

Recycling and biodegradability of RFID



CERP#7 meeting
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- ▶ Mandated by the French “pole de competitivite MauD”, situated in the Lille region in France, to undergo a study aimed at evaluating the research interests in the field of **recyclable and biodegradable RFID tags**.
 - ▶ Identification of running initiatives in the field
 - ▶ Opportunities to launch a research activity on such topics,
 - ▶ Potential partners with whom R&D cooperation should be sought.

- ▶ Very few people/organisations having seriously considered the issue while most of them consider it has important
- ▶ Issues are not today on recycling of the tags but potential perturbations of recycling streams by RFID tags
 - ▶ By construct, tags not easy to remove
 - ▶ Contamination by tags substrates and antenna metals
- ▶ Mostly concerned : passive tags. Active tags follows electronic products recycling directives

- ▶ Short term

- ▶ Compatibility of RFID tags, usage and support recycling stream

- ▶ Medium term

- ▶ Life cycle assessment: RFID tags enabled LCA databases building

- ▶ Long term

- ▶ Biodegradable tags

► Impact of emerging technologies

► Printed electronic, molecular electronic, organic electronic, micro power

Topics requiring new or intensified research

	Before 2010	2010-2015	2015-2020	Beyond 2020
Vision society	<ul style="list-style-type: none"> Wide take up of RFID 	<ul style="list-style-type: none"> Integration of objects 	<ul style="list-style-type: none"> Internet of things 	<ul style="list-style-type: none"> Unlocked full potential of the Internet of Things
People	<ul style="list-style-type: none"> Socially acceptable RFID 	<ul style="list-style-type: none"> Ambient assisted living Biometric IDs Industrial ecosystems 	<ul style="list-style-type: none"> Smart living In-vivo health Security based living 	<ul style="list-style-type: none"> Mastered continuum of people, computers and things Automated healthcare
Politics	<ul style="list-style-type: none"> First global guidance Standardisation 	<ul style="list-style-type: none"> First global governance Unified open interoperability 	<ul style="list-style-type: none"> Authentication, trust and verification 	<ul style="list-style-type: none"> Inclusive Internet of Things
Standards	<ul style="list-style-type: none"> Network security Ad-hoc sensor networks Protocols for distributed control and processing 	<ul style="list-style-type: none"> Interoperability protocols and frequencies Power and fault resilient protocols 	<ul style="list-style-type: none"> Intelligent devices cooperation 	<ul style="list-style-type: none"> Health security



	Before 2010	2010-2015	2015-2020	Beyond 2020
Vision technology	<ul style="list-style-type: none"> Low power and low cost 	<ul style="list-style-type: none"> Ubiquitous integration of tags and sensor networks 	<ul style="list-style-type: none"> Code in tags and objects 	<ul style="list-style-type: none"> Smart objects everywhere
Use	<ul style="list-style-type: none"> Interoperability framework (protocols and frequencies) 	<ul style="list-style-type: none"> Distributed control and databases Ad-hoc hybrid networks Harsh Environments 	<ul style="list-style-type: none"> Global applications Self-adaptive systems Distributed memory and processing 	<ul style="list-style-type: none"> Heterogeneous systems
Devices	<ul style="list-style-type: none"> Smart multi-band antennas Smaller and cheaper tags Higher frequency tags Miniaturised and embedded readers 	<ul style="list-style-type: none"> Extended range of tags and readers and higher frequencies Transmission speed On-chip antennas Integration with other materials 	<ul style="list-style-type: none"> Executable tags Intelligent tags Autonomous tags Collaborative tags New materials 	<ul style="list-style-type: none"> Biodegradable devices Nano-power processing units
Energy	<ul style="list-style-type: none"> Low power chip sets Thin batteries Power optimised systems (energy management) 	<ul style="list-style-type: none"> Energy harvesting (energy conversion, photovoltaic) Printed batteries Ultra low power chip sets 	<ul style="list-style-type: none"> Energy harvesting (biology, chemistry, induction) Power generation in harsh environments Energy recycling 	<ul style="list-style-type: none"> Biodegradable batteries Wireless power

- ▶ **Many thanks to all persons having contributed to the study**
- ▶ **Final report to be presented end of October**
- ▶ **All:**
 - ▶ **Contributions**
 - ▶ **Comments**
 - ▶ **Interests for cooperation still more than welcome**

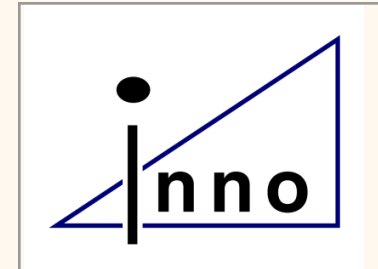


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Thank you for your attention!