

VISIT TO PRINTOCENT

PrintoCent

Ilkka Kaisto, Director

Introduction

Visit to Maxi-line

Company Cases

Discussion

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VTT – Technology for business

VTT Technical Research Centre of Finland Ltd is the leading research and technology company in the Nordic countries. We provide expert services for our domestic and international customers and partners, and for both private and public sectors. We use 4,000,000 hours of brainpower a year to develop new technological solutions.

We develop new smart technologies, profitable solutions and innovative services. We cooperate with our customers to produce technology for business and build success and well-being for the benefit of society.

VTT is a non-profit organisation and a crucial part of Finland's innovation eco-system. VTT operates under the mandate of the Ministry of Employment and the Economy.



- Turnover 277 M€ (2014 VTT Group),
- Personnel 2,600 (1.1.2015 VTT Group)
- Business Areas
 - Knowledge Intensive Products and Services
 - Smart Industry and Energy Systems
 - Solutions for Natural Resources and Environment

VTT's competence and technology focus areas



Knowledge intensive products and services

- Microelectronic systems
- Intelligent sensor systems
- Printed and hybrid functionalities
- Communication systems
- Digital systems and services
- Health and diagnostics
- MIKES metrology institute

Total ~ 750 person years

Smart industry and energy systems

- Life time management
- Nuclear safety
- Smart energy and system integration
- Systems engineering
- Structures and functionality
- Materials and manufacturing

Total ~ 900 person years

Solutions for biomass and environment

- Industrial biotechnology
- Biofuels and bioenergy
- Process chemistry and environmental engineering
- Biomass and food processing
- Fibres and biomaterials

Total ~ 650 person years

Business ecosystems, value chains, foresight

PRINTOCENT

TOWARDS INDUSTRIALIZATION OF PRINTED INTELLIGENCE

Printed Intelligence

PrintoCent

Innovation stream

Industrialization

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VTT Technical Research Centre of Finland,
Printed and hybrid functionalities

2015-06

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History VTT Printed Intelligence ... 2012

Marketing theme

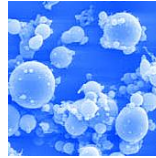
Roll-to-Roll

Roll-to-Product

Roll-to-Revenue

Product examples

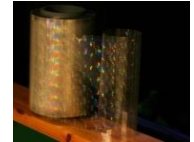
BASF materials for printed electronics



Orion Diagnostica CleanCard PRO®



Iscent holographic foil



Major references

Metso
Avantone

BASF, Nicanti, UPM
Orion Diagnostica

>10 start-up
companies established

Pico 2003

ROKO 2007

Pilot production MAXI 2012

Machines



People

10

40

Strong EU-project
portfolio created

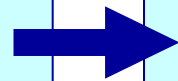
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Phases

*Project mode
late 90s - 2005*

**Strategic research
Program
2006 – 2009**

**Commercialization
Stage, 2010-**



Printing machine



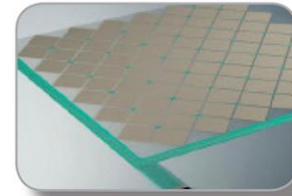
New products:
flexible, thin, light-weight,
transparent
mass & niche manufacturing
cost effective
sustainable



