES BY SECTOR

There is certainly a boost of apps for health monitoring thanks to the development of smartphones and of seamless, unintrusive personal devices. Due to health awareness, well-elderness, and internet access, these devices are expected to have further growth. The new term mHealth (mobile health) is used for this practice of medicine and public health, supported by mobile devices.

Applications are generally centered in monitoring vital signs (heart rate, temperature), but also sleep cycles, burned calories or daily activities (Up by Jawbone), and sometimes include reward programs or become social.



m-health graphic by Fastcompany.com



HRS-I system by Tokyo University



CES innovation 2011 award winner: heart rate monitor by oregon scientifc+gaiam



Heart remote monitoring system by Nuubo



HP Mobile Health Monitoring solution



Fujitsu i-ring



Up system daily activity tracker by Jawbone



Sleep cycle app for iPhone



iHealth system



MEDICAL DEVICES **OPPORTUNITIES BY SECTOR**

Other monitoring devices or apps are the monitoring of temperature through time (temperature strip recording) which could be used in sick babies and could be remotely sent to the mother's device, or the monitoring through visual recognition. Health monitoring devices or apps might have a marketshare when combined with personal workout machines and so do pressure sensitive textiles when combined with other functionalities.



Conventional Forehead temperature strip by Feverscan



Vital signs monitoring through visual recognition by Philips



Temperature sensor by PST electronics Baby remote monitoring by Sikker



Technogym systems





Alphafit pressure sensitive textiles



ERGONOMY / BIOMECHANICS / ORTHOPAEDICS OPPORTUNITIES BY SECTOR

A special chapter in health monitoring is the collection and analysis of biometric data. Ergonomics & biomechanics can also benefit from this technology. Lumoback and Modwell's biosensors monitor posture. When the wearer deviates from a pre-set alignment goal, the system sends an alert via iPhone telling the wearer to correct their posture. Ergoskin and the Smart e-pants additionally send electric signals for long time standing patients so as to activate their muscle activity. Electrothermic orthopaedics can be combined with these postural technologies.



Lumoback



Ergoskin by Talia Elena Radford Cryns



Lumoback



Smart e-pantsby Alberta Innovates – Health Solutions



Modwell's Bio Sensors



Heated rehabilitation prostheses by Cetemmsa

PHARMACEUTICAL PACKAGING OPPORTUNITIES BY SECTOR

The Finger reader is a combination of a finger reader and a bluetooth headset, where the finger point scans barcodes and transmits information (product composition, price, ingredients...) to an earpiece as audio instructions, aiming at helping the visually impaired. This technology can be applied to the pharmaceutical medical instructions, where dosification instructions could be spoken and replayed (could be aimed at the elderly and the visually impaired). Smart blister packs or e-communicative packaging is already a mature technology and is reaching mass market.



Finger reader by Hansub Lee



Holst Centre & Qolpack smart blister pack



PharmaPak, Child resistant, senior friendly compilance packaging by Stora Enso



EXPERIMENTAL FASHION & CONSUMER GOODS **OPPORTUNITIES BY SECTOR**

Hussein Chalayan is one of the fashion designers that has fostered and popularised the use of embedded electronics into garments. Embedded technology (Electrothermic, Photovoltaic, Electroluminiscent; ET, solar, EL) into haute couture clothing is still in its experimental stage but has very promising future prospects.











REFERENCES

This trend relates to the latest technologies and materials; to new spatial quests; to a desire to combine health with spa and comfort into a common culture with a holistic approach; to go beyond human genetics, and to rethink traditional systems.



Planetary Resources Inc

New spatial quests

50 years after the first trip to the moon, there is a noticeable increase in "space tourism", available only for billionaire adventurers, through various new companies such as Space-X or Virgin Atlantic. Also the outer space serves as research scenario for new unknown materials that are treated almost as the new precious stones.



Choi+Shine architects

Rethinking radiator by Jacob Rochus

Make the familiar strange

Human-shaped power towers, radiators that emulate the logs of a camp fire,...Technology and design is turning familiar shapes into non-directly recognizable objects, changing the appearance and look of what surrounds us.



3D printed lamp by Ucodo

3D objects printing



Rotomoulded shoes by MarloesTen Bohmer

AWAKENING

The possibility of printing 3D objects is already here. Even if its nowadays used for product design prototyping and for the manufacturing of small components, it has a very promising future. Off-line and online companies offer these services, where it is the client who customises the design.



Tron-inspired Corian material showroom, Milan 2011

Evolution of new architectural materials

Corian (by DuPont) is a ceramic+resin based material, that can be manufactured and manipulated in a similar manner to plastics, and therefore can have embedded elements, such as EL lights. Light becomes then architectural by embedding it into floors, walls and wavy surfaces.

CETEMMSA



"Once upon a dream" by Mathieu Lehanneur

Wellthy

The jetlag sleeping capsule "Once Upon a Dream" was specially designed for hotel guests who suffer from jet lag. It acts like a resynchronization room where sweet dreams are ensured. The sleeping capsule was designed by stepping on existing data from people who suffer from chronic insomnia. A whole holistic concept



Clone chair by Sam Buxton

Clone

The Clone Chaise is actually a luminous lounge chair that is capable of taking on the anatomical form of a human being. It will interact with the potential user, lighting up its electroluminescent display while you interact with it. Constructed using acrylic, steel and sequencing electronics, it exemplifies the emergency of medicalinspired product designs.



Science Gallery's HUMAN+ exhibition

Smart bodies

Will people equipped with prosthetic technologies soon outperform "natural" abilities? How are we blurring the boundaries between human enhancement and body augmentation? How does the realm of prosthetics merge aesthetics and technology, in transforming the form and capabilities of the human body? How are artists, designers and scientists joining forces to push the boundaries of prosthetic technologies?



Philips Probe Design (see Youtube video)

Digital gastronomy

Philips Food Probe design concepts are taking the food + health monitoring systems to the next level. The food printer would allow "printing" of certain nutrients depending on the daily health analysis that transmits the information to the printer. The printer would allow for different textures (jelly, mousse) with different ingredients.

CETEMMSA 2013 OBSERVATORY



Inlaid skin by Andreea Mandresku

Biocouture by Suzanne Lee

Biocouture

Fashion meets biology. Bridging the boundaries of science and fashion, a series of projects are hoping to revolutionise the textile industry, creating a cleaner future. Biocouture is a project by Suzanne Lee where she experiments with the clothing garments that can grow from bacterian cellulose. Inlaid skin is more an aesthetic project in which soft skin-coloured carved rubbers are glued directly to the body, trying to mimic skin textures. An aesthetic for future health monitoring systems?



Electronic Skin by University of Illinois

E-skin

Electronic skin is no thicker than a human hair but is able to record heartbeats, brain activity and muscle contractions just as accurate as conventional methods using electrodes. It can contract and stretch without breaking. The creators plan to add piezoelectric devices powered by body movements, batteries and wireless communications for uploading data or commands.



Spray fabric by Fabrican Ltd.

Spray techniques

Fabrican is a new spray generated non-woven fabric. Applications include from Spray-on clothes, to Spray-on medicine patches, to Spray-on hygiene wipes, to Spray-on air fresheners. They propose applications specifically for the medial sector, such as new types of patches, wound healing products, dressings, bandages and casts and slow release systems. Maybe interesting to combine them with printed electronics?



