openTRV

sensors and infrastructure
cheap 'n' easy

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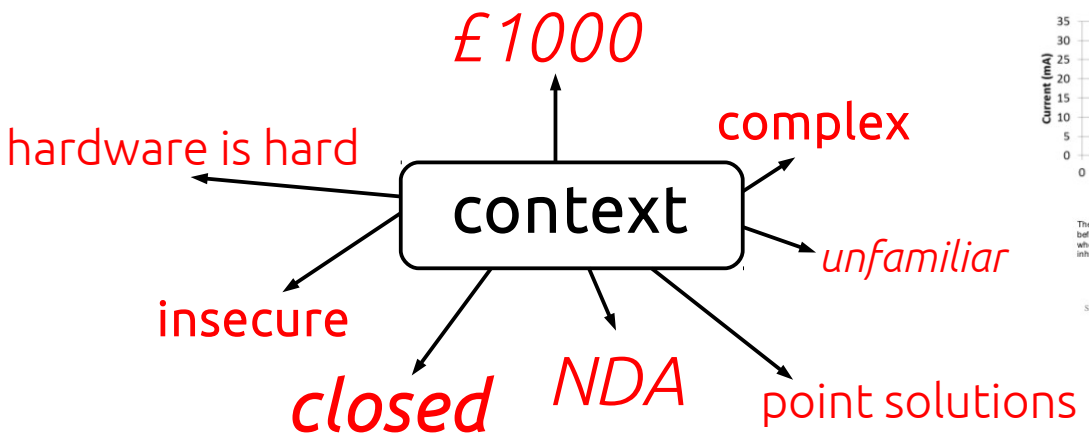


CAMBRIDGE CMOS SENSORS

CCS101 Datasheet

CC-000064-DB

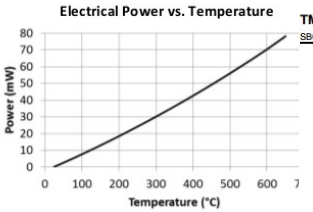
Electrical Characteristics

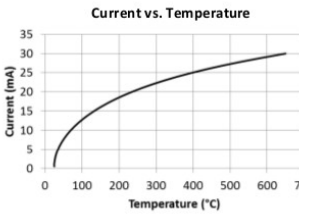
Parameters	Conditions	Typical Value	Units
Operating Temperature		600	℃
Thermal Rise Time (t_{90})		15 ± 5	ms
Thermal Fall Time (t_{10})		30 ± 5	ms
Power Consumption (P_H)	DC @ 600 ℃	72 ± 7	mW
Heater Voltage (V_H)		2.4 ± 0.3	V
Heater Current (I_H)		30 ± 4	mA
Ambient Resistance (R_0)		40 ± 10	Ω
Heater Resistance (R)[1]		80 ± 20	Ω
Heated Area		0.05	mm^2
Emissivity	2 -14 µm wavelength	0.7	
Frequency at 50% Modulation		38	Hz
Lifetime	600 ℃ @ 50% duty cycle	>5	years

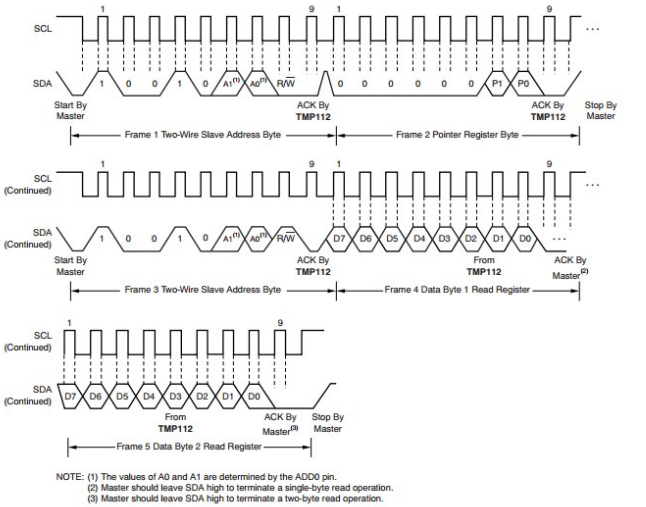
Note:

1. $R = (R0\text{-}RT)[1 + \alpha(T - T0) + \beta(T - T0)^2] + RT$; T0 = 25ºC;
RT (Track Resistance) = 12Ω ± 0.5Ω@ 25ºC; $\alpha = 2.05 \times 10^{-3}\ K^{-1}$; $\beta = 0.3x\ 10^{-6}\ K^{-2}$

