

Challenge for the next 25 years – Innovation and Change.

Martin Curley

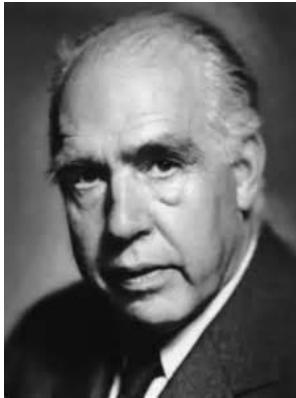
Professor of Innovation,
Maynooth University,
Chair EU Open Innovation Strategy and Policy Group
Martin.Curley@Nuim.ie

Former VP, Director, Intel Labs Europe
European CTO of the Year 2015

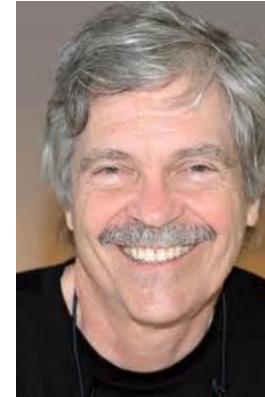
KOITA Global Forum,
Seoul,
27/10/16

The Future – two views

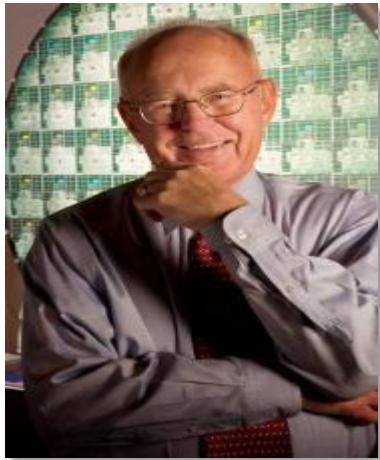
- Prediction is difficult, especially about the future
 - Neils Bohr



- The best way to predict the future is to invent it!
- Alan Kay



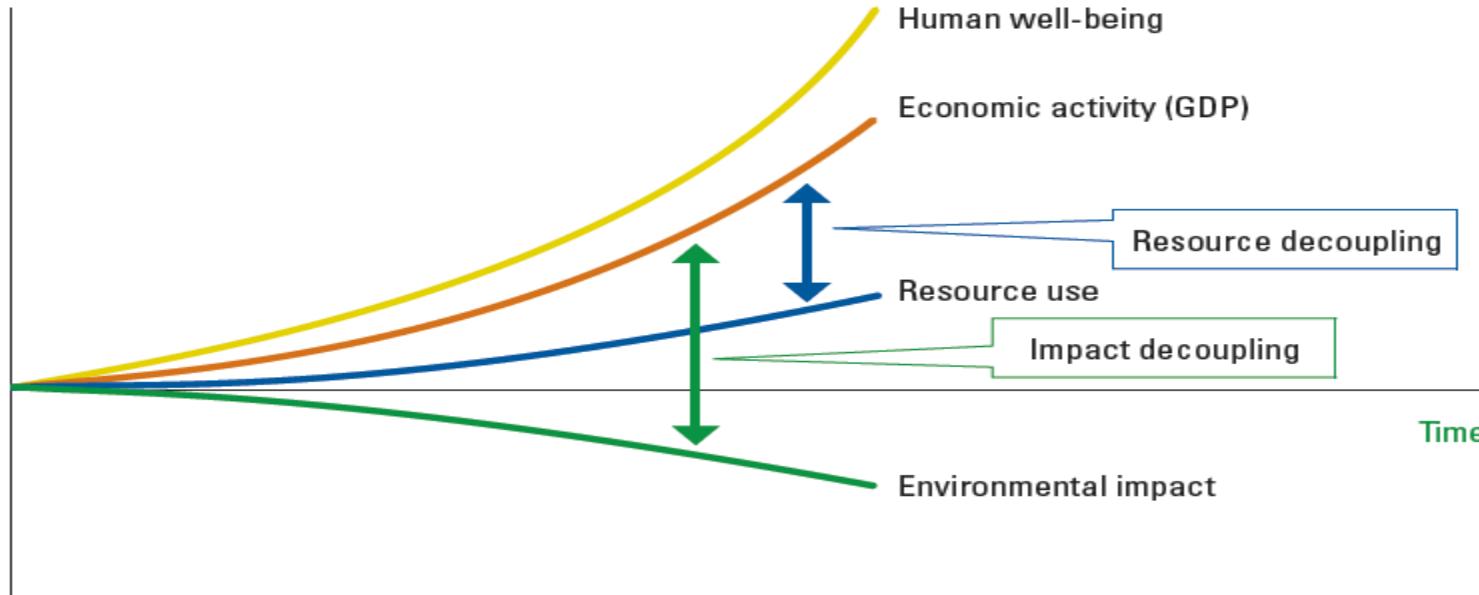
The Collision of Key Mega Trends



**Creating Sustainable
Digital Shared Value
through Open
Innovation 2.0**

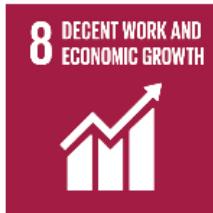


Sustainable Intelligent Living: Resource Decoupling

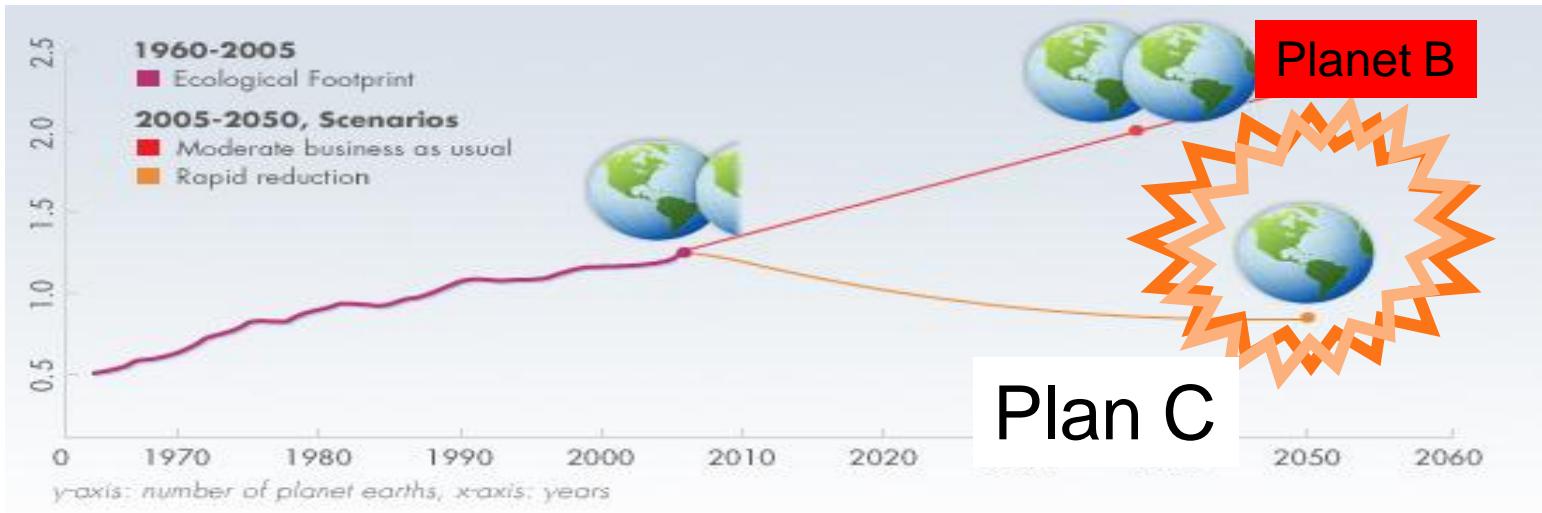


Source: UneP international resource panel

Sustainable Development Goals



...Moore's law is colliding with almost every domain



There is no Planet B!

