Unplugged

evs 27
The 27th INTERNATIONAL ELECTRIC VEHICLE SYMPOSIUM & EXHIBITION
BARCELONA
17th-20th November 2013

Toward a wireless city

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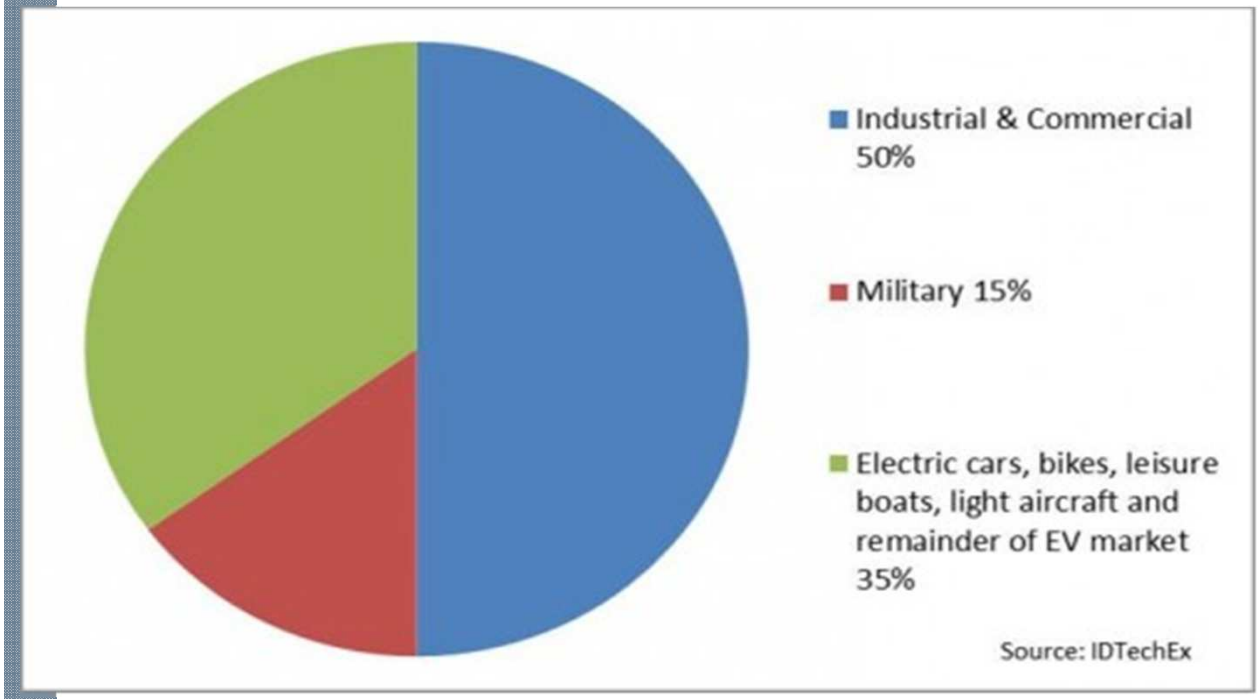
UNIVERSITÀ DEGLI STUDI FIRENZE
DIPARTIMENTO DI INGEGNERIA INDUSTRIALE

SEVENTH FRAMEWORK PROGRAMME

Organized by Fira Barcelona avele
Hosted by AVERE mea Ajuntament de Barcelona
In collaboration with EVAAP EDTA
Supported by European Commission