Infrared Source Performance

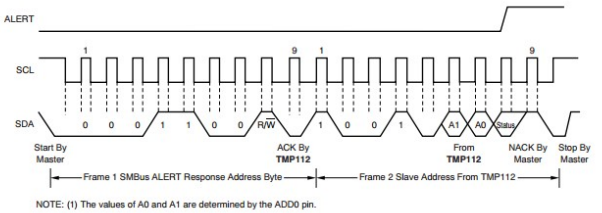






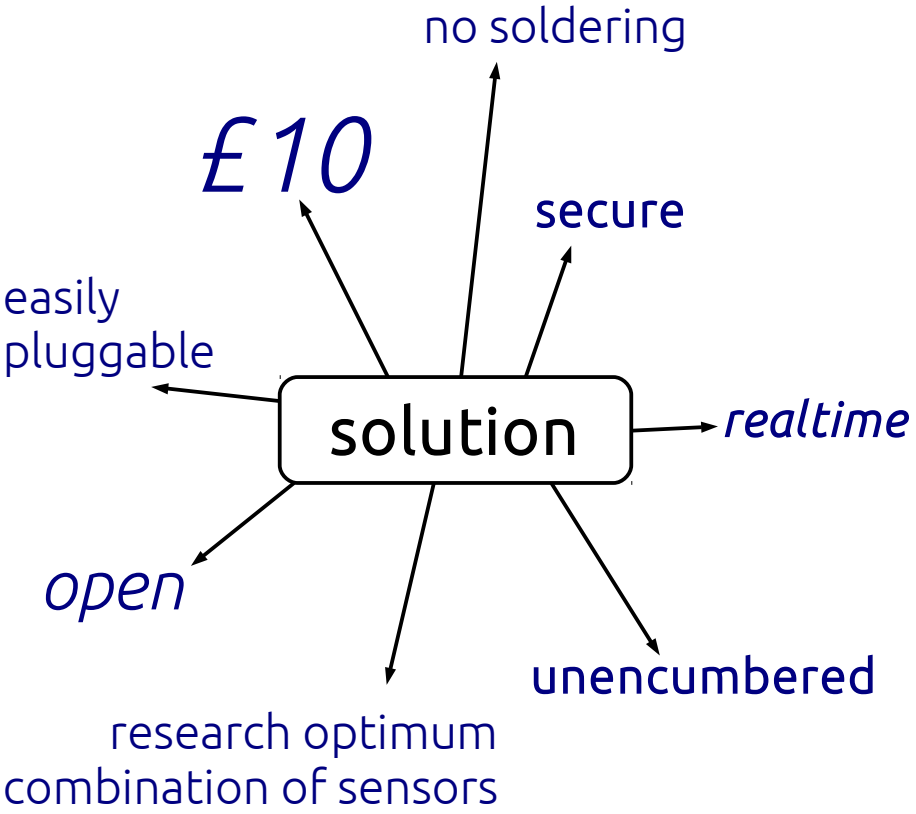
NOTE: (1) The values of A0 and A1 are determined by the ADD0 pin.
(2) Master should leave SDA high to terminate a single-byte read operation.
(3) Master should leave SDA high to terminate a two-byte read operation.