Jose Maria Figueres



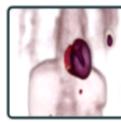
...Moore's law is colliding with almost every domain



Genomics
Research



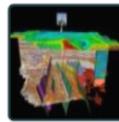
Financial
Analysis



Medical
Imaging



Weather
Prediction



Oil
Exploration



Design
Simulation



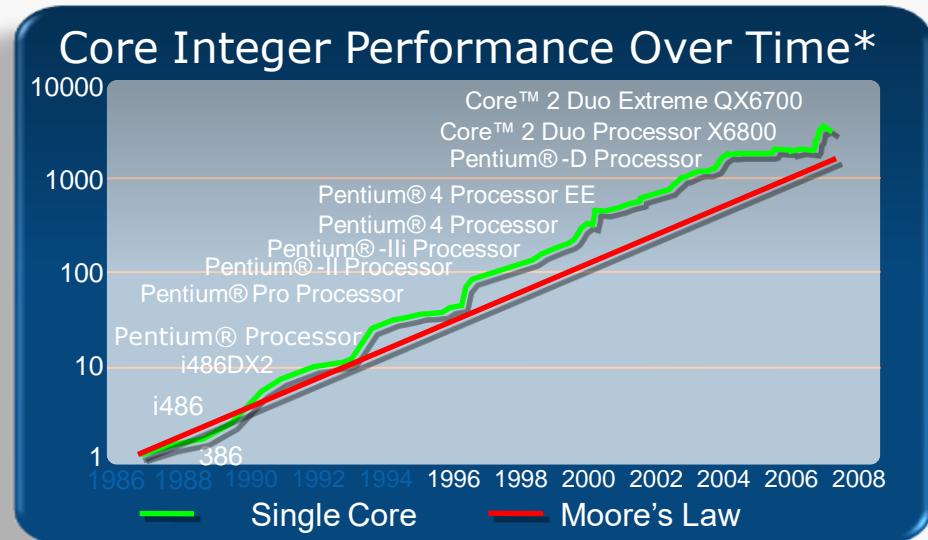
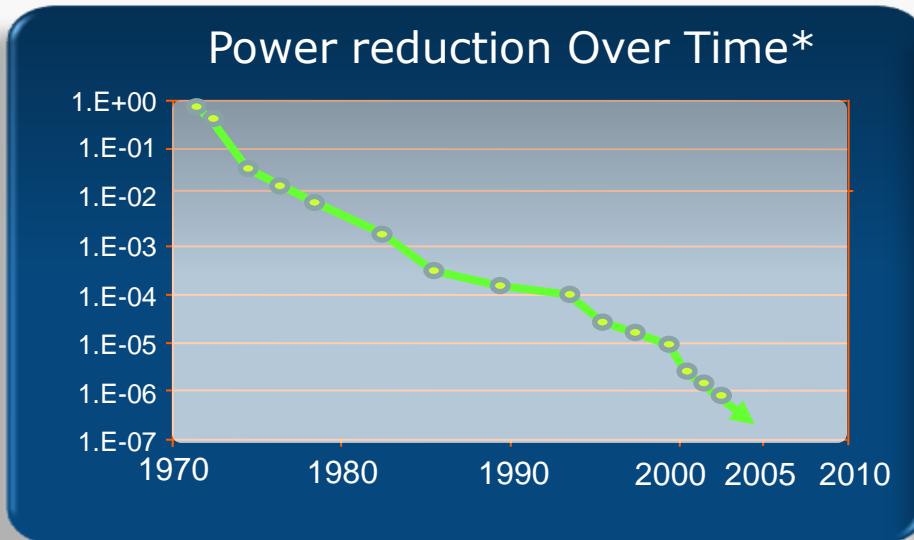
Cloud
Computing



Data Center
Refresh



MOORE'S LAW DRIVES CONTINUOUS CHIP-LEVEL ENERGY EFFICIENCY: directly Sustainability



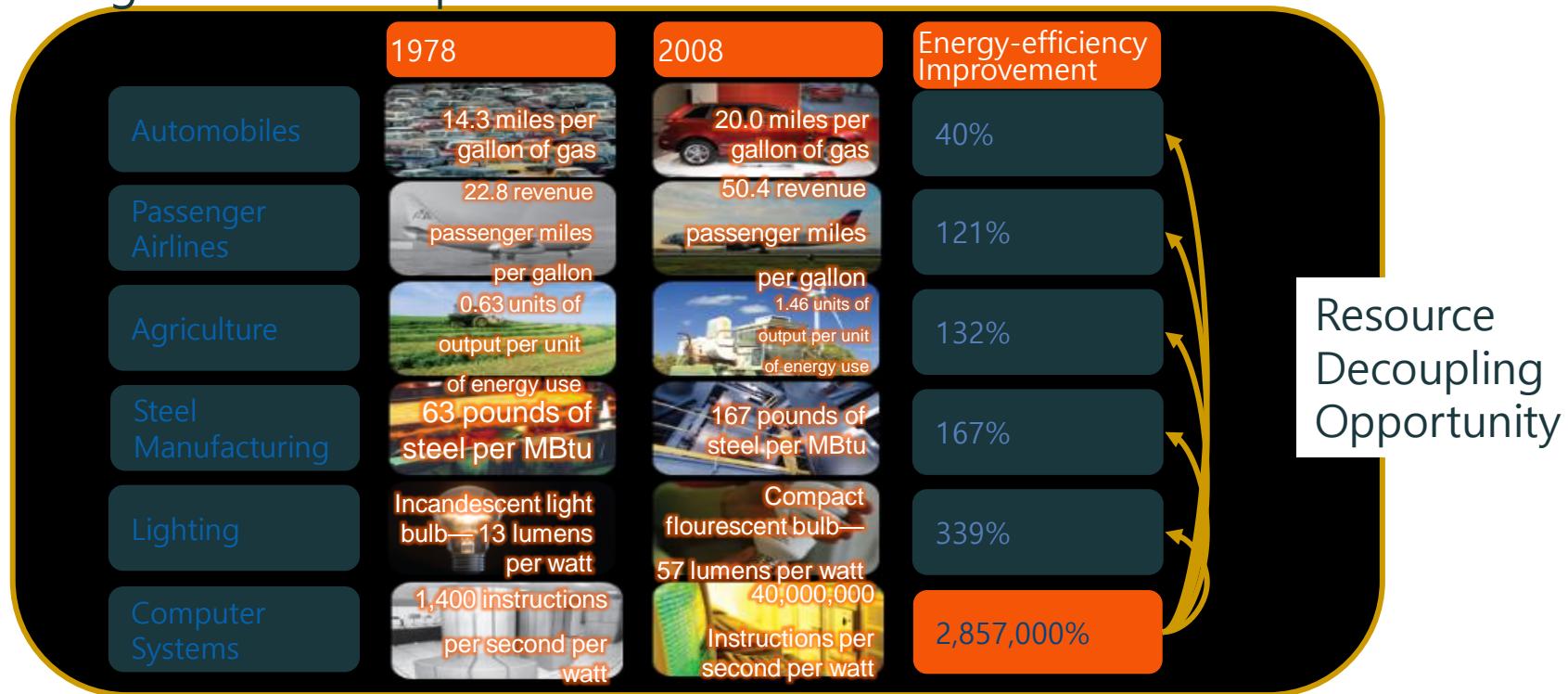
1 million x factor reduction in energy/transistor over 30+ years
Smaller, faster transistors = faster AND more efficient chips and computer systems

And The Trend Continues...