Forever Youth serum liberator by Yves Saint Laurent

Elixir

Youth liberator is the new range of high-range cosmetics products from Yves Saint Laurent, as kind of an elixir for eternal youth that can be achieved through science. Could this sector's marketing and packaging strategy be translated into food industry and sell food nutrients as youth liberator pills?



COLOURS & MATERIALS



From left to right, top to bottom: 1/ Norman Mailer "Moonfire" book. Taschen. 2/ Bridal Magic space by Process 5 design.
3/ Ballerine by Miki Nakamura. 4/ Ella Doran's "Geo" wallpaper. 5/ "Artic rock" by Jasper Grootel. 6/ Ottoman collection by Noé Duchaufour-Lawrance for Cinna. 7/ Minimalux kitchenware. 8/ "Forever Youth Liberator" by Yves Saint Laurent. 9/ "Inlaid-skin" by Andreea-Mandrescu.

This macrotrend emphasizes on one hand, the use of quilted and faceted effects in subtle airy tones and shiny mirror effect surfaces, specially in fashion, product design and for architectural features. On the other hand, a more pastel-like palette, whether used as accents or as main colours, is found in innovative cosmetics and food-related products.

- glass & pyrex
- chalk

- mirrored surfaces
- varnished ceramics
- airy, net-like textiles
- laboratory inspired packaging
- quilting effects
- new composites (i.e. cork+resin)
- faceted surfaces and patterns
- 3D printing techniques in resin-like materials
- technical textiles in pastel blues or greens
- dégradé patterns
- extrathin rubber
- laser cut silicone-type surfaces
- non-woven and spray fabrics

COLOUR PALETTE



COLOUR HARMONIES

HARMONY 1



HARMONY 2



HARMONY 3



HARMONY 4









macrotrend 2: SWITCH





Coloured iPhone cases

"As product users, we want intense experiences in every area of our daily lives. Consumers demand differentiation in the products they use. This need to surprise drives strategies for the creation of new experiences. Smart products furnish an enormous amount of dynamism, interactivity and opportunities to discover something new whenever they are used. Smart systems, objects, devices and materials are the basis for transforming passive products into active ones. "

Dr. Laura Lopez Head of Scientific Valorisation CETEMMSA Technological Centre



CONTEXT AND MACROTREND TIMELINE

This trend has an extensive range of sector applications, most of which rely on apps, on light as an attentiongrabber (especially interested in the use of coloured electroluminiscent), and on connectivity between objects and people. Industries can include entertainment, advertising, gaming, toys, mobility & alternative transport, connected cities, health & fitness, and gadgets.

2020			
form follows data			
light as a material in motion smart cities (seamless, reconfigured, networked and social)			
			objects and packagings communicating



013 OBSERVATORY
INSPIRATION



1/ Janet Hansen light designs.
2/ Heimtextil trends forum 2012.
3/ Matthew Miller SpringSummer collection 2011.
4/ "Fire" pattern by Zuzunaga for Kvadrat.
5/ Peter Zimmerman painting.

INSIGHTS

- fun
- exercise, movement
- connect, connect, connect
- attract attention
- ludic, play
- connected spaces
- early technology adopters
- gadgets
- interaction
- form follows data

- communicating
- light in movement
- apps!
- group connections
- retailing
- energy release
- entertaining
- activewear

SWITCH

• plus sign (Nike+; Google+,etc)

CETEMMSA

35

• smart plastics



LED lighting has been used in the entertainment industry for a while. Cute Circuit Design studio and Janet Hansen are exponents of this techno-fashion discipline. They have developed costumes for performance stars, such as Katy Perry. The interesting point for the use of light in entertainment is the effect of light in movement which can achieve spectacular effects (see Wreckjng Crew Orchestra's video).







Galaxy dress by Cute Circuit

Golf training systems by Swinguru

Wrecking Crew orchestra (see video on youtube)



ADVERSTISING / PROMOTION / PACKAGING / DISPLAYS OPPORTUNITIES BY SECTOR

Blinking displays, lighted paper and cardboard, moving displays, flat voice recorders and speakers, paper radios....All these printed electronics applications have found widespread adoptance in the retail packaging industry as a way of grabbing attention from consumers. Promotional merchandising products are also a market where EL technologies can be applied.



Ballantine's blinking packaging



EL Packaging by Karl Knauer KG



EL DVD folder



Pepsi EL moving panel (from Printed electronics fair)



Equalizer T-shirt by Nitelife designs



Packaging with moving display by MWV



Audiopaper by Toppan forms



Esquire 75th anniversary e-paper display cover by Americhip



Electronic cards by Touchcode





GAMING / INTERACTION / SMART GAME

OPPORTUNITIES BY SECTOR

Pressure activation of lighted colours, shapes and numbers lead to games for learning purposes and also for leisure and adult gaming. We can think of pressure activated table games, furniture, or garments, or even slot-machines or lottery items. Combining pressure with vibration (as with Vivitouch screens) and sound, or associating biophysical movements to musical sounds can open new possibilities. The integration of sensors into gaming suits or accessories (wristbands, etc), can be an interesting path for product development. T-shirtOS is a preproduction project where a t-shirt integrates camera, wifi and a luminous panel for tweet and image displays sent via smartphone.



Demonstration Street Printed electronics fair



Philips Lumalive-Proximity and touch



Nunoerin interactive bench



Moritz Waldemeyer





Interactive sensory jacket by Cetemmsa T-shirtOS by Cute Circuit & Ballantines



Philips Lumiblade display



SWITCH

Vivitouch



Biophysical musical instrument by Xth sense







Kids products are early adopters of new technologies. T-ink company has developed a whole range of products targeted kids towards. For instance, Airwavez, the world's first inflatable radio, in cojunction with Toys-R-Us, has flexible controls for on/off, volume and station selection that are printed directly on the vinyl body of the radio to create a unique user interface and experience. Conductive ink watches, table games or workshops/kits on how to learn through electronics are some other examples of where to apply printed electronics.



Portable flexible radio by T-ink (as seen at printed electronics fair)



Conductive ink watch by T-ink (as seen at printed electronics fair)



Organic and printed electronics game board (as seen at printed electronics fair)







Many applications rely on tracking systems through geolocalization (including GPS systems) or thanks to wireless technologies. For instance, the Finder app is a two-part RFID Locator: you stick the tracking stickers to objects that you tend to misplace often, like keys, phone, wallet etc. Other possible tracking applications are the Track-a-pet collar for pets. GPS tracking and orientation, together with vibration systems in sneakers, is a way of finding ones way through unknown cities or for can be used by the visually impaired. Also, Epson has launchin a subtitling app for the hearing impaired which is integrated in smartphones and a pair of gogles.



Finder app by Chu Wang

GPS shoes by Innovalley & Cettemmsa



Track a pet, Talk to me exhibition



AUTOMOTIVE - Young & city cars

OPPORTUNITIES BY SECTOR

Car models such as Fabia Skoda, Seat Ibiza and other small urban cars such as Twizzy or Hiriko are a possible target for printed electronics products. It could be in the form of coloured dashboards, or through embedded electronics in a funny, coloured manner, all with the lightness of printed electronics.







Electroluminescent dashboard by Surelight

Hiriko car by Innovalab Vitoria

Electroluminescent flexible command by Cetemmsa

RETAIL SIGNALETICS

In the same way that product packaging has potential for EL displays, so does for retail window displays, signaletics and street displays, including flexible sunshades. Seat occupancy in theatres could also be facilitated with flexible EL tags that display whether the seat is occupied or not thanks to a pressure presence detector. Corporate costumes can also be lighted up for better customer service.