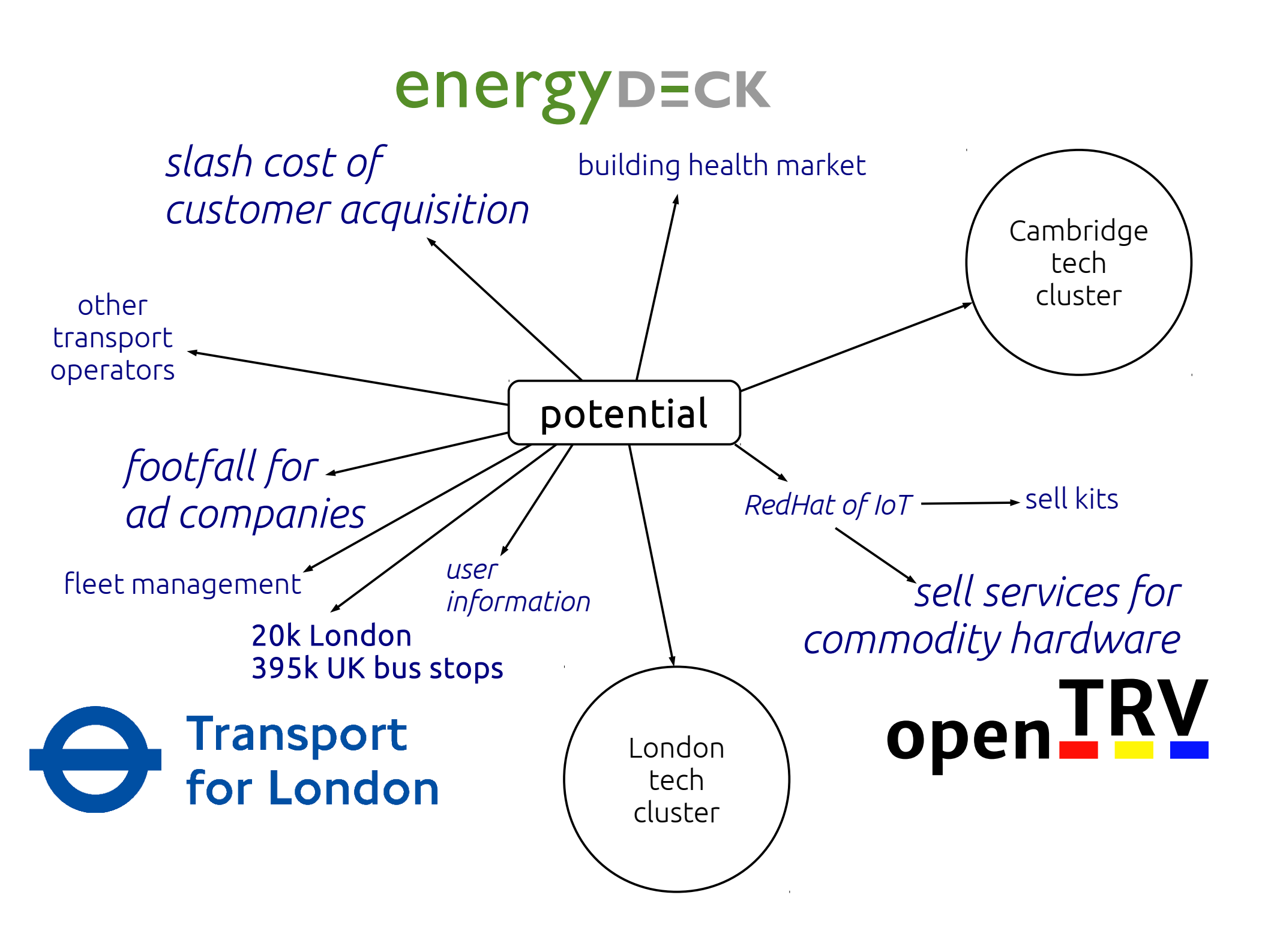
Figure 12. Two-Wire Timing Diagram for Read Word Format



NOTE: (1) The values of A0 and A1 are determined by the ADD0 pin.

Figure 13. Timing Diagram for SMBus ALERT


no soldering
£10
secure
easily
pluggable
solution
realtime
open
unencumbered
research optimum
combination of sensors


energyDECK
slash cost of customer acquisition
building health market
Cambridge tech cluster
other transport operators
potential
footfall for ad companies
RedHat of IoT
sell kits
fleet management
user information
sell services for commodity hardware
20k London
395k UK bus stops
Transport for London
London tech cluster
openTRV

openTRV

energyDECK

Lehman
Nomura
Lloyds
Unicredit
Google

credibility

Transport for London

Letter of Intent

UNIVERSITY OF SURREY

Institute for
Communication Systems
5G Innovation Centre

Department
of Energy &
Climate Change

ixaris

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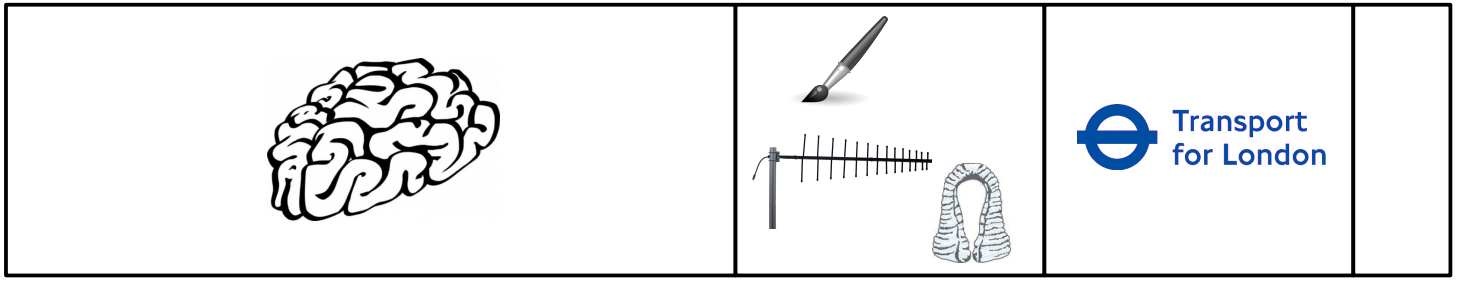