Source: Intel Labs

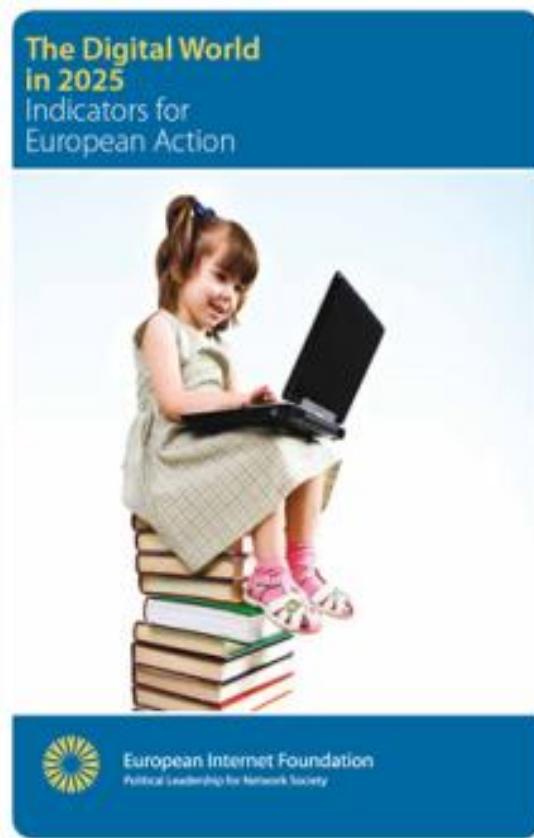
Increasing Energy Efficiency

ICT leading sector in energy efficient improvements : need to take advantage of this out-performance.



Source: Intel

Mass Collaboration as the Dominant Paradigm



Technology Catalysts for Change



>1 Zetabyte Internet Traffic³



>1 Bn More Netizen's¹



>15 Bn Connected Devices²

...by next year



Energy



Retail



Smart Cities



Healthcare



Finance



Transport

New Business + Usage Models

Tectonic Shifts



Big Data



Cloud



Mobile and Social

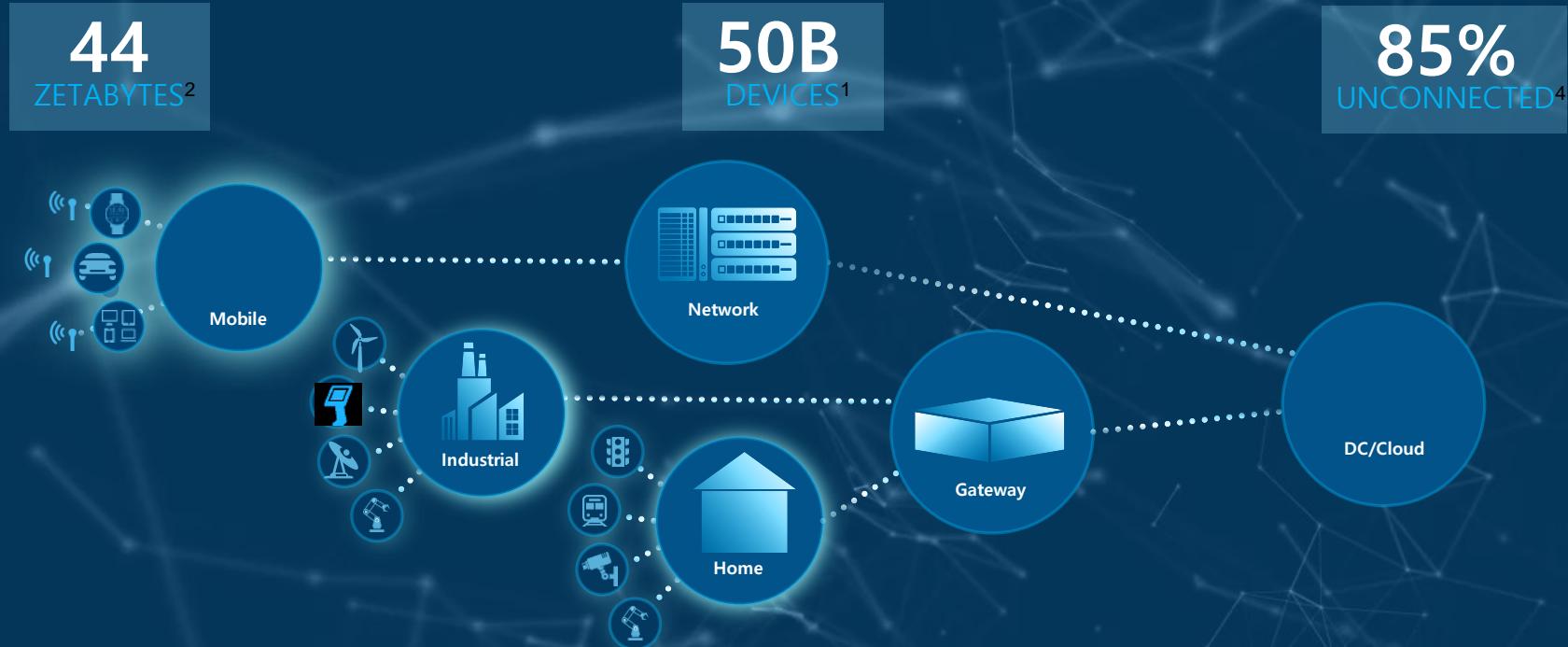


Internet of Things



Security

The Internet of Things is coming ...