Rob Ryan EL window display



Mango street display



Retail display by Surelight



Sunshade with brand



Cinema seating signaletics by Surelight



Lighted costume by Cetemmsa



SMART CITIES / CITY TRANSPORT / CITY SIGNALETICS

OPPORTUNITIES BY SECTOR

Cities are a scene of new developments. As described in the Audi Urban Future Award, cities will be: free of barriers (seamless city); will be owned by its inhabitants (reconfigured city); will be interconnected (networked city) and will be a places for neighborly cooperation (social city).

Certainly, the city is becoming like a playground, a big living room for social gathering of citizens. It is becoming more connected, with spaces dedicated to wifi connection [Espace Numérique] and tweeting spaces (with cameras recording the activity and loading the images), more seamless (Driverless city) and incorporating the latest apps (augmented reality). And, treated as a big living room, cities have to provide comfort and sustainability.



Away, augmented reality app by J Mayer



Tweeting seat by Chris McNicholl



Espace numérique by Mathieu Lehanneur



Metapapier: wifi-free enabling wallpaper iPavement-wifi enabling tiles



Driverless city by Bjarke Ingles group





SMART CITIES / CITY TRANSPORT / CITY SIGNALETICS

OPPORTUNITIES BY SECTOR

City transport and city signaletics could assume new ways of lighting transport & public equipment through EL foils. Presence-triggered light walls could help lighting of public spaces replacing the traditional streetlamps. As an example of data sensoring and wireless connection, Urbiotica has integrated sensors to determine when containers are full and sends the information wirelessly.







Integral bus stop, Lyon by Osmose

Fillness sensors by Urbiotica

The strømer dobpler presence triggered publc light wall



MOBILITY - Cycling & small motorbikes

OPPORTUNITIES BY SECTOR

Cycling and biking in urban spaces need indicators of movement, much in the same way as cars do. So far, we can find reflective lace accessories or the speedvest, which includes an accelerometer. It could be interesting to develop products in this direction with added functionalities, such as EL jackets accessories, with speed and direction displays, or combine solar power with EL signaling for amateur or professional bikers.



EL and solar powered cycling jacket by by PDD and Goose Design



Bicing bag by Cetemmsa



Myspeedvest





Sporty, casual wear is also a niche market for cool, latest-trend applications. Sneakers with light, integrated commands and keys, etc. but all following the latest fashion trends. We can imagine a digitally printed parka or a quilted finish jacket with embedded commands.



Fashion & sports exhibition Barcelona



Electroluminescent sneakers by Oryon Technologies



Textile key by Cetemmsa



Yesorknot sail-sourced bag



PANIQ wearable electronic system by QIO System





HEALTH & FITNESS

OPPORTUNITIES BY SECTOR

Personal performance monitors have experienced a rise in popularity thanks to the launching into market of the second generation of devices, which act more like a coach, a companion that challenges and rewards, in order to turn training into a play game or a competition. Smartphone apps and wireless data transmission makes possible monitoring and data analysis possible. Leader products such as miCoach fitness activity tracking system, and Nike+ or Nike fuel record movements or vital signs. Some new developments are: waterproof GPS (Finis Hydro), 3-axis movement recording (FitBit), accessories or apps for reward programs (Movband) or gender-specific developments (Numetrex woman).



Adidas Micoach Fitness Tracking



Numetrex sports bra-heartbeat sensor



Motoactiv



Nike+ digital sneakers



Nike+ basketball



Nike Fuel Band



Movband for active children reward program



SWITCH

GPS tracker by Finis Hydro





Fitbit 3-way axis tracker





REFERENCES

This trend is much about communicating objects, connected cities, social interaction and, admit the current crisis, making life more fun. Fitness and casual fashion, friendly gadgets and entertainment industries also fall into this trend.



"Talk to me" exhibition at MoMA New York

Exhibition: Talk to me. Design & communication between people and objects.

This successful exhibition focused on objects that involve a direct interaction, such as interfaces, information systems, visualization design, and communication devices. Also on projects that establish an emotional, sensual, or intellectual connection with their users.



Smart Cities Barcelona promotional image

Smart Cities Barcelona / Urbiòtica

Recently Barcelona's mayor announced a strategy for city planning based on the idea of Smart Cities, those that can offer up-to-date information on traffic or that can offer wifi connection. Urbiòtica has already put in use some urban elements based on sensors and data recording instruments.



The App & Mobile Case Study Book by Taschen

The boom of Apps / geolocalization

Apps are a way of improving human interfaces and are bound to replace websites as we know them. Some apps need only a smartphone, others are dependent on a physical accessory. Designing services that are accompanied by an accessory is a path for development of technological products.



Berg little printer by Bergcloud

Friendly gadgets

Berg's little printer prints out on a receipt-size paper all the news or tweets you need to keep in a physical format. As mobile and cloud technologies advance, gadget products that are connected to the web have become smarter and friendlier and can be used by the whole family or office.

SWITCH



EL panel shown @ Printed Electronics fair (demonstration Street)

Games and (interactive) signaletics

What if interactive games for kids or even adults (slot machines, for instance) could be designed and produced in a lighter way and with new shapes thanks to flexible electroluminescent panels? Even signaletics could have a more interactive action.



Youtube: Fabia Skoda 2,112 colour combinations

Colour as personalisation-Pimp my ride!

Giving users the option to personalise their product through colour is not new, but in the automotive industry, giving choice for more than 2,000 colour combinations for one car is a way to engage younger users of utility cars. This optionality could be integrated into printed electronics products - want a redlight coloured seat?



Promotional iPhone case image

Fitness and running boom

Who is not running nowadays? The rise of health awareness and the need for a more spontaneous grouped activity has drawn many to have regular running exercise even in urban environments. Accessories that monitor, reward or connect users to this activity are prone to have an increasing commercial interest.



Light dancing outfits and Movistar advertising

Light in movement

Introducing light into scenic arts outfits can offer striking results. EL wire and LED's have been used up till now in the entertainment industry, and now it might be the time to introduce printed EL fabrics.





Digital print dress by Manoush

Digital printing

Digital printing allows new graphic design applications onto fabrics/textiles. Nowadays it is possible to digitally print onto various materials[cotton, silk,..] which opens up new product developments. Digital print is up!



Uniqlo website

Technological innovation in fashion

For a few years International fashion clothing brand Uniqlo has been directing part of its collection towards functional technical fabrics and puts a great effort in marketing this initiative, creating also a series of logos to identify each functionality. Their leitmotiv: "It's how the future dresses." uniqlo.com



Picture from the "Fashion&Sports" exhibition in Barcelona

Fashion & sports

Fashionable sport gear is becoming the new casual look. The exhibition "Fashion&Sports" in Barcelona brought together fashion retailers Desigual, Custo, Munich and other brands to create specific sporty designs and stylings.



LittleBits

Learning electronics

LittleBits products are tiny circuit-boards with simple, unique functions engineered to snap together with magnets. No soldering, no wiring, no programming, just snap and play. Each bit has a simple, unique function (light, sound, sensors, buttons, thresholds, pulse, motors, etc), and modules snap to make larger circuits.

littlebits.cc



COLOURS & MATERIALS



From left to right, top to bottom: 1/ "Da funk" typography by Javier Losada. 2/ Nike AirMax. 3/ Nike Fuel Band. 4/ Akihito Hira collection as shown at Rio Moda Hype. 5/Little Greene paints collection. 6/ Duvetica collection AW12. 7/ Nike "Zvezdochka" by Marc Newson. 8/ Digital print parka. 9/ PVC waterproof coat by MSGM.