major step change
breaking down silos

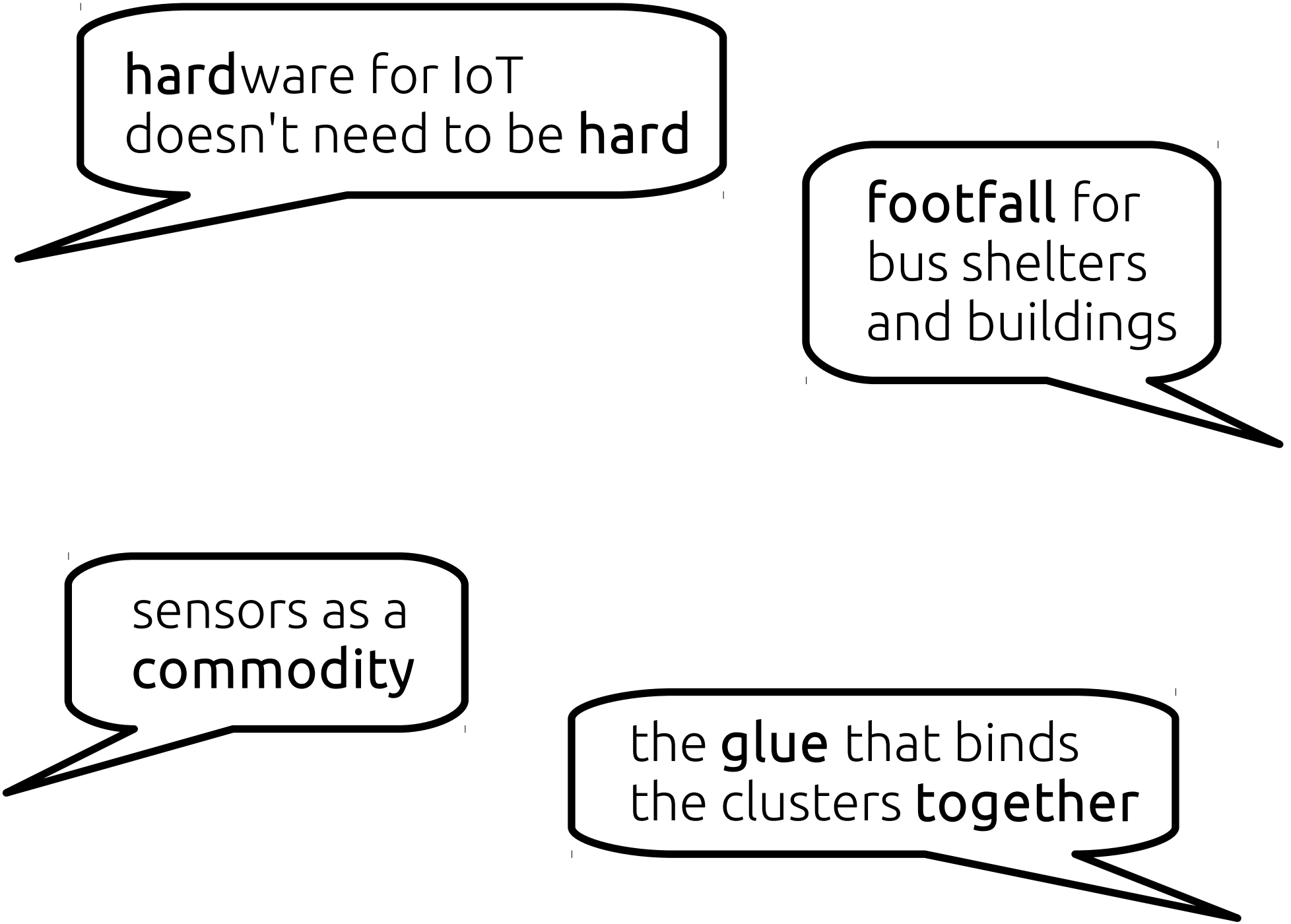
sweep away
hardware barriers

funding

don't reinvent
the wheel

IoT services enabler

public money public good


hardware for IoT
doesn't need to be **hard**
footfall for
bus shelters
and buildings
sensors as a
commodity
the **glue** that binds
the clusters **together**

energyDECK

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Mark Hill
Bruno Girin

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