The total HEV and BEV market value in 2024

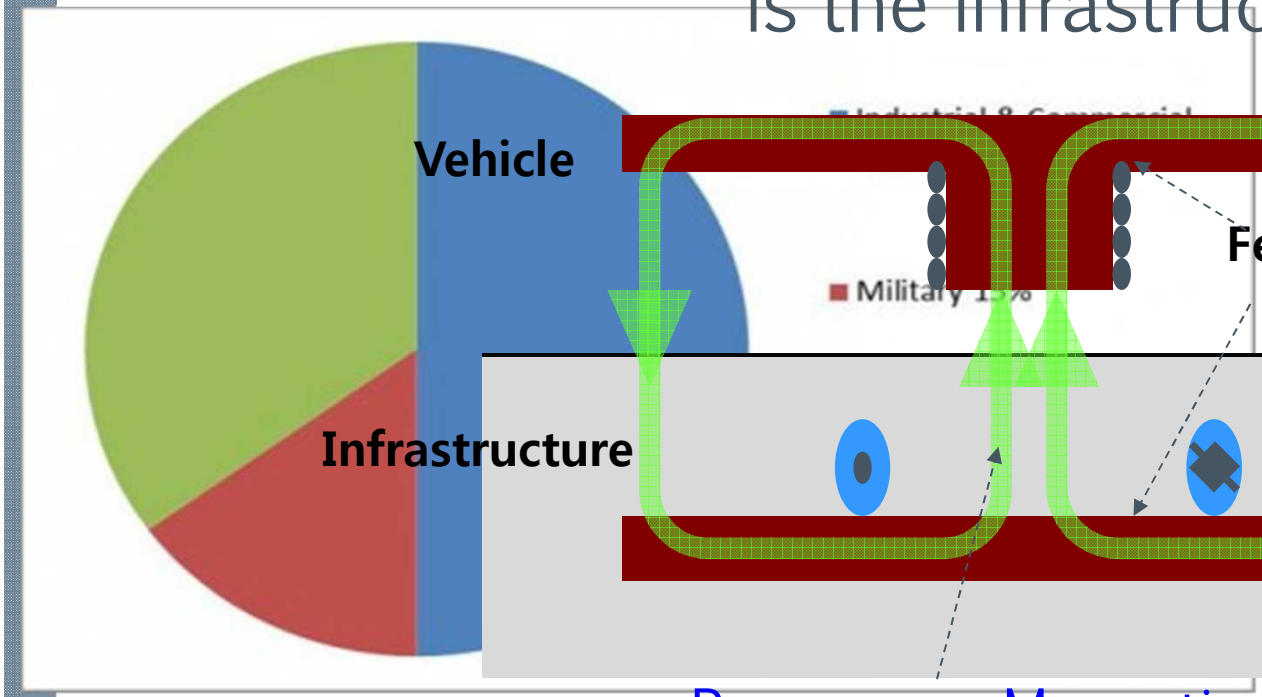


Commercial vehicles are the winners!

Working to have a "market ready" technology

Major limit to mass introduction is the infrastructure

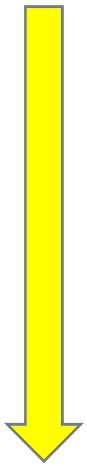
The total HEV and BEV market value in 2024



Commercial vehicles are the winners!

Solution sustainability

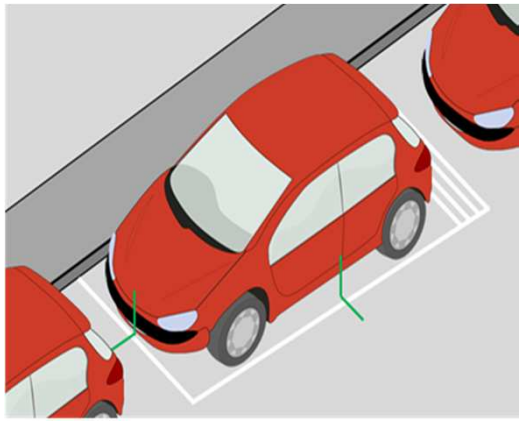
- Business model
- Ease of use
- Service level
- Safety

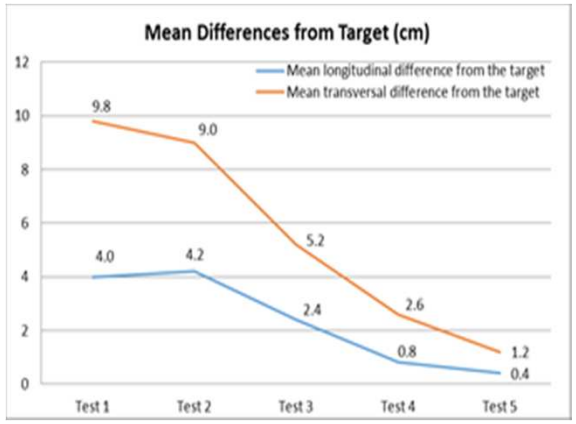


1. Static wireless city
2. Static en-route
3. Dynamic en-route

Static wireless city

- Reduced cost of infrastructure (commercial solution already on the market)
- Ease of use