COST OF SENSORS
PAST 10 YEARS

1 2X

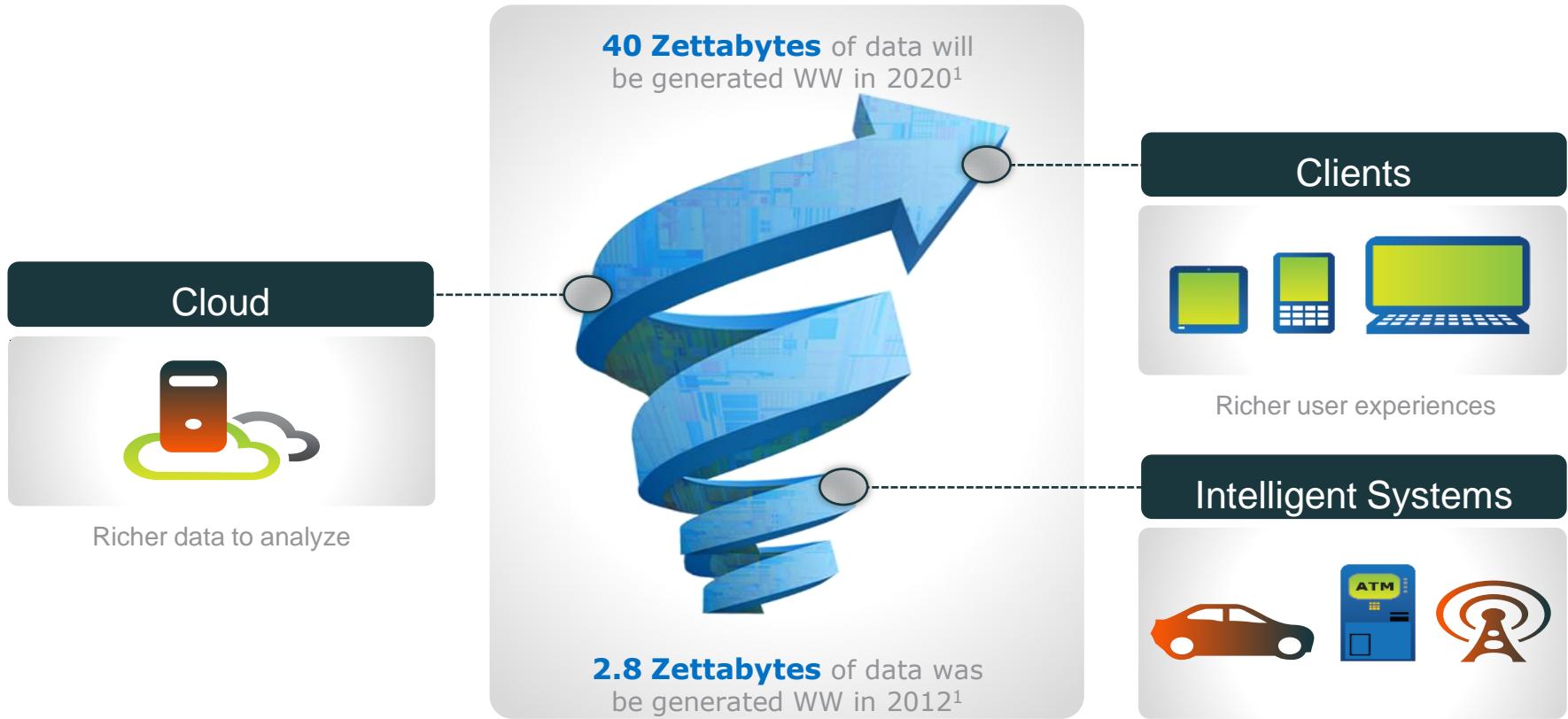
COST OF BANDWIDTH
PAST 10 YEARS

2 40X

COST OF PROCESSING
PAST 10 YEARS

3 60X

Virtuous Cycle of Data-Driven Innovation



(1) IDC Digital Universe 2020, (2) IDC

The World re-imagined at Light Speed

Knowledge



to



Shopping



to



Communicating



to



Educating



to



Travelling



to



Entertaining



to



Sharing



Pinterest



Industries established over a **Century**
re-architected in under a **Decade**

Many more opportunities....Fashion, Sport etc

... Re-imagining the World at Light Speed

Smart Grid



e.ON

ENERGOC
pulse energy
Vigilent
SimpleEnergy

Smart Cities



London,
Dublin,
San Jose

Agriculture



Work



Healthcare



When the **impossible...**
becomes **possible**

Construction



Crossrail

TPX Energy

Transportation



UBER

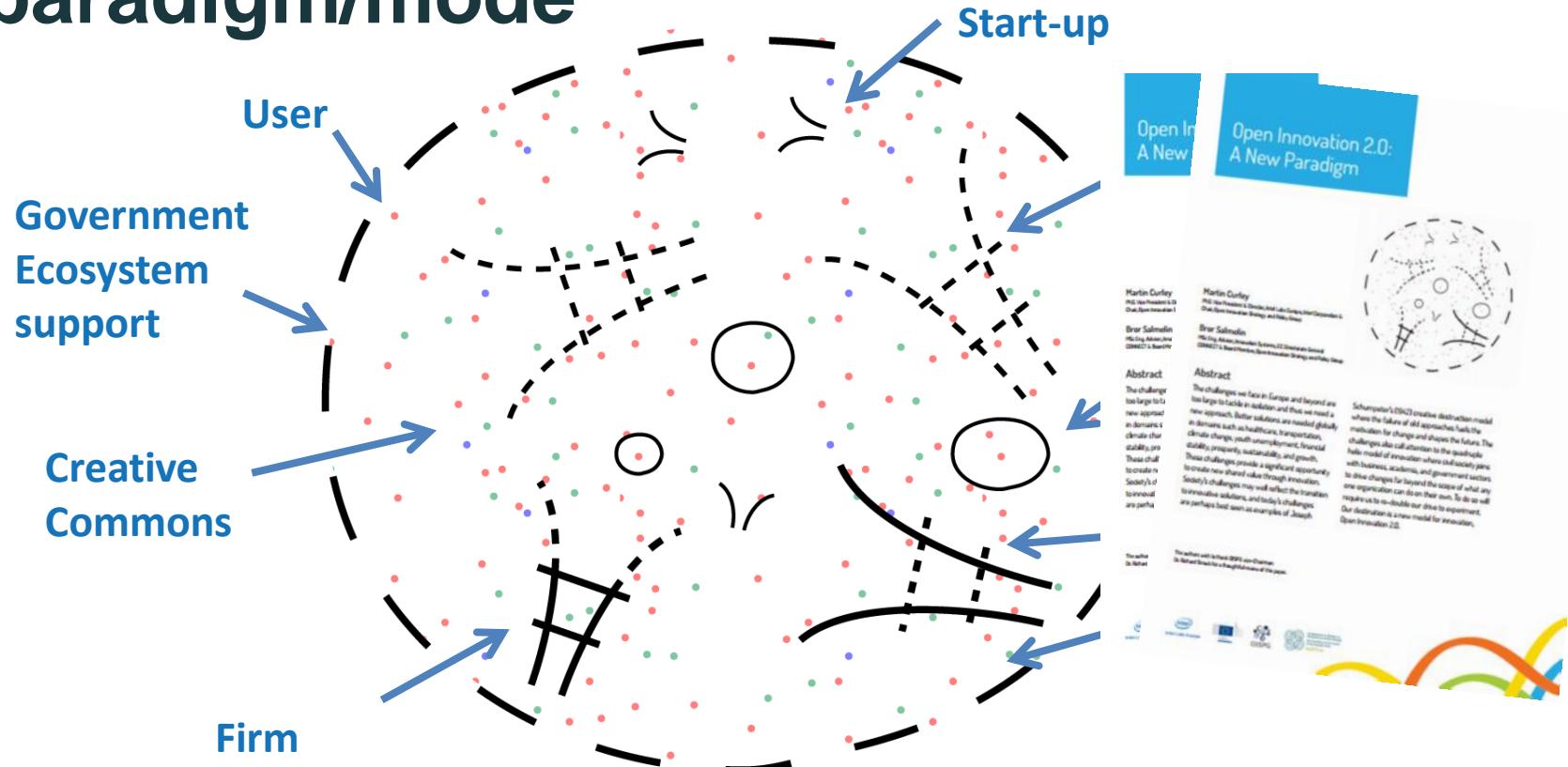
zipcar

drive zipcars by the hour or day

HAIL
Google Home

... to the much harder, all enabled by Open Innovation 2.0

Open Innovation 2.0: A new paradigm/mode



Towards Sustainable Intelligent Living

- | | |
|---|---|
| <ul style="list-style-type: none">- Former business model- Volume driven- Consumption- Energy and resource intensive- Inherently hazardous/toxic- Linear systems- Chemistry and physics- Proprietary- Organization- Product | <ul style="list-style-type: none">New business modelValue drivenPreservationKnowledge intensiveInherently safeCircular systemsBiology and informationOpenEcosystemService |
|---|---|

From the Linear to the Circular to the Performance Economy

Adapted from Stahel

17

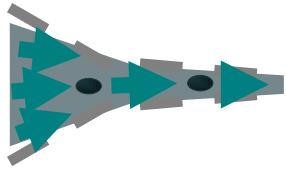
FROM: PROPRIETARY



Modes of Innovation

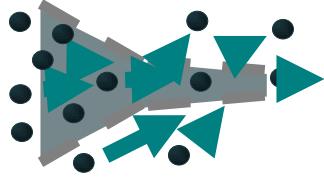
Closed innovation	Open innovation	Open innovation 2.0
Dependency	Independency	Interdependency
Subcontracting	Cross-licensing	Cross-fertilization
Solo	bilateral	Ecosystem
Linear	Linear, Leaking	Non-linearMash-up
Linear subcontracts	Bi-lateral	Triple/Quadruple Helix
Planning	Validation, pilots	Experimentation
Control	Management	Orchestration
Win-lose game	Win-win game	Win more-Win more
Box thinking	Out of the Box	No Boxes!
Single entity	Single Discipline	Interdisciplinary
Value chain	Value network	Value constellation