Conductors, backplanes



Solar cells



Sensors



OLED lighting



Diagnostics

Printed Intelligence Is Based on

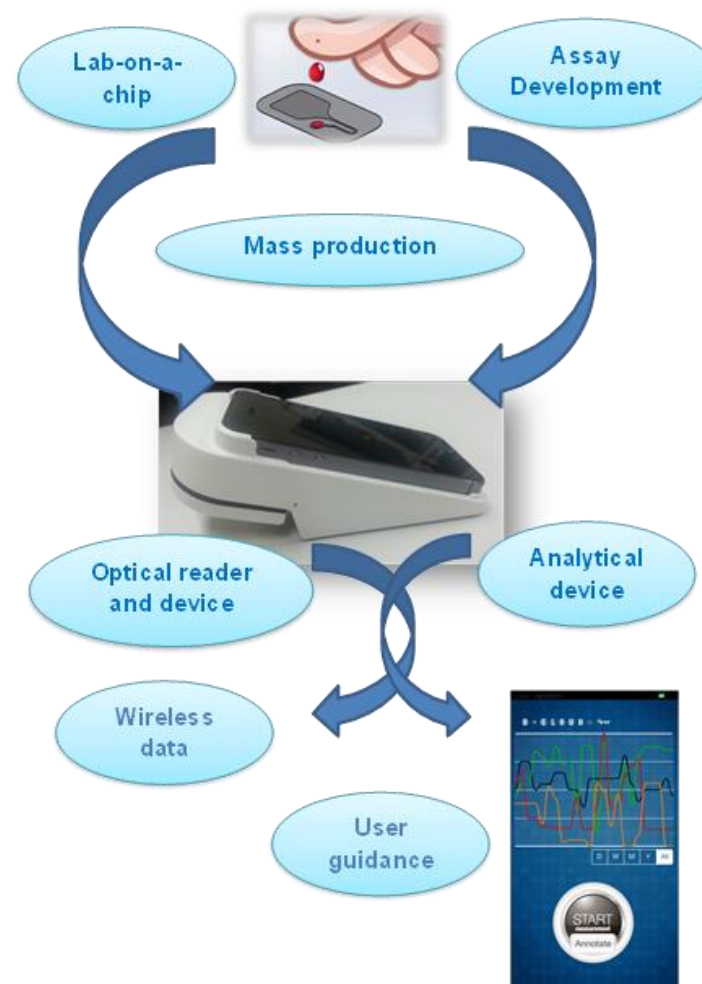
- fluid processable materials technology
- large area high-volume printing like mass-manufacturing methods
- functionality from electronics, biotechnology, chemistry, optics, optoelectronics, etc. integrated as devices and systems

Mobile Health and Wellness Monitoring System

From test Chip to Cloud Service

- VTT's one-stop shop for creating new diagnostic solutions for the customers:
 - reagent development
 - development of analytical devices
 - personal health solutions (ICT)

- Application Example: Dose Coach for MS Disease Medication
 - Measures the medication level from serum sample by immunoassay
 - Asks for symptoms and side effects to evaluate effect of medication
 - Collects data to cloud service



Future home/office with varying functionalities
... and versatile wireless sensor hidden everywhere