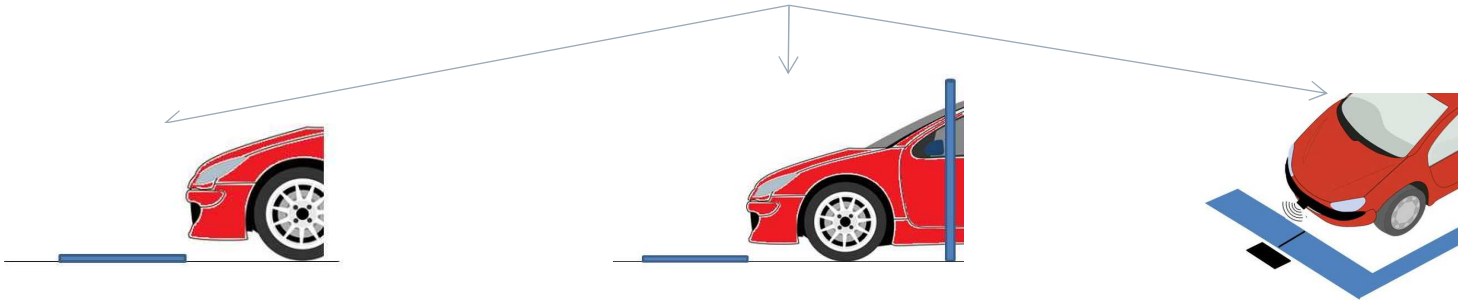


Static en-route wireless city

› For personal vehicles: high number of infrastructure needed in order to satisfy the user needs

Feasibility of the approach to charge the vehicle while not moving (i.e. traffic light)

Tested Maneuvers



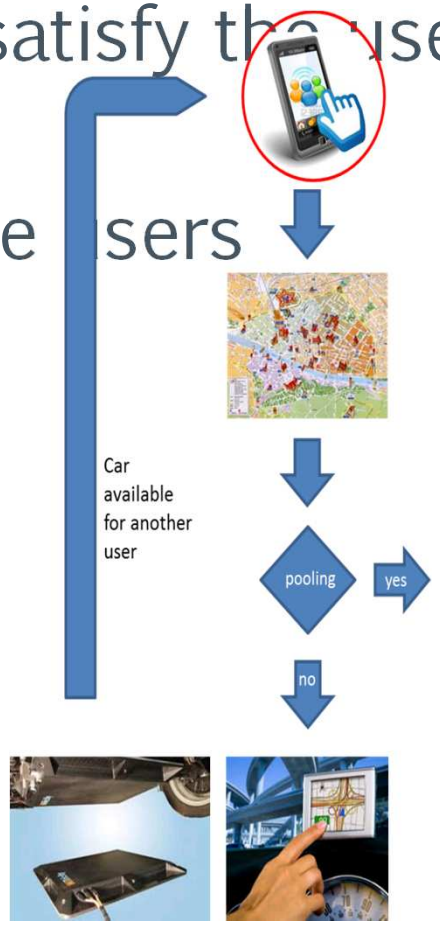
Not aided

Visual system aided
- External reference alignment -

Audio/visual aided
- “Radar” obstacle detection system -

Static en-route wireless city

- For personal vehicles: high number of infrastructure needed in order to satisfy the user needs
- Advanced services available for the users thanks to V2G communication

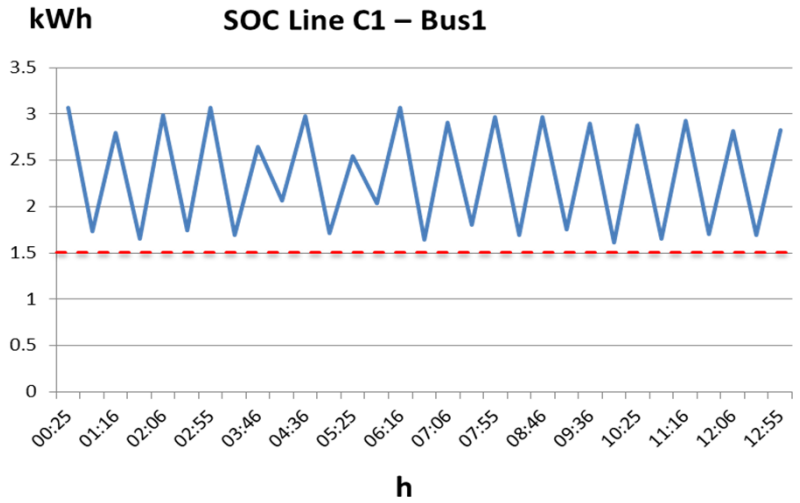


Static en-route wireless city

- For personal vehicles: high number of infrastructure needed in order to satisfy the user needs
- Advanced services available for the users thanks to V2G communication
- Public service with terminal stop charging