Innovation extending out of the Lab



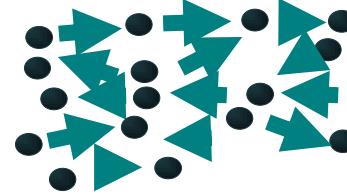
Centralized inward
looking innovation

Closed Innovation



Externally focused,
collaborative
innovation

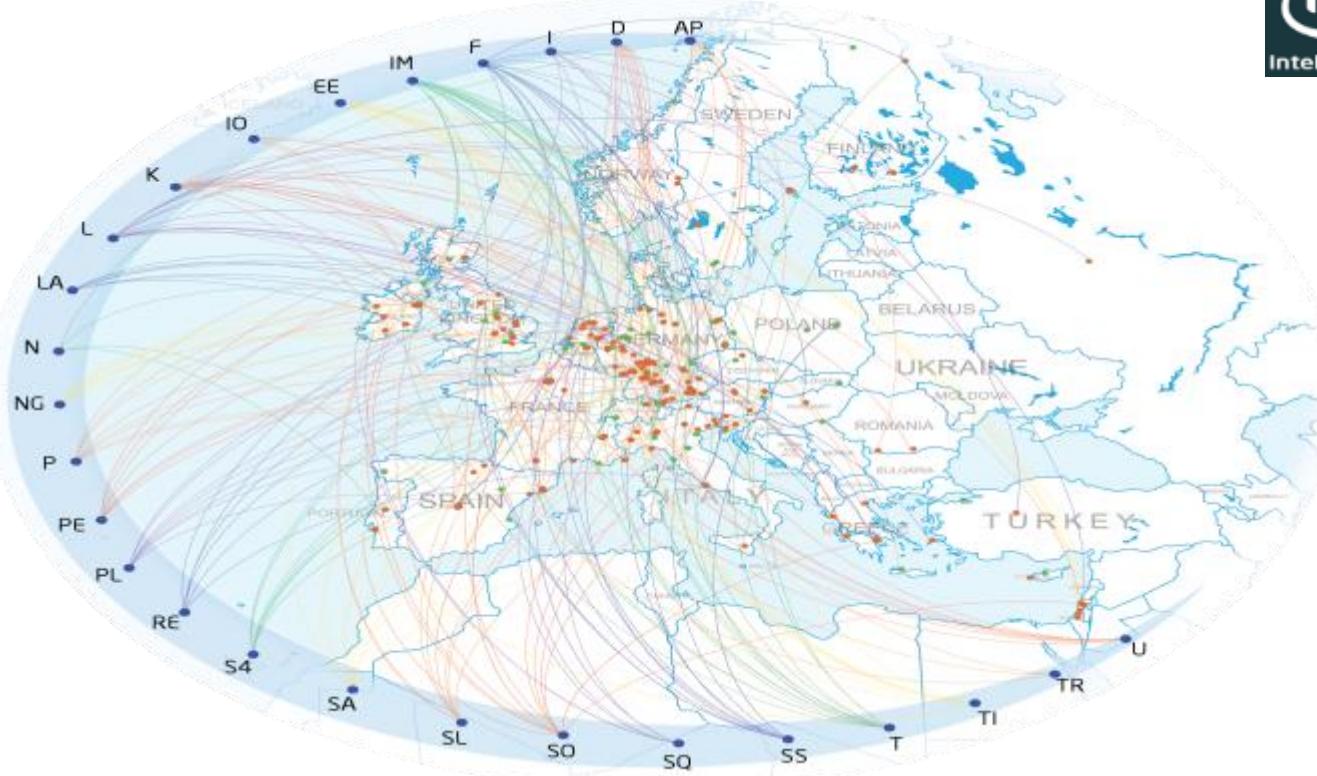
Open Innovation



Ecosystem centric,
cross-organizational
innovation

Innovation Networks/
Ecosystems

... it is about the ecosystem



Alignment, Amplification, Acceleration

Copyright © Intel 2015

What keeps the Big companies awake at night?



**Will new business models
and new players eat their
business?**

Engage with the ecosystem to co-develop new models and accelerate new players

Open Innovation 2.0: Some Core Patterns



nature.com/news/twelve-principles-for-open-innovation-2-0-1.19911

Shared Vision

It starts with a Vision.....

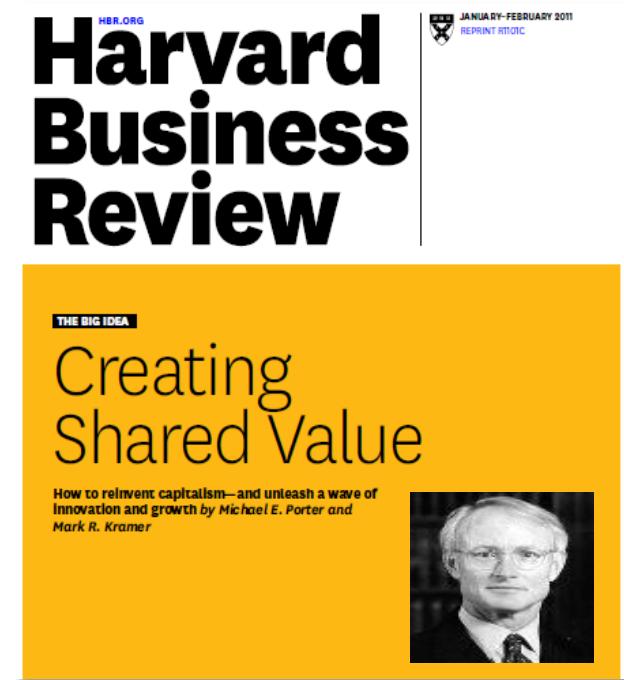


....I believe that this nation should commit itself to achieving the goal before this decade is out, of landing a man on the moon...."

John F. Kennedy 1961

Shared Value

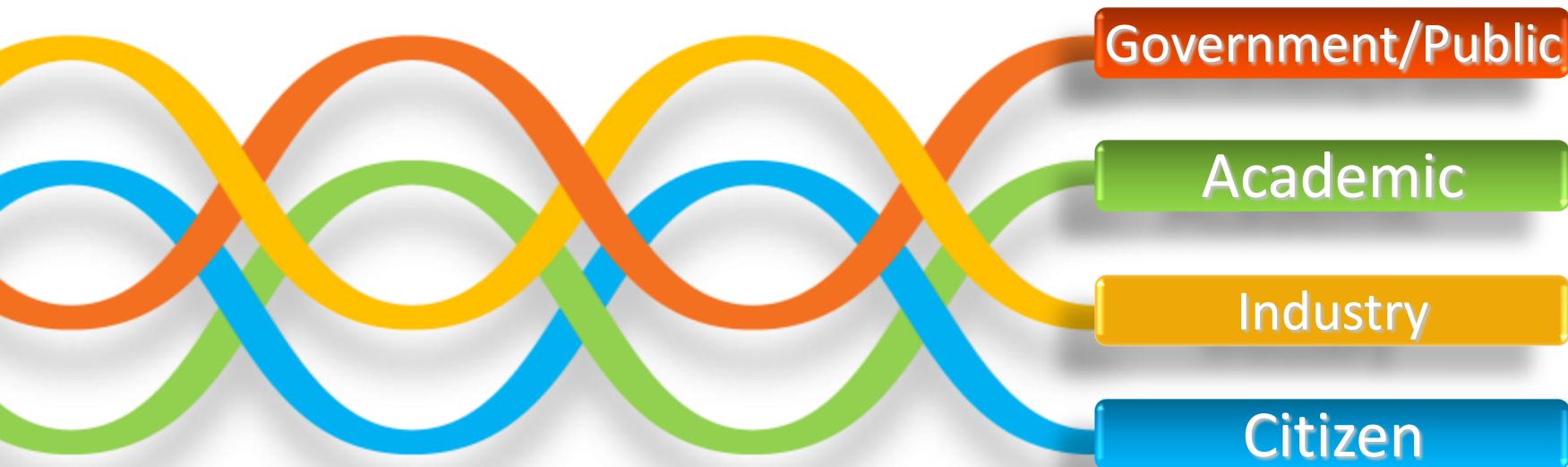
- Re-conceiving the intersection between society and corporate performance
- Find Win – Win outcomes
- Profit through solving big problems