A colour palette of brights with black and white defines this trend. Black is a colour being now adopted for fitness activewear, working in colour block detailing with other brights, using technical textiles. White is outlined with black and another bright colour, using transparencies. Solid colour items are presented in rubbery surfaces or with quilted effects. Coloured brights can also be combined altogether through digital effect prints.

- black with bright accents for activewear
- clasps

50

- casual technical fabrics
- play with colour combinations
- colour blocking
- energy-recalling colours

- coloured transparency
- outlines in black+bright colour

SWITCH

• shading effects

- all over solid colour
- rubbery surfaces with relief effects
- quilted garments
- multicoloured surfaces with blurr effects
- digital printing

COLOUR PALETTE



COLOUR HARMONIES

HARMONY 1					
HARMONY 2	1				
HARMONY 3	}				







macrotrend 3: HERITAGE

"make the strange familiar"



Trumstand iPhone dock by Pleiades Designs

"Smart systems can help to a large extent of care processes by facilitating access by the user and/or reducing the consumption or acquisition cost, thereby enhancing the persons quality of life and improving the outcome of this type of service."

Cristina Casellas Researcher CETEMMSA Technological Centre



CONTEXT AND MACROTREND TIMELINE

This macrotrend can be easily applied into interiors & lifestyle companies, those who pay special attention to merging traditional crafts with high design and quality values; that value indoor and outdoor comfort. Also companies having an interest in producing products for active ageing people, aiming at easing their lifes. Also for brand value companies, such as luxury brands, where authentication services could be applied.



INSPIRATION



1/ "Autarchy" collection by FormaFantasma.
2/ Rockid chair by Ontwerpduo.
3/ Weber high-range barbecue.
4/ Johan Lindsten "tapestry" chair.

INSIGHTS

- hybrid
- democratic hedonist
- wellthy
- luxe technology
- fusion
- make the strange familiar
- reinterpret old designs with new technologies
- British utility
- \bullet traditional structures / companies with tradition
- active ageing
- as thonet's bend wood revolution

- reworking existing products with new technologies
- boat interiors
- highly skilled crafts
- reinterpretation of the past
- authenticity-royalties
- old+new
- security in the brand that you are purchasing
- ease daily tasks
- smart leather
- inclusive design
- supranormal design
- fight the fakes
- HERITAGE





Home interiors are the places where mature technologies can enter the market. Homes are tending to be more and more environment friendly, Concerns about rising electricity bills, people are turning to new ways of lighting and heating in a more eco-friendly way (LED and solar, respectively). Also, new official instructions will require electrical appliances to display their daily electricity consumption. Interiors will also be more connected, and objects will be able to send information wirelessly and also react emotionally. Additionally, homes are becoming smaller and specific products for this market will be needed.

Wallpapers & blinds

The design studio Loop ph launched a few years back an electroluminescent wallpaper that was triggered by the sound level. Since thens , they have made EL panels, wallpaper and fabrics. Recently, Jonas Samson presented an EL wallpaper. The Bright blind by Makoto Hirahara pretends to emulate sunlight in small spaces with no natural daylight as an alternative way to light up spaces. In fact, EL lighting as a 2-dimensional source of light and wallpaper is a good option.



Light emitting wallpaper by Jonas Samson

Wallpaper by Loop ph

Bright blind by Makoto Hirahara

New ambient lamps

Side lamps, portable lamps, or nightlights can be designed using the printed EL technology which can, at the same time, be activated by sound, light or presence. The foil or 2D properties of this type of lighting can offer many possibilities. Up till now we find works by Soner Ozenc and John Wischhusen with their EL Flutter collection, electroluminescent glowing butterfly nighlights, which offer a safe, low-energy light. The Show&Tell studio also shaped an electroluminescent pane into a classical side table lamp, and Shingyoung Ma also works with Eluminescent conceptual lamps.







Foil lamp by Shinyoung Ma

Lampada light by Show&Tell studio

Lamp by Marcus Tremont



Furniture with integrated lighting

The 2D, flexible properties of electroluminescent foils can facilitate the easy integration of light directly into objects in an easier operation than with traditional lighting systems. The EL plywood desk integrates not only light but also a calculator. Not exactly with EL printed technology, the full moon sideboard by Sotirios Papadopoulos uses a special luminous and ecological paint called ELI (comes from a special ecological powder which is modified into a gelcoat-PVC and covers the furniture) to showcase a photorealistic image of the moon. The FootLume carpet design is basically a high-tech rug jammed with electroluminescent lights and weight sensors that help find your way at night. Office and home interior chairs could integrate light to support reading and working in a more intimate way.



EL plywood desk by US Department of Energy



Full moon sideboard by Sotirios Papadopoulos for Ennezero



Footlume carpet by University of South Bank London

58



Decorative

Light can be treated as a decorative element integrated into textiles or as a source for decorative artworks. Much in the same way, thermochromic prints can enter the home market as decorative elements. Sam Buxton's tablecloth illuminates through EL technique; Linda Worbin and Esther Layoz offer graphically interesting thermochromic designs.



Tablecloth by Sam Buxton



"rather boring tablecloth", thermochromic, by Linda Worbin



Thermochromic textile panels by Esther Yaloz





Embedded electronics & remote control

That objects will be offering more functionalities is a fact. Integrating electronics into everyday items is not new, and can expand more so as to offer real value. For instance, the remote control pillow, a gadget-like item that can offer advantages for poor-sighted people. Or the Glopillow, which begins to glow and gently brings the user out of sleep 40 minutes before the pre-set alarm time. This enables a natural waking process which helps to set the circadian rhythm or "body clock" and results in more healthy sleep/wake patterns. Another clock-based application into objects is the Timecurtain, which has an on/off chronometer, and the Multimedia mirror, which, in this case, allows also access to radio and in-voice messages



Glo Pillow, wake up light and clock, by Embryo



Remote control Pillow as seen at Museu dels Invents Bcn



Timecurtain

by Soner Ozenc

Multimedia mirror by Stocco Italy



Heated indoor & outdoor upholstery; carpets & floor coverings

Heating technology through fabrics or flexible surfaces is already on the market, and can also find more opportunities since it is a mature technology. Thermal comfort can find applications not only indoors but also outdoors. Indoors, sofa and carpets can offer this enhanced thermal comfort and for outdoor applications, swimming and terrace items such as lounge couches or chair covers for terrace and restaurant outdoor chairs.

Another option is to sell the fabric by the meter with already integrated heating elements, such as the Vowalon synthetic leather.



Vowalon synthetic heated leather



Sensor-activated heating sofa by Cetemmsa and Kibuc



Kettal outdoor lounge





AUTOMOTIVE - Family cars & luxe cars

OPPORTUNITIES BY SECTOR

Family range cars are being visualised nowadays as a second home, where you can be connected & indoor comfort is a valued asset. This extra comfort and connectivity can be achieved by means of printed electronics with the particularity that EL and ET are both lightweigth and efficient, being a sustainable option.

Examples of indoor car styling with home reminiscents are the collaboration of interior & product designer Patricia Urquiola with BMW and upholstery fabric company Kvadrat, with padded, comfortable seats, "side table" lamps and all the extras for babies & kids comfort. Top level fashion brands are also entering the market of car interiors, as a signature of quality, with examples of car interior styling of BMW for Burberry executed by Luis Gispert.