Static en-route charging for busses

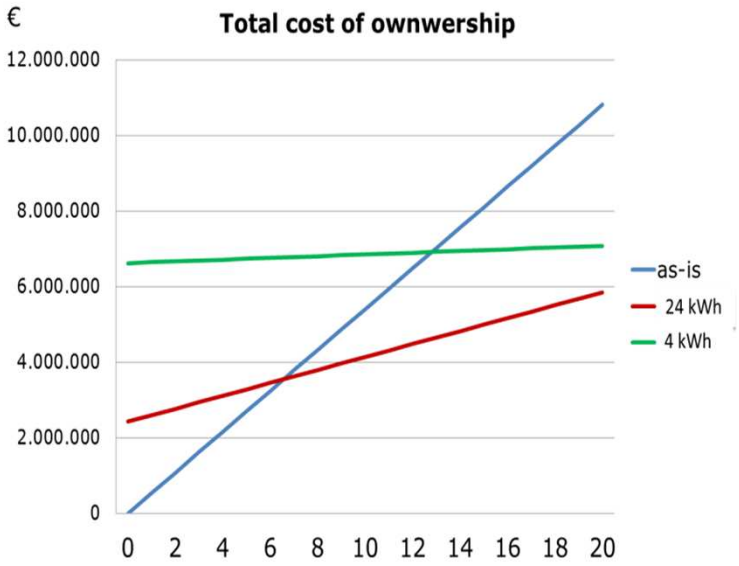
› Drastic reduction of battery size for urban busses



Line C1-C2-C3

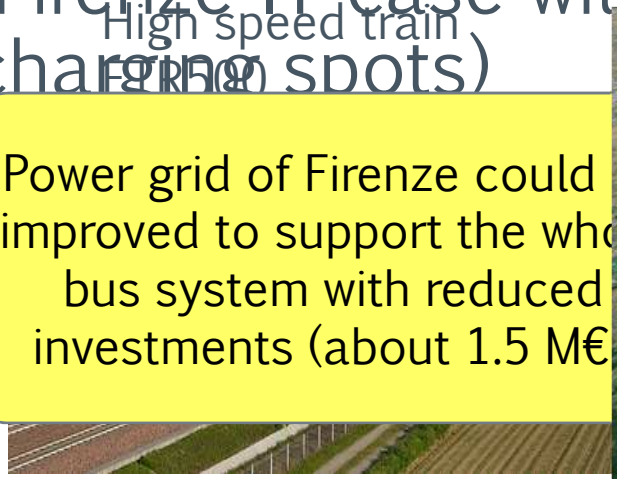
Static en-route charging for busses

- Drastic reduction of battery size for urban busses
- Reduction of ownership cost