<http://hbr.org/2011/01/the-big-idea-creating-shared-value>

Quadruple Helix Innovation

Government, Academia, Industry and Citizens collaborating together to drive structural changes far beyond the scope of any one organization could achieve on it's own



Intel Sustainable & Connected Cities Institute

*The Concept: driving the computing continuum
and innovating the city of the future*



leads
protocols

more
sustainable cities

Imperial
London

Collaboration

London's Challenges

Smart London Plan: Enable London to Adapt and Grow

Operations & environment

1) Make available the city's performance, consumption, and environmental data as open data

Planning and operations

4) By 2020 showcase a robust 3-D map of all London's underground assets, accessible and updatable in real-time by all asset owners and works planners.

Transport & Environment

2) By 2016, develop a robust quantitative understanding of the contributions that smart technical solutions and associated services can make to the management of London's transport and environmental infrastructures.

Environment

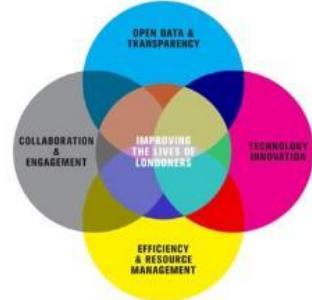
5) By 2020 ensure London has the best air quality of any major world city, which will require significant (c. 50%) reduction in emissions from London's transport sector.

Energy

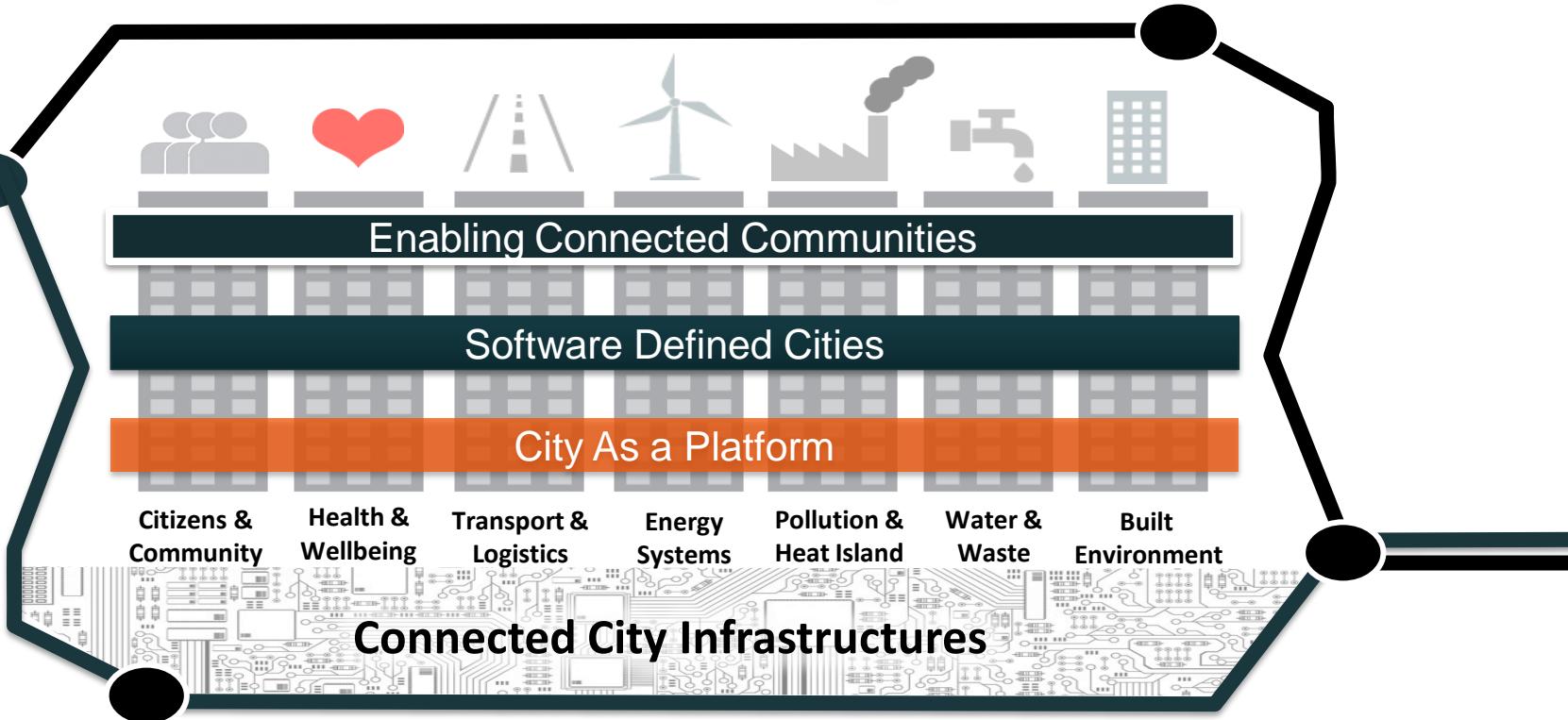
3) By 2020, stimulate smart grid services in London to restrict growth in peak electricity demand and associated infrastructure costs, with 10,000 MWh/annum of contracted supply and demand response.

Environment

6) Work towards a reduction of greenhouse gas emissions to reach 40% below 1990 levels by 2020.



Goal- Enable Sustainable City Services



Source: ICRI London

Living Labs

- Marrying technology with real world problems
- Collaboration & Ecosystem enablement
- Multi- disciplinary R&D Platform to continuously iterate, refine





LONDON: RESEARCH, 5 TEST BEDS, 150 GATEWAYS, DEC 2013 – DEC 2015

Intel, ICRI Cities & the Future Cities Catapult

Hyde Park Project

- Affordable Environmental
- Monitoring for Urban Green Spaces
- Water, Air & Soil Quality Noise & Light Pollution
- Public Engagement

Brixton Listening



Urban Behavior
Change & Walking

Elephant &



Measuring the
impact of photo
catalytic paint in
Built Environment

Tower Bridge



Measuring impact
of traffic idling
waiting for bridge
to close

Air Quality Enfield

- Air Quality Awareness
- Improving Traffic Flow
- Improving Local Environments
- Mini Holland Scheme

***Collaboration between Public
Bodies, Industry, Academia
and Citizens***

Hyde Park

Large heterogeneous
IA edge to cloud
demonstrator with the City
of London



Weather



Air Quality



Sound



Light



Water



Data Mule Area

Disruptive Innovation



Benefits
Cost
Size
Scale
Automation



 **Creating sustainable
ecosystems**
**Queen
Elizabeth
Olympic Park**

Source: ICRI London

Can we create a framework for analysis of “performance-in-use” for IoT technologies that enables the market to make decisions on investing in technology infrastructure.