Patricia Urquiola & Giulio Ridolfo customisation for BMW and Kvadrat as part of The Dwelling Lab project

BMW and Burberry as seen by Luis Gispert



OUTDOOR ACTIVITIES & LIGHT SPORTS

OPPORTUNITIES BY SECTOR

Light outodoors activities and light sports can benefit from printed and integrated electronics. From leisure boats with added thermal ad lighting comfort, to urban cycling suits with integrated commands, or golf and fencing suits with movement and pressure sensors.



Boat designed and remodeled by StudioJob



Cycling suit by J. Lindeberg



Bufalino Camper car by Cornelius Comanns

ACTIVE AGEING PRODUCTS

Products and services for active ageing people have a encouraging prospective marketshare that is worth mentioning. The "No country for old men" collection of furniture and lighting elements specifically designed for the elderly is a clear commercial project that takes into consideration this specific target. The "indulgent bathing" basin by Tomek Rygalik adds functionalities for those with age-related disabilities (flexible spout that can be used to facilitate hair washing, illuminated wall mounted mirror with digital display and bluetooth receiver connected to a body weight measuring seat). Dependent people such as Alzeimehr's patients can find tracking solutions thanks to the GPS shoes. Integration design (see designingwithpeople.org) is a growing discipline and printed electronics can offer enhanced solutions.



"No country for old men" reading light by Lanzavecchia +Wai



Indulgent bathing by Tomek Rygalik ofr Ideal GPS shoe by Gtx corp and Aetrex Standard

HERITAGE



CONSUMER GOODS

OPPORTUNITIES BY SECTOR

Top retail brands are adopting some technologies into their products. Suit retailer Bagir commercialized, through Marks&Spencer stores, their Suit with integrated commands for iPhone. Designer Richard Nicoll, commissioned by Vodafone, presented a "connected" technological bag. Integrated commands and autonomous battery chargers are so far the main applications (apart from RFID technologies) for this type of retail companies. On the other hand, a hybrid artistic take on wearable tech can be found in the Click-sneaks sneakers, that emit heel-walking sound with every step.



Suit with integrated commands by Bagir (sold @ Marks&Spencer)



Richard Nicoll & Vodafone



Click-sneakers by Studio5050



REFERENCES

This trend is about merging the traditional with new technologies and about keeping a visual or functional connection to key popular iconography, much in the way as electronics revolution in the XIXth-XXth century took place. It is also about recognizing the need for elderly-targeted designs and of new needs for privacy and status.



"Hot matters" radiator by 5.5 designers

New heating supports

This piece is a radiator produced by Saazs. It has a thin layer of metal inside the glass that puts off infrared heat when electricity is passed through it. Traditional recognizable shape that takes advantage of new advances on materials.



Traditional XVIIth windsor chair and Tom Dixon's 2012 version Central: BMW 328 Hommage concept car.

New classics

Reinterpreting the key essence of traditional, all time winner designs, by means of new techniques or materials is a current trend. Examples of this are the Windsor chair by Tom Dixon and the BMW 328 Hommage concept car, specially crafted to mimic the design of the original ultralightweight sports car utilizing carbon fiber-reinforced plastic.

HERITAGE



"Space" vase by Paul Lobebach

New craftmanship

Machined using a new multi-axis CNC technology, this table is the result of a four month experimental collaboration with an American aerospace manufacturer.

Again, crafting goes one step further by adopting state ofthe- art technologies without losing the traditional look.



"Royalties" exhibition @ COAC Madrid

"Royalties" and "Fight the fakes"

Royalties is an actual exhibition at the Architects College in Madrid, which showcases designs from master designers and architects of the XXth century. In this current microtrend of valuing original designs, the British movement "Fight the fakes" emphasizes the consumption of professional know-how.

CETEMMSA

65



Moleskine + iPhone

Analogic + digital

What if we put together "analogic" supports with "digital" ones? We obtain a new product which holds the best of both worlds. Moleskine's collaboration with iPhone characterizes this idea of merging technologies for an upgraded service.



Basel chair by Jasper Morrison

Supranormal design

Jasper Morrison designs illustrate the need for formal, effective designs, which emphasize the return to solid, clean, utility objects, after decades of star-status and experimental designs. The primary function of the object is what is important.

jaspermorrison.com



Vintage solar fan by Elena Corchero

Vintage + new technology

Elena Corchero is a techno-fashion designer that promotes the fusing of technology with tradition. This vintage solar fan exemplifies the idea of technology evolution without forgetting traditional functions and designs.

lostvalues.com



"No country for old men" by Lanzavecchia + Wai

Active ageing products / inclusive design

This year is the european year for "Active ageing." Not only this, but it is also a serious niche sector which is booming, due to higher life expectancy. This "No country for old men" collection of domestic objects for the elderly represents the type of product specially targeted for this growing population segment.

europa.eu/ey2012 and lanzavecchia-wai.com





workbay chair by the Bourollec brothers

Personal privacy

In a exponentally connected world, personal privacy is a necessity. In terms of office and public space equipment this chair design exemplifies this need for personal retreat from surrounding light, sound or visual clutter.



"Louis XV goes to sparta" couch by Maurizio Galante

Faking it

With the advancement of digital printing, faking textures of materials are, amongst other applications, progressively found in product design. The main advantage of this microtrend is the possibility of producing low-cost, lightweight products with the look of more heavy and costly materials.





COLOURS & MATERIALS



From left to right, top to bottom: 1/ "Doubleface" by Florian Hauswirth. 2/ Knitted stools by Claire Anne OBrien. 3/ "Inlay" cabinet by DFront for Porro. 4/ Loewe promotional image. 5/ Ceramic tiles by Lubna Chowdhary. 6/ Hermès chair for their Home collection. 7/ Detail of W hotel at Vieques Island, by Patricia Urquiola. 8/ Roberts Radio reedition. 9/ Solar vintage brooch by Elena Corchero.

There are mainly two ways to work colour & pattern in this trend. On one hand, neutrals such as raw wood are combined with midtones in subtle and matt surfaces, with a colour-blocking effect; and multicoloured products such as crochet, patchworks and classic prints (gingham, toile de jouy, florals).

- raw wood
- colour-blocking of 2 colours
- soft, rounded outlines
- new marquetry
- 3D artistic & domestic knitting reworking existing products with
- new technologies • pure lines

- leather in natural finish
- pleating
- mid tone colours as accent colours for interiors (home & car)

HERITAGE

- & products
- matt surfaces

- new tapestries
- cross stitch, patchwork
- modern tapestry
- floral, gingham, tartan checks in midtones
- modern & hypertextured crochets

CETEMMSA 2013 OBSERVATORY

68

COLOUR PALETTE



COLOUR HARMONIES








macrotrend 4: **PERFORMANCE**

"beyond human boundaries"



"Hyperconnectivity is present in the design of new products. So let us get ready to handle virtual networks linking up hundreds of millions of Smart products generating an information flow that will help us to share values, interests, hobbies and experiences with other users of these products."

> Urbez Santana Smart System Integrator CETEMIMSA Technological Centre





CONTEXT AND MACROTREND TIMELINE

Automotive applications, protective equipment, security bodies, extreme sports and new 3D materials are the main sectors identified for this macrotrend.



form follows function

creature-inspired functional design

extreme textiles & performant, robust materials

new efficieny, new energies space and sci-fi equipment inspiration interactive safety workwear

2020

hyper-performant & wireless extreme sports equipment

72 CETEMMSA

INSPIRATION



1/Image of the sun while a solar eruption.by NASA's Solar Dynamics Observatory satellite 2/ Image from the film *Minority Report* 3/ Tent by Fieldcandy.com. 4/ Image from Techtextil-Avantex Forum.