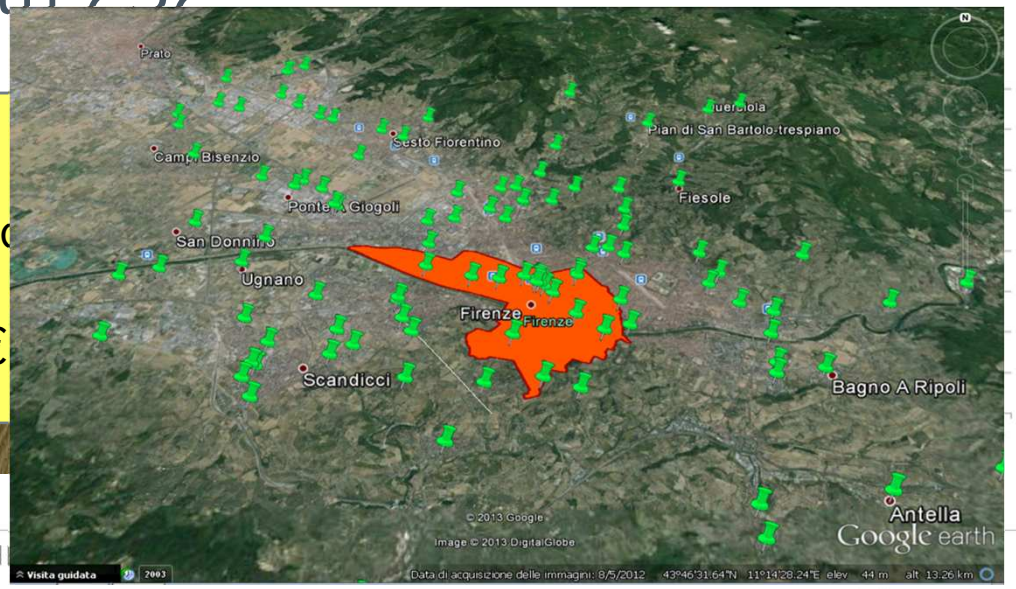


Static en-route charging for busses

- Drastic reduction of battery size for urban busses
- Feasible approach for a whole city's transport (Firenze-IT case with 232 charging spots)



Power grid of Firenze could improved to support the whc bus system with reduced investments (about 1.5 M€

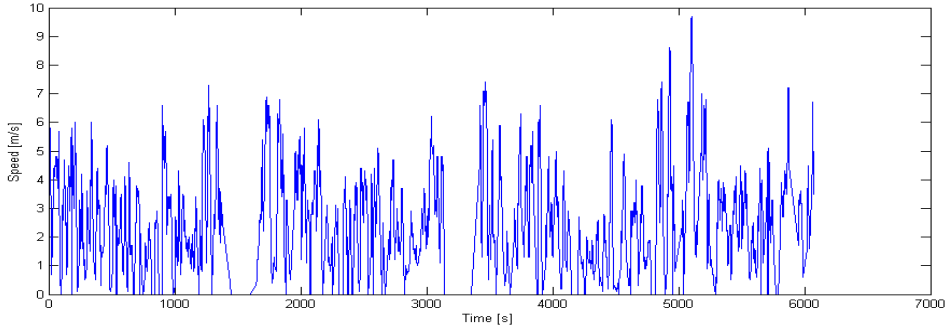


Dynamic wireless city

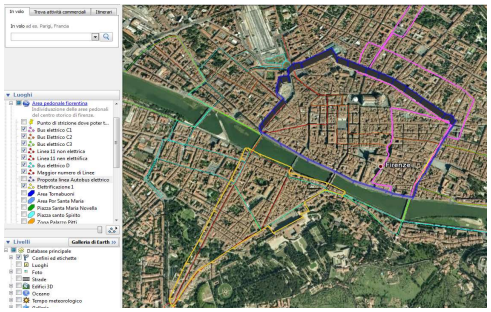
› Infrastructure must be intensively used in order to reach quickly the BEP (bus routes, highways tions)