“A Living Lab of experimental hardware integrated with Smart Park facilities to test IoT services in the park.”



Billion device challenge communication

Managing radio communications in densely-populated network of sensing devices.
[adaptive radio management to ensure reliability and enhance performance.]

"Adaptive radio protocols to opportunistically route messages adapting to the dynamic application requirements in terms of energy usage and the expected quality of service."

Source: ICRI London



Citizen engagement: sense making with citizens

How to explicitly bring citizens into the loop of Urban IoT and support them as data prosumers; both consuming available urban data for personal / community gain, and providing valuable new data in the form of citizen experiences and feedback.

"Roam.io: Novel (beyond screen) interaction stations that support two-way exchanging of knowledge – from citizen to the city, and from city to the citizen – to the benefit of both parties."

Source: ICRI London



Sustainable Connected Cities

Dublin



Intel Labs Europe



TRINITY COLLEGE DUBLIN
COLÁISTE NA TRÍONÓIDE

THE
UNIVERSITY
OF DUBLIN



Dublin City Council
Comhairle Cathrach Bhaile Átha Cliath



Dublin Living Lab

Driving the Limits of IoT through Research
in Complex Real World Urban Environments



Flood Monitoring



River & Tidal Levels
Hyper-local Rainfall Patterns
Early Warning Platform
Emergency Response

Smart Stadium



Abnormal Crowd Behaviour
Pitch Management
Sound Monitoring
Fan Engagement



EPA Public Engagement



Citizen Science & Design
Air Quality Awareness
Odour Monitoring
Water Quality



Urban IoT Business Models



IOT Capability Maturity Framework
Agile Data Driven Procurement
KPIs & RoI Evaluation Methods