INSIGHTS

- emergency
- survival
- extreme
- force
- performance design & materials
- protection
- motorbikes
- militar
- \bullet professionals in the marine, forestry & security industries

- form follows function
- endurance
- invisible-non-detected
- safety
- anti-wifi and radar
- hyperconnected
- vigilance
- sci-fi inspiration
- inspiration from animals
- adventure sports
- astronaut-inspired garments

CETEMMSA

73

AUTOMOTIVE - Sports cars, safety cars, trucks

Lighting displays are being used in racing cars (see surelight application) but could also be used for lighting outer shells of sporty cars. Actually, car masks are being used as adhesive foils, and it would be interesting to create some that could withstand weather conditions or have specific functions (be it either change the car's colour, have a lighted shell that outlines the sportive character of the car; reinforce the bullet-proof properties on a security van; and so on).

Additionally, ergonomic and comfort seat conditions for long-distance drivers such as truck drivers could be considered in this section. On the other hand we can also consider security helmets, such as the Revolution IQ HTS, which monitors wearer's vital signs, sending them wirelessly to the medical support team and thereby reducing risks and time. Motorbike suits, shoes & gloves with enhanced protection and performance offer possibilities for technology integration.



23 INSPERIOR

Surelight's application on Lemans' car



Lighted, flexible brand application in helmet by Cetemmsa



Self illuminating glove, Manchester University



Revolution IQ HITS helmet



Mercedes-Benz Actros truck



Workwear is a sector that is increasingly needing integration of electronics and sensors into the garments for protection and safety. For instance, the Avantex award-winning research project for forestry workwear, substantially increases safety in the use of power saws in forestry through an innovative extension of existing protection technologies. The sensor-based cut-protection clothing kicks in to prevent injuries by automatically switching off the power saw. This is achieved by means of proximity sensors incorporated into the fabric of the protective clothing.

Antoher example for security bodies is Tex-Vest, an interactive vest with an illuminated textile design for use in police work. It was developed to substantially increase the safety of police officers during road checks and traffic control. The textile converts hand signals into clearly understandable light signals that are easy to see in bad weather or darkness as well as in daylight.



Carhatt workwear



Flexible electroluminescent uniforms by Tex Vest for Traffic co Cetemmsa



Forestry workwear Avantex prize by Martin Rupp; Angela Mar-Erhardt



GCell PV Jacket





Flexible electroluminescent uniforms by Tex Vest for Traffic control, Jaka Plesec (Avantex prize 2011)





EXTREME SPORTS & AUTONOMY

OPPORTUNITIES BY SECTOR

Integrated electronics are specially useful in sectors such as extreme sports like skying & mountaineering. The most popular applications released into market are push-to-talk integrated functions, garnment-integrated wireless control of equipment, heating, electroluminescent garments, and GPS tracking plus wireless communication.



EL jacket by marmot



O'Neill's push to talk jacket



Bailo jacket







Recon GPS googles





Electroluminesent snow outfit by Cetemmsa



Solar tent concept by Orange



Tunabug portable speaker



Backpacker's diary (solar+EL) by Zhongren Zhang and Chun Yang



SURVIVAL / EMERGENCY SERVICES OPPORTUNITIES BY SECTOR

During natural disasters and emergency evacuation, certain functions of printed electronics can be of use, specially when there is power shortage. LuminAID is an award winning emergency light product that can be completely autonomous. Other examples could be tents with autonomous lighting (through EL+solar cells) or heated elements (blankets).



Emergency shelters with EL lighting by BondCote



1 CHARGE

- Fully charges in

Anna Stork & Andrea Sreshta

Inflate the light to

2 INFLATE

③ ILLUMINATE

Press button for

OFF, HIGH, and LOW light settings



First aid Emergency ShelterTent



3D FABRICS - Protective, medical, objects

OPPORTUNITIES BY SECTOR

Alveolar and flexible 3D structures can offer enhanced structural resistance. If that is combined with pressure sensors it can offer possibilities in construction and objects production. 3D knits can be used for upholstery, sound muffling, or even military purposes. As an example, Palmhive bobble knit, which is a military Bobble camouflage, is a black warp knitted fabric used to protect tanks from radar detection by virtue of the fact that it has no hard edges for the radar to bounce off. There are two coating options, a hard and soft finish. One of the fabrics most unusual features is its elasticity. Its stretch is such that the fabric is sold by weight rather than length. Another application for 3D fabrics could be the creation of custom-made scaffolds for organ repair or growth.



Structural alveolar 3D-Spacer chair prototype by Next



Eletromagnetic field protective knit by Cetemmsa



Corcap cardiac support device by Arcon cardiovascular inc

AUTHENTICATION & BRAND SECURITY OPPORTUNITIES BY SECTOR

Thanks to printing electronics, there are many security encriptation developments (such as the smart ID card) and also authentication services through RFID techniques.







uskewaar



RFID services by Kovio



REFERENCES

Performance is about finding solutions to humans' limits so as to explore and be protected beyond our natural abilities. Emulation from animals' shapes and materials, from spaceships/spacesuits, and from futuristic movies are the inputs for future developments.



Extreme textiles exhibition at Cooper Hewitt New York

Extreme textiles exhibition & book

The subtitle of this exhibition and book, "Designing for high performance" explains which industry categories incorporate high performance textiles (stronger, faster, lighter, safer and smarter). The conclusion is that flexibility and lightness are some of the functionalities that make the textile desirable in so many diverse applications.



Bioluminescent Aequorea victoria jellyfish as seen at UGA research

Form follows function

Submarine creatures with bioluminescent properties can be of inspiration in terms of how light is distributed through the organism so as to light effectively. Generally speaking, the natural world is a continous source of inspiration for optimization of functions.



NASA's Spacesuit glove with embedded robotic controls

Space equipment-inspiration

A spacesuit is a miniature spacecraft designed to keep an astronaut alive and well in the most hostile environments. Taking these premises, one can tranlaste the design, materials and functions of these garments into other protective environment applications.



Armchair by Maximo Riera

Robust materials

As part of an animals and reptiles collection, this chair piece retains the animal's natural vitality whilst being biologically accurate in its appearance. Inspiring his use of materials which confers this solid, robust look.

maximoriera.com



PERFORMANCE



Audi website

New efficiency, new energies

Audi's research and development directions are clear about efficiency, connectivity and new electric energies. A clear message that can be incorporated into printed electronics industries. Website worth checking.

audi.com



Tron Legacy movie

Sci-fi inspiration

Worth seeing for inspiration is the Tron Legacy movie, seguel of the original Tron film. Suits with integrated light, protective garments and a whole aesthetic that acts as a reference for "futuristic" designs.



Bobble camouflage fabric by Palmhive

3D performance knits & carbon fibre

The military industry is an innovation pusher, and 3D kints find in this area a good chance for development. Other technical developments with carbon fibre becoming structural and/or 3D are finding wide applications. (see Mitsubishi Rayon's pyrofil carbon fibre).



3D knit dresses by Sandra Backlund

3D knit

Fashion designer Sandra Backlund creates threedimensional knitwear in unusual and elaborate shapes that turn the wearer into a living sculpture. Technologically advanced, it could give path to new developments into other security & performance sectors.

sandrabacklund.com

COLOURS & MATERIALS



From left to right, top to bottom: 1/ "Sonumbra de Vincy" installation at London Tent 2011 by Loop pH. 2/ Spacer chair prototype by Next 7/75 for Droog design. 3/ Bioimplantable device by Ellis developments. 4/ Tron Legacy official replica Bike Suit. 5/ Toyota Fun vii concept car. 6/Detail of carbon fibre woven foil 7/ Cargo bags. 8/ Storm zipper by Riri Inc. 9/ First Aid emergency shelter tent.

Performance is a trend related to anything which is used beyond normal conditions for humans to be performant in extreme environments. Structural and alveolar materials in whites for medical scaffolds, objects & construction; sturdy materials & technical textiles in black & silver with sight-capturing neon colours apply to security and protection; and finally materials with enhanced wear-resistance & integrated electronics for extreme sports, come in a militar-range colourway.

- alveolar knits
- fractal patterns
- structural materials
- net-like structures/patterns
- robustness
- perspiration
- silicone
- carbon fibre in all forms
- techtextiles

- denim jeans
- waterproof canvas

- CETEMMSA 2013 OBSERVATORY
- 82

COLOUR PALETTE



COLOUR HARMONIES

HARMONY 1



HARMONY 2



HARMONY 3









macrotrend 5: NOWTOPIA

"Do It Yourself"



DIY wooden cell phone by MIT

"What really matters is understanding how the users of products see these objects, make them their own and relate to them, and how these objects influence individual behaviour and the construction of a person's image. Furthermore, the movement towards a sustainable lifestyle is already irreversible."

> Rosa Rodríguez. Designer CETEMMSA Technological Centre





CONTEXT AND MACROTREND TIMELINE

In this trend we can find basically three opportunity directions: implicating the consumer into a DIY mentality (workshops & kits), being responsible with the planet in terms of energy consumption (self-powered & energy harvesting devices) and bringing the technology to places where its use can be vital (better world), taking also into account cultural and local identities.

_{year} 2020		2030
upcyclers & makers	Do It Together	the fertile city
hacking: repair & improve mindset	custom made through new technologies	light-foot living self-powered and energy harvesting devices
design for the other 90%	the industrial alternative	
local knowledge & sustainable design	better world: global design thinking	
ethical production	nomadic lifestyle	



INSPIRATION



1/ Work by Gambiólogos Fred Paulino, Lucas Mafra 2/ "Designed in Hackney" Sugru material application.
 3/ Green Utopia exhibition, Heimtextil 2011 4/ Whackpack, by BeBenny as seen at Tent London 2011.

INSIGHTS

- the industrial alternative
- custom made through new technologies
- upcyclers & makers
- power of making
- self sufficiency & autonomy
- do it yourself DIY
- cultural specificity
- \bullet design for the other 90%
- the use of the product is dictated by the user
- friendly DIY instructions
- fight against planned obsolescence
- second life for products
- no waste
- nomadic lifestyle

- hack / fun / modern steampunk
- helpful / DIY/ ecoconscious
- game over
- new wave culturalists
- activists
- sustainable design
- global design thinking
- the fertile city
- community
- solar power
- self powered & energy harvesting
- use of new printing technologies to do own's electronics
- repair & improve mindset
- NOWTOPIA





To promote the winter launch of the new IKEA Norway iPad store catalog, Norwegian ad agency SMFB created IKEA Beröra: a conductive sewing kit for making gloves and mittens work with touchscreen devices. Twelve thousand kits were made for the promotion- they sold out in two weeks. The Lumiblade Creative Lab launched the Lumiblade Experience kit, for the consumer to experiment with OLED plates and find applications by themselves. The association "Technology will save us" is also promoting a DIY mindset regarding electronic equipment. They offer workshops and sell directly to consumer kits on, for instance, how to build your own loudspeaker. Barcelona based Fablab, is also offering workshops on how to create your christmas gifts through 3D object printing and on how to make your own solar powered backpack.



IKEA Bërora product. See video in youtube.



Lumiblade creative Lab workshop



Lumiblade Experience Kit



On of the kits of "Thechnology will save us" make your own loudspeaker



Fablab workshop



On of the kits of "Technology will save us": electrocard kit





OPPORTUNITIES BY SECTOR

Devices that use our body's kinetic energy are key nowadays as they provide a simple and sustainable means of keeping digital devices charged. For instance, Aire masks convert the air flow power generated by breathing into electricity that can be used to power mobile devices. In a similar way, the "keep running pants" integrate a kinetic-powered MP3. You stop, music stops.

Other home devices like the mini hydro turbine or other new plastics which harness energy through friction (could then be used in clothing, shoes,...) are other new alternatives to gather and generate energy through movement. Solar energy is still a good way to power devices and is starting to be built up in devices as part of the design.



Aire mask in use



"Keep running" pants by Inesa Malafej and Arunas Sukarevicius



Mini Hydro turbine by Jin Woohan



Solar bag by Neuber



IKEA's solar powered outdoor lamp



Cargopants with solar panel by Silvr





Design and technology is nowadays a key resource for developing countries. In places where power supply is low, autonomous systems of lighting, heating or electricity generation can substantially change the life of many people. Architects partners KVA Matx developed a solar+light bag with a similar principle. The "Sun blanket" releases in the light or heat the energy harvested during solar hours. One clever application of geolocalization + EL lighting is the Sajjadah mat, which lights up when correctlyoriented to Mecca. Another example of cultural application is the "Prayer companion", a gadget-product intended for nuns to be aware (through tweet-like messages) of outer news and pray for those in need. On the other hand, urban and indoor vegetable growing gardens are expected to have a boom, as well as air purifying systems.

Design for the other 90%



Sun blanket



Treehugger radio



Sierra solar bag, by KVA MATX architects

Culture-specific developments



Sajjadah by Soner Ozent. It illuminates when correctly oriented to Mecca



Prayer companion, from the Talk to me exhibition

Earth & air





CETEMMSA



Bel Air purifier



REFERENCES

Nowtopia claims a new industrial era, in which production is descentralized from big factories and the consumer holds back his imprint in the product or use. A new era in which solidarity and mentoring will be the grounds for product development, and in which discarded does not mean waste, but a new opportunity.



Nowtopia book by Chris Carlsson

Nowtopia

A book on the new politics of work, those that emerge from people, not from market or politics. People are taking back their time and technological know-how from the market and in small ways, are making life better right now, setting the technological and social foundation for a movement of liberation from market life.



"Technology will save us" DIY technology movement

Technology will save us

Technology Will Save Us exists to educate and enable people to make and experiment creatively with technology. The desire to produce, invent, make and fix things is reemerging. This business is part of that shift. technologywillsaveus.org



Power of Making Exhibition (London). Book and on Vimeo

Makers

Making is one of the strongest of human impulses, and it is also a way to express, to know how things are made, to create value through our skills. We are facing a sort of New Craft period in which working with your hands, in-house manufacturing, having control of every aspect of the process and hacking the post industrial milieu are key.

NOWTOPIA



3D printing machine by Makerbot

One of your own

The boost of 3D printing machines has reached personal use. Makerbot can be used for DIY gadgets or small mechanical parts, completing the process of making one's things.

makerbot.com





Martino Gamper chair collection

Upcyclers

Upcycling is the process of converting waste materials or useless products into new materials or products of better quality or a higher environmental value. Martino Gamper 100' chairs collection is based on the upcycling movement.

martinogamper.com



Sugru material

Hacking: repair & improve

In a quest to fight planned obsolescence, sugru is a new material which helps repair and improve existing products, in a playful and subversive way. It is a new air-curing rubber that can be formed by hand. It bonds to most materials and turns into a strong, flexible silicone.

sugru.com





DIY friendly instructions

Instructions have to be easy, specially for DIY products. Graphically friendly characters (such as ikea's one for the IKEA Bërora product) ease the way for technology to reach non-geek consumers.