No need to recharge during all the travelled path: optimization needed

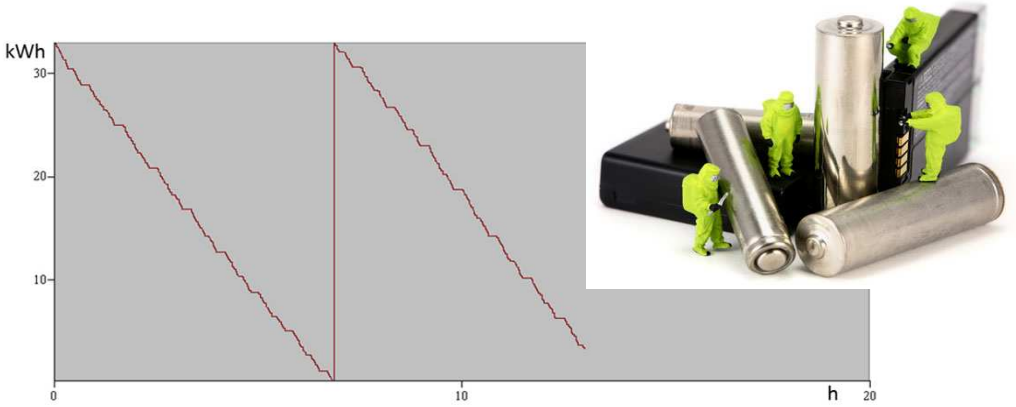
Dynamic wireless city



Driving cycle



Urban infrastructure



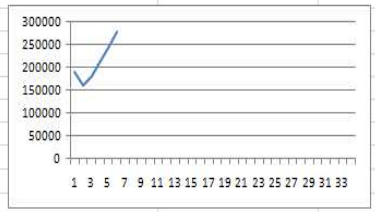
Battery status

Optimization

Dynamic wireless city

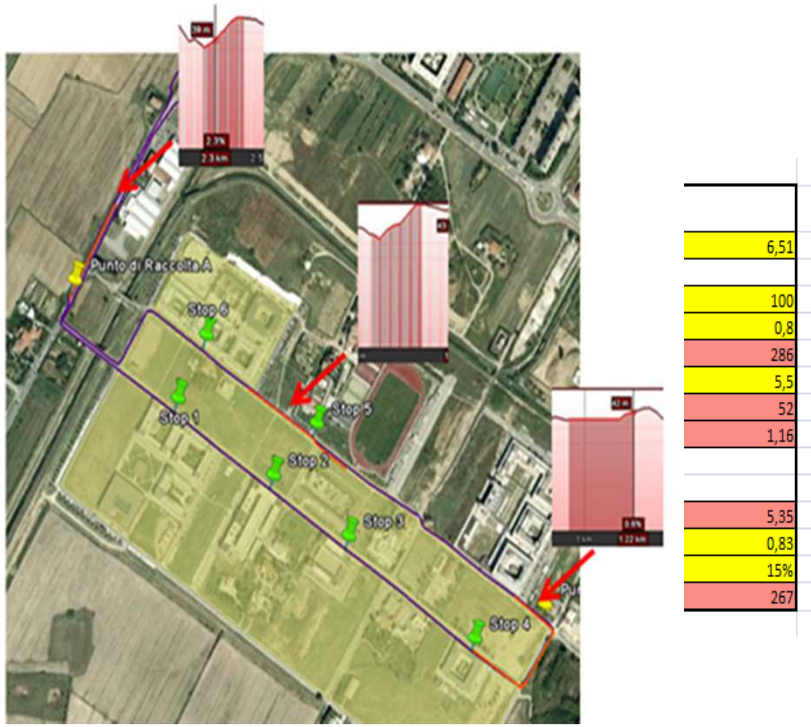
› Infrastructure must be intensively used in order to reach quickly the BEP (bus routes, highways principal feasible applications)

	A	B	C	D	E	F
1	Infrastructure cost			Legend	Number of subparts	cost value
2				Enter Value	1	189020
3	Cable cost			Software Value	2	161740
4	Elect. Line lenght (m)	286		Calculated Values	3	182540
5	Number of subparts	2		Calculated Costs	4	210540
6	Segment lenght (m)	5		Minimum	5	243340
7	Total wire (m)	870			6	278540
8	Wire cost (€/m)	40	total wire cost (€)	69600	7	
9	Units cost				8	
10	number of sw central	2	total sw central cost (€)	40000	9	
11	Software central cost (€/pz)	20000			10	
12	number of sensors	116	total sensor cost (€)	5800	11	
13	Sensors per segment (#)	2 sensors per segment			12	
14	Sensor cost (€/pz)	50			13	
15	number of switchers	58	total switcher cost (€)	3480	14	
16	Switcher cost (€/pz)	60			15	
17	number of p.inverter	2	total p. inverter cost (€)	40000	16	
18	P. inverter cost (€/pz)	20000			17	
19	total cost (€)	161740	Solver		18	
20					19	
21	Ducts cost				20	
22	Total ducts (m)	286			21	
23	Duct cost (€/m)	10			22	
24	total cost of ducts (€)	2860			23	
25					24	
26					25	
27					26	
28					27	
29					28	
30					29	



Cost function

Moving time in	
kWh required	6,51
Power Inverter	100
Yield while mo	0,8
Lenght [m]	286
Avg speed [m/s	5,5
Moving time [s	52
Total charge [k	1,16
Charge left [kW	5,35
Yield at stop	0,83
Safety Factor	15%
Assumed stop	267



Follow the project

www.unplugged-project.eu

info@unplugged-project.eu

“Unplugged FP7 project” group

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See you at the demo site in Saragozza!