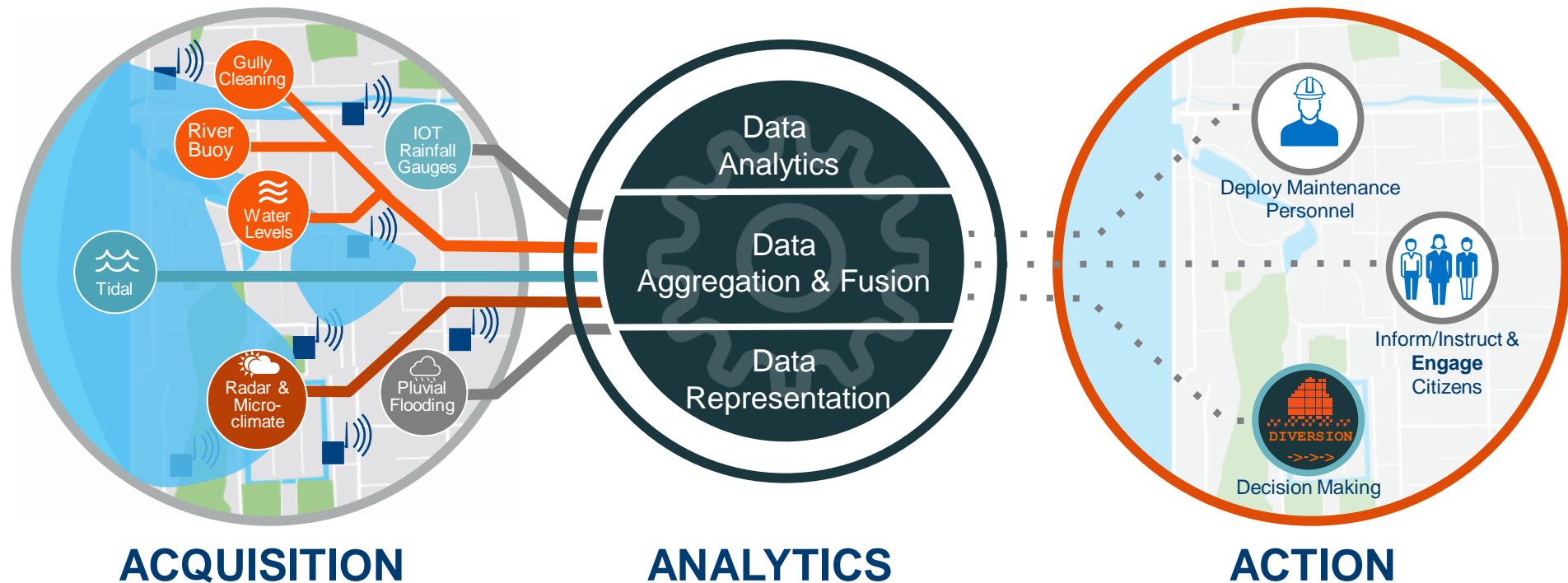
Extreme Weather – Flood Management

Save lives and reduce damage through heightened sensed awareness

Pervasive environmental sensors & IoT gateways at granular level

Advanced cloud based data processing & analytics

Customised, real-time intelligence & alerts for stakeholders



ACQUISITION

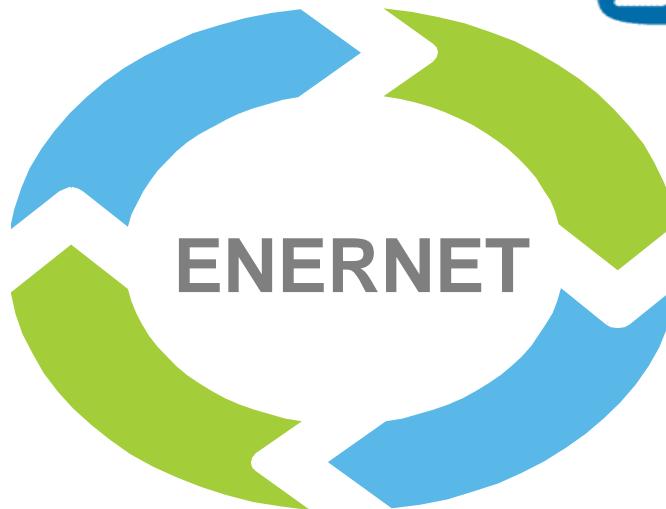
ANALYTICS

ACTION

Source: Dublin and Intel

ENERNET Transformation Project

Citizens

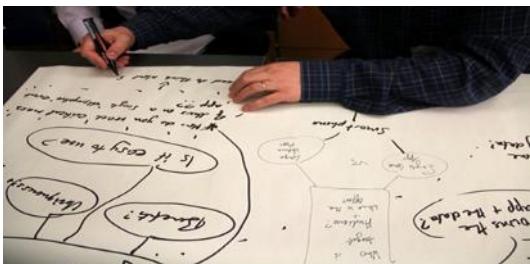


Co-Creation and Innovation Platforms

Field
Research

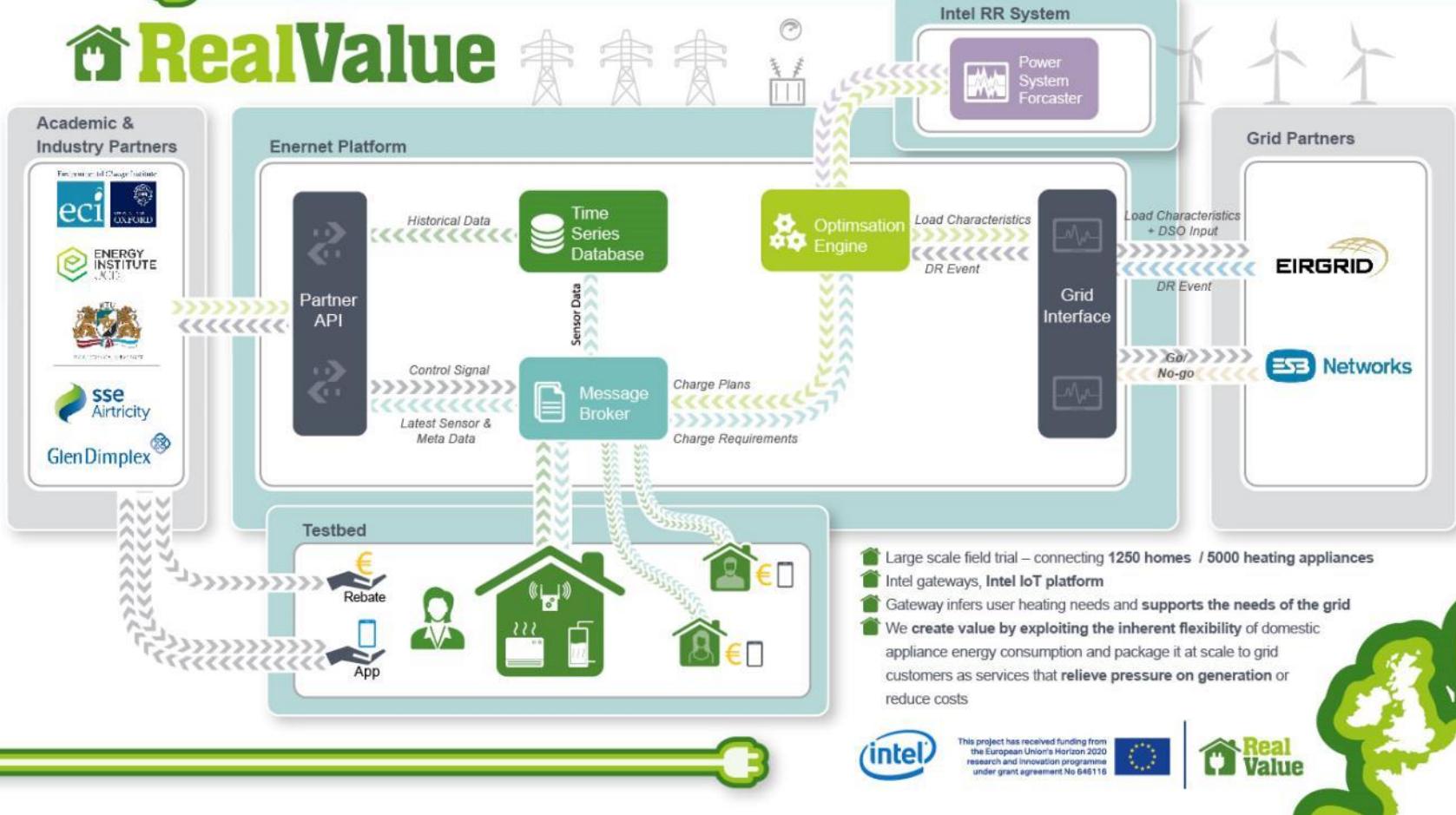


Co-Design



User
Experience

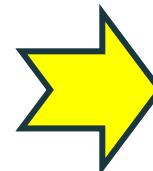
RealValue



The Rise of the User

User as “Research-Object”

- Observation and Surveying
- Prototype Development
- Testing (Usability, Feasibility, Market Testing)
- Piloting



User as Innovator

- Interactive User Feed-back
- Incremental User Innovation Ideas
- User Idea Generation
- User Community innovation
- Services by Definition “Co-creation”

Industry R&D Led

○ Consumers



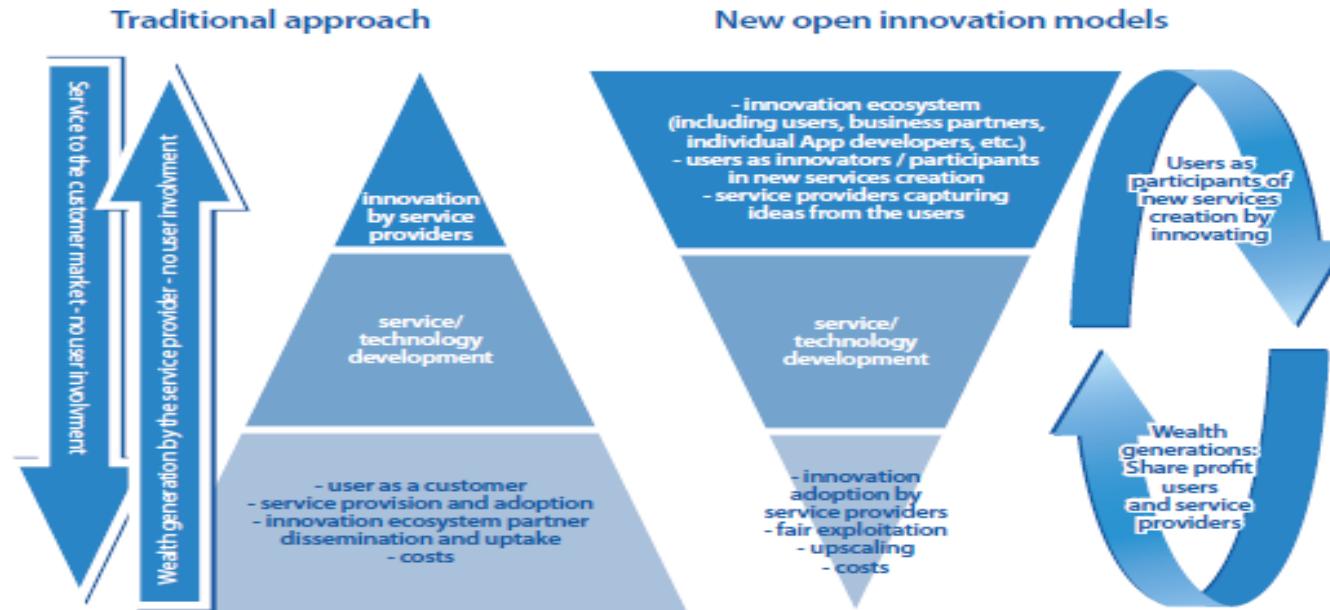
User/User Community Led

○ Contributors

○ Innovators

Source: IPTS; Jean Claude Burgelman, 2007

Open Innovation Business Models



Source: EU OISPG

Openness to Innovation

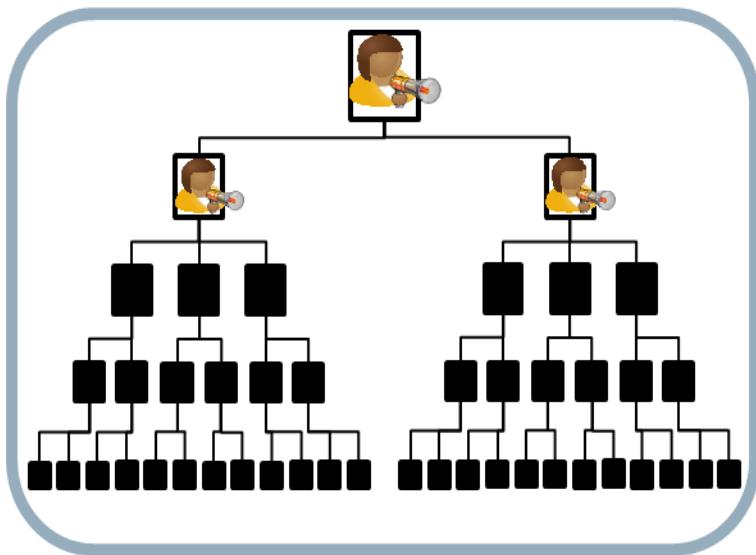


92%