Solar energy wallpaper



Solar energy charger



Solar energy tablecloth



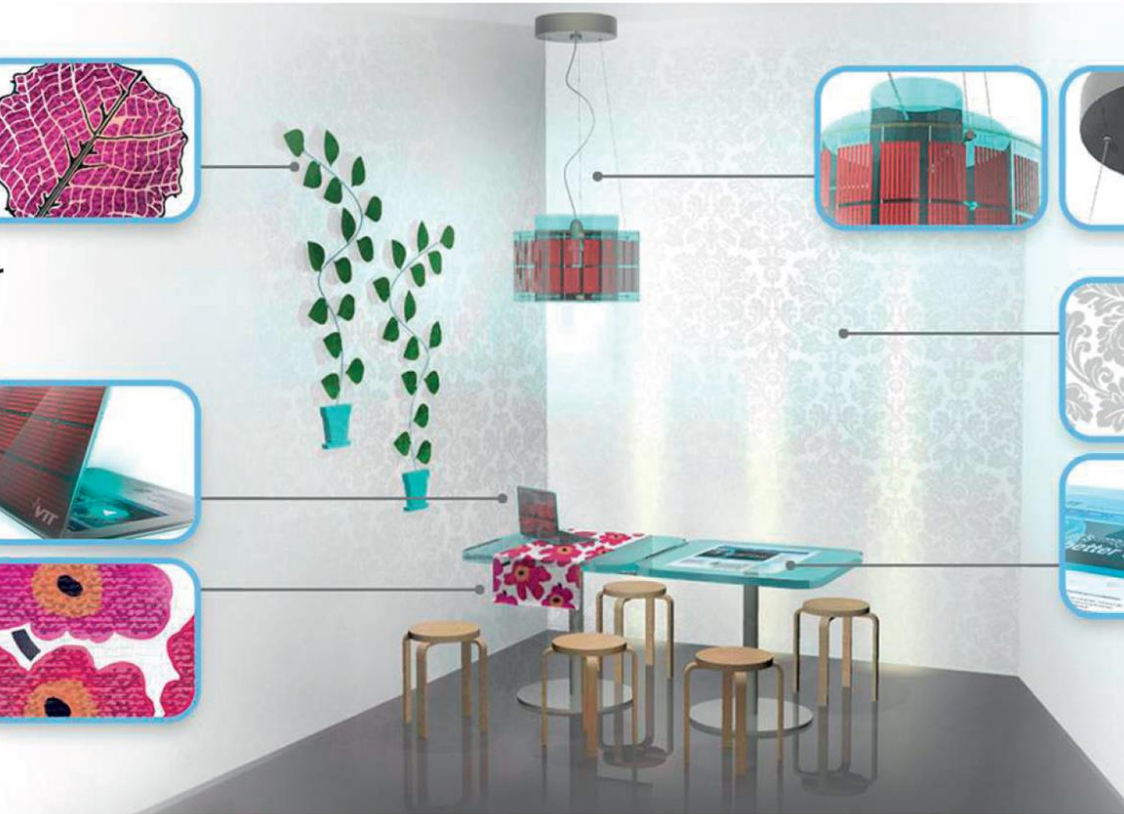
Solar energy lamps

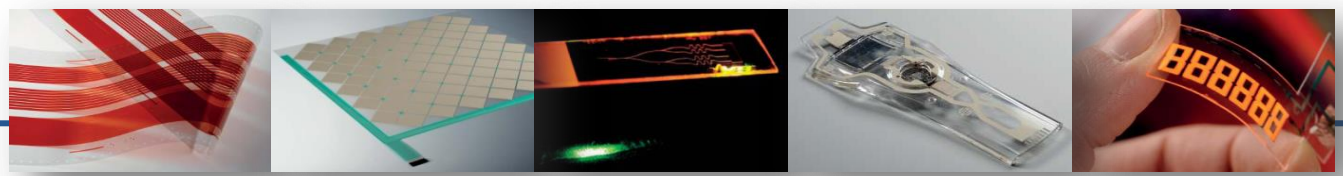


Solar energy
lpaper



OLED Display





PrintoCent Innovation Centre

commercializes the research results of the Printed Intelligence and Optical Measurement and takes the technologies from lab-to-fab-to-markets.

Regional Goal is to get 1% of the forecast 250 billion € printed electronics market 2030 to Finland and to Oulu = over 10000 employees.

VISION

PrintoCent is world-class printed intelligence and optical measurements innovation centre, whose customers are globally leading companies



PrintoCent

Commercializes the research results of the Printed Intelligence and Optical Measurement

2009 -2012

- Established 2009 - VTT led community **to create business**
 - Goal to >10 M€ programme
- Status 2012 - **resources for commercialization and industrialization**
 - Pilot Factory and Demonstrators
- Cooperates – **excellent network**
 - COLAE

2013-2015

- Create Industry Cluster **to build Value Chains**
 - 50 companies - now 42 onboard
 - 22 start - ups
- Offers unique **Design, Develop and Pilot Manufacturing Environments**
 - >300 people working
 - Services - companies, research institutes. trainings, student thesis
- Joint projects – **15 M€ programme**
 - 3 cases / 100.000 pcs
 - Learning about various Product Concepts
 - Towards Industrial Balanced Competence Building

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PrintoCent Industry Cluster Members (43)

<p>DELEKTRE DESIGN FOR ELECTRONICS</p>	<p>Beneq</p>	<p>Optitune <i>see Beyond</i></p>
<p>FLEXBRIGHT</p>	<p>CLOTHING+</p>	<p>ULTRACOM OY</p>
<p>iscent</p>	<p>Coatema <i>Essence. Machinery. Growth.</i></p>	<p>ASYS GROUP</p>
<p>FocalSpec</p>	<p>NEFICON</p>	<p>KELLA <i>Hella Lighting Finland Oy</i></p>
<p>Wp Weproductise</p>	<p>elcoflex</p>	<p>metso</p>
<p>THE ACTIVE PAPER COMPANY</p>	<p>Tekniseri</p>	<p>TOYO INK</p>
<p>BioNavis</p>	<p>screen tec</p>	<p>BOSCH</p>
<p>NANORDIC.COM</p>	<p>Global Innovation Network</p>	<p>CORNING</p>
<p>GoodWiller Oy</p>	<p>CANATU</p>	<p>ORION</p>
<p>INKRON</p>	<p>OFFCODE</p>	<p>MERCK</p>
<p>TactoTek</p>	<p>Picosun <i>The ALD Powerhouse</i></p>	<p>RUUKKI</p>
<p>Leia MEDIA</p>	<p>ynvisible</p>	<p>POLAR <i>LISTEN TO YOUR BODY</i></p>
<p>Enfucell</p>	<p>Startup & Micro</p>	<p>miPata</p>
	<p>SME</p>	<p>LSE</p>

PrintoCent Pilot Factory Concept



- R2R functionality testing
- Component assembly
- Injection moulding

Roll to Product



- Pilot production for components, products and systems
- Multilayer printing in register
- Product testing and characterising