Newspaper wood by Mieke Meijer for Vij5 studio

No waste

Discarded materials such as newspaper gain a new life thereby reducing waste and turning the production process all the way around. A new sustainability concept which is not about refraining consumption but about consuming with an ethical and ecological responsability.

www.vij5.nl





La Ville Fertile exhibition, Paris

Urban jungle

A not-very-far image of a city, in which gardens, vegetable gardens, and playgrounds move up to the roofs, where air quality is better and at the same time city surface is enlarged.



"Grow me" kit

Grow your own food

Growing your own vegetables is a good solution for health conscious consumers. Even if one does not know how to do it, one can buy a fully equiped kit and become the perfect urban gardener.



"Design for the other 90%", Smithsonian Institution and Cooper Hewitt National Design museum

Design for the other $90\%\,/$ Design thinking

Many of developing countries problems can be solved with current or state-of-the-art technology from developed nations. This book recaps some of the most successful technological and non-technological designs aimed at improving life in developing countries.



Sajjadah mat by Soner Ozenc

Cultural technology

What if technological advances helped ease culturally based habits? This Sajjadah mat eases praying direction thanks to geolocalization-activated electroluminescent image, which illuminates when correctly oriented to Mecca.

sonerozenc.com





COLOURS & MATERIALS



From left to right, top to bottom: 1/ Cordula Kehrer Basket bins. 2/ Jan Vormann's Lego interventions. 3/ "Albie Pupie" light by James Plumb. 4/ "Electro card kit" by Bare Conductive & Technology Will Save Us. 5/ iPhone transparent back panel introductory package by ifixit. 6/ Rainycatz discarded electronics pendant. 7/ Thirsty plant kit by Technology Will Save Us. 8/ Green exhibition: welcome to Utopia, Heimtextil fair 2011. 9/ 360 water paperbottle by Brand Image.

Nowtopia is a trend in which materials are selected based on scrap, reused or very basic materials, such as paper. Additionally, the upcycling process of initially discarded materials relooks them or the product in a new unexpected way. Discarded analog electronics play also an important role.

Packaging is important in this trend, using craft+black or aluminium-finish plastics+black & white The intervention and upscaling of a product is signaled with bright colours.

- lego-inspired works
- cardboard with black
- raw wood

NOWTOPIA

- reclaimed wood
- bright colours signaling the
- intervention onto a product
- basket weaving techniques with discarded materials
- aluminium-finish plastics with white
 paper
- and black
- analog electronic plates
- craft, cardboard



COLOUR PALETTE



COLOUR HARMONIES

HARMONY 1



HARMONY 2



HARMONY 3







APPENDIX







APPENDIX 1: SUMMARY OF SECTOR OPPORTUNITIES













PERFORMANCE beyond human boundaries



NOWTOPIA Do It Yourself



ARCHITECTURAL LIGHTING ARCHITECTURAL HEATING DOMOTICS AUTOMOTIVE-concept cars EMOTIONAL & INTERACTIVE OBJECTS SPA/ WELLNESS HEALING THROUGH SKIN FEEDING THROUGH SKIN / SMART FOOD WIRELESS HEALTH MONITORING ERGONOMY/ BIOMECHANICS/ ORTHOPAEDICS PHARMACEUTICAL PACKAGING & INSTRUCTIONS EXPERIMENTAL FASHION & CONSUMER GOODS

ENTERTAINMENT INDUSTRY ADVERTISING/PROMOTION/PACKAGING GAMING/INTERACTION KIDS/TOYS APPS AUTOMOTIVE-young & city cars RETAIL SIGNALETICS SMART CITIES / CITY TRANSPORT/CITY SIGNALETICS MOBILITY-cycling & small motorbikes DAILY ACTIVEWEAR HEALTH & FITNESS

HOMES

wallpaper & blinds
new ambient lamps
furniture with integrated lighting
decorative
embedded electronics & remote control
heated indoor & outdoor upholstery; carpets & floor coverings

AUTOMOTIVE-family cars & luxe cars
OUTDOOR ACTIVITES & LIGHT SPORTS
ACTIVE AGEING PRODUCTS
CONSUMER GOODS

AUTOMOTIVE-sports cars, safety cars, trucks MEN @ WORK/SECURITY @ WORK/SECURITY BODIES EXTREME SPORTS & AUTONOMY SURVIVAL, EMERGENCY SERVICES 3D FABRICS-protective, medical, objects AUTHENTICATION & BRAND SECURITY

KITS & WORKSHOPS SELF POWERED & ENERGY HARVESTING A BETTER WORLD design for the other 90% culture-specific developments earth & air

APPENDIX 2: MACROTRENDS TIMELINE

Macrotrends concepts placed into a timeline arrangement.

AWAKENING	WITCH HERITAGE	PERFORM	ANCE N	IOWTOPIA
^{year} 2013				2020
geolocalization apps gadget-based apps games and interactive sig	gnaletics tech- Fashion (e-shirt) activity reward programs	light as a objects ar communic and intera	form follows data material in motion smart cities (seamless, reconfigu networked and socia d packagings cating icting with consumer	ıred, I)
		hybrid analogic+ digital vintage+new establishment of New Classics in design	user-centered design: meaningful design	tech-Craftmanship supranormal design luxury authenticity
form follows function creature-inspired functional design extreme textiles & performant, robust materials	new efficieny, new energies space and sci-fi equipment inspiration	interactive safety workwear hyper-performant & wireless extreme sports equipment		

100 TE CETEMMSA

2020

2030

medi-home smart bodies 3D objects printing manufacturing humanised and "alive" materials conencted homes medi-food bio- and non-woven couture and home appliances digital food e-skin biosensors and food grown in transit wellthy concepts (health+comfort+spa) home diagnostics seed and DNA archives new architectural materials holistic health spatial commercial aviation

supracomfort

utility and efficiency @ home

upcyclers & makers	Do It Together	the fertile city
hacking: repair &	custom made through	light-foot living
improve mindset	new technologies	self-powered and energy
design for the other 90%		harvesting devices
	the industrial alternative	
local knowledge & sustainable design	better world: global design thinking	
ethical production	nomadic lifestyle	

CETEMMSA

APPENDIX 3: PRINTED ELECTRONICS ROADMAPS

Printed Sensors, Smart Objects and Smart Textiles roadmaps from the OE-A 4th edition white paper.



Roadmap for organic/printed sensors graphs the development of product generations over time from simple to more complex functionality and the ability to address different market segments. [Source: Dublin City University, Fraunlhofer IZM]



Roadmap for smart objects graphs the development of product generations over time from simple to more complex functionality and the ability to adress different market segments. (Source: Schreiner)



Oe-a Organic Electronics Association

Roadmap for smart textiles graphs the development of product generations over time from simple to more complex functionality and the ability to adress different market segments. (Source: Cetemmsa, Francital Environment)

We strongly believe in Printed Electronics



TECHNOLOGICAL CENTRE

Av. d'Ernest Lluch, 36 - Parc Científic i de la Innovació TecnoCampus E-08302 Mataró - Barcelona (Spain) T. (34) 93 741 91 00 - Fax (34) 93 741 92 28 cetemmsa@cetemmsa.com - Ewitter @cetemmsa

www.cetemmsa.com