R2R Pilot production



- Ink tuning for R2R process
- R2R printing trials
- Layer and component prototyping and testing
- R2R process development

Up-scale to R2R



R&D at the research laboratories

- Material research, development and testing
- Printing tests with different techniques
- Layer and component characterisation
- Application development
- Demonstrator manufacturing

Start-Ups founded since 2010, over 100 employees

1. MK Fluidics (1), Machinery, Tools, Diagnostics, Oulu
2. FocalSpec (10), Optical instrumentation, Oulu
3. *(Lumedy -OLED lighting solutions, Oulu – on hold)*
4. Nanordic (2) Nanomaterials, Oulu
5. Iscent (1), Hot embossed decorative products, Tampere-Helsinki
6. TactoTek (20), Smart molded structures, Oulu:
7. Ginolis, (44) Rapid diagnostics,Oulu:
8. KeepLoop (2), Mobile phone microscope, Tampere & Oulu
9. Spektikor(3),Disposable heartbeat monitor, Oulu: CEacceptance 11/2012
10. *(Detemex (0), Disposable diagnostics, (accelerator-1), Oulu)*
11. Neficon(1). Development services, (accelerator-1), Oulu
12. Goodwiller(3), Disposable Diagnostics; (accelerator-1), Oulu
13. *(Premisense(0), home monitoring, (accelerator-1), Oulu)*
14. MePromation (1), R2R testing services, (accelerator-1) Oulu
15. Qlu (7), Hearing Aid Services and Systems (a
16. The active paper company (2), Helsinki
17. InstaFe (0), Oulu
18. Flexbright () – Spinout from Neonelektro, t
19. Posterfy (4) - Advertisement, Helsinki
20. MoniDrops (3) - Disposable Diagnostics (accelerat
21. Kala Products (1), Oulu
22. Movesole (0) , Oulu

Challenge is to identify high quality business cases – on going regionally

- 0.5 B€ market potential
- Industry interest - channel to market
- Competence - resources to make it

Partners

- A** Finland, Oulu: VTT/PrintoCent
- B** France, Lyon: Plastipolis
- C** France, Grenoble: CEA
- D** Germany, Dresden: OES
- E** Germany, Heidelberg: InnovationLab
- F** Germany, Munich: Fraunhofer/EMFT
- G** Netherlands, Eindhoven: TNO/Holst
- H** Netherlands, Eindhoven: KMC/Innovation Fab
- I** UK, Cambridge: CIKC
- J** UK, Sedgefield: CPI
- K** Switzerland, Basel: CSEM
- L** Spain, Barcelona: CETEMMSA/PEC4
- M** Greece, Thessaloniki: AUTH
- N** Sweden, Norrkoping: Acreo
- O** Portugal, Famalicao: Centi
- P** Austria, Weiz: StOLAE
- Q** Belgium, Gent: IMSC,

Acronym: COLAE

Starting date: 1 Sep 2011

Duration: 36 months

Call: FP7-ICT-2011-7

EC budget: EUR 3.75M

Web-page: www.colae.eu

Coordinator: VTT Technical Research Centre of Finland

Target

**OLAE to
industrial designers and engineers,
end users and integrators**

Future Steps on Industrialisation Route 2015 ->

Disposable
microfluidics
&
health batches



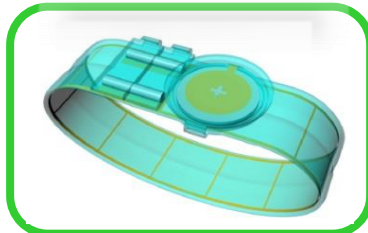
Smart flexible
lighting &
signage



Energy
harvesting
& storage



Wearable
products



- Identified Key Application Areas for Product Concepts
- Pilot Factory Upgrade 2015-2016
⇒ Advanced Pilot Manufacturing
- Efficient Ecosystem for Industrialization
- InnoFest 2015, Innovation Competition, June 11-12, Oulu, Finland
- **PRINSE'2016** Printed Intelligence Industrial Seminar, Oulu, Finland
June 7-8, 2016
- **PrintoCent Innofest 2016** - Ideas/teams competing, Oulu, Finland
June 9-10, 2016

PrintoCent Designer's Handbook



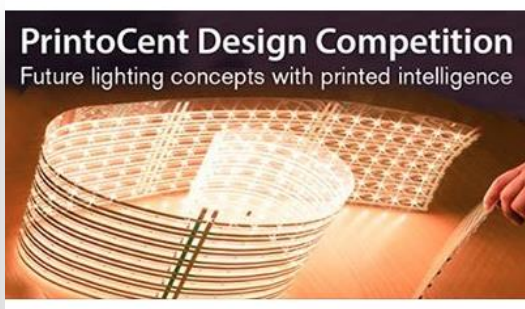
Buy and download from: www.ppe-info.com

Solid stream of innovation activities

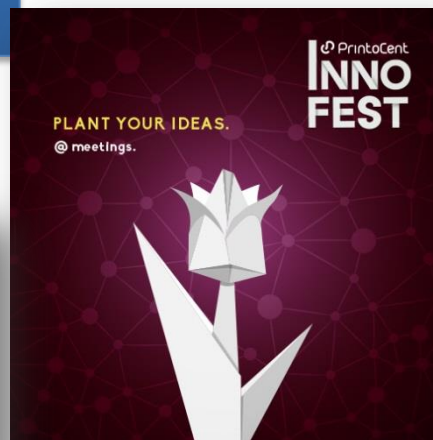
1st InnoFest
2014



1st Design
Competition
2014



2nd InnoFest
2015



Future
Design
Competitions



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Tykky by
Oskari Koistinen



Eclipse by
Samuele Saccardi



Aava by
Anniina Koivuaho



Table light by
Juho Saavalainen



Fabian by
Joonas Laitinen



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PRINTOCENT

INDUSTRIALIZATION

FLEXBRIGHT

SPEKTIKOR

POSTERFY

GINOLIS

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PrintoCent – Industrializations leaders

06/2014

- Leia Media – ePaper, Media applications Helsinki
- Focalspec – on-line inspection Oulu
- Flexbright – lighting applications Oulu
- Tactotek - intelligent surfaces, user interfaces Oulu
- Goodwiller - rapid diagnostics, Oulu
- Ginolis, ex GIN - automation&OEM solutions for manufacturing of rapid diagnostics, Oulu
- Spektikor - visual ECG –indicator, Oulu

	2013	2014	2015	2016
Turnover	2	4	10	30-40
Personnel	40	60	120	300

Besides companies offering design, development and manufacturing services like Elcoflex, Screentec, Tekniseri, ... turnover 2014: 14M€

What is Flexbright?

- Flexbright is 2013 founded innovative Finnish company specialized in printed and hybrid LED-lighting solutions
- Owned by Finnish companies and several private owners
- HQ located in Kangasala, Finland. CEO Mr Pekka Makkonen
- New production line starts its operation 2015 in Oulu
- Flexbright co-operates with VTT and other leading high-tech companies and institutes in Finland



In co-operation



WORLDS SMALLEST ECG-INDICATOR

Spektikor is now available in two versions DHBI-1 and DHBI-2



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**Spektikor,
easy monitoring,
even from a distance.**

Internet of Things Roaming to Hand Towel Dispensers

- The cloud-driven display brings **digital advertising** to places where it has not been possible before.
- Digital display can be installed anywhere – no power cord needed
- **First commercial application**, the display is integrated **into Lindström's towel dispensers**. The advertisement on Smart Lid changes every time a customer pulls the towel or moves a hand in front of the screen
- In Finland alone, Lindström has 100 000 dispensers from which fresh towel is pulled around 100 million times a year

For succesful commercialization we need
Application driven solution
System to run the service
Components high enough maturity level

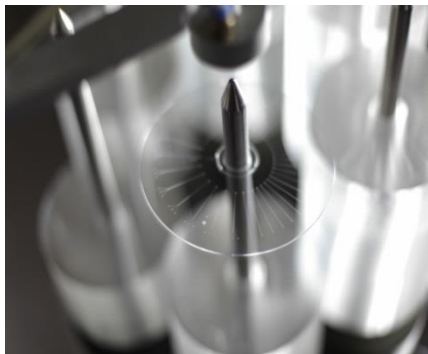


POSTERFY



GINOLIS OY - DIAGNOSTIC DISPOSALS MADE EASY

- Ginolis is a privately held company head quartered in Oulu, Finland, with a subsidiary in Uppsala, Sweden.
- Employs 80 of which 60 in Finland and 20 in Sweden.
- Revenue 2014 is 3,4 M€ (2015 Budget 8 M€).
- ISO 13485 Certified.



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PRINTOCENT

THANKS FOR YOUR ATTENTION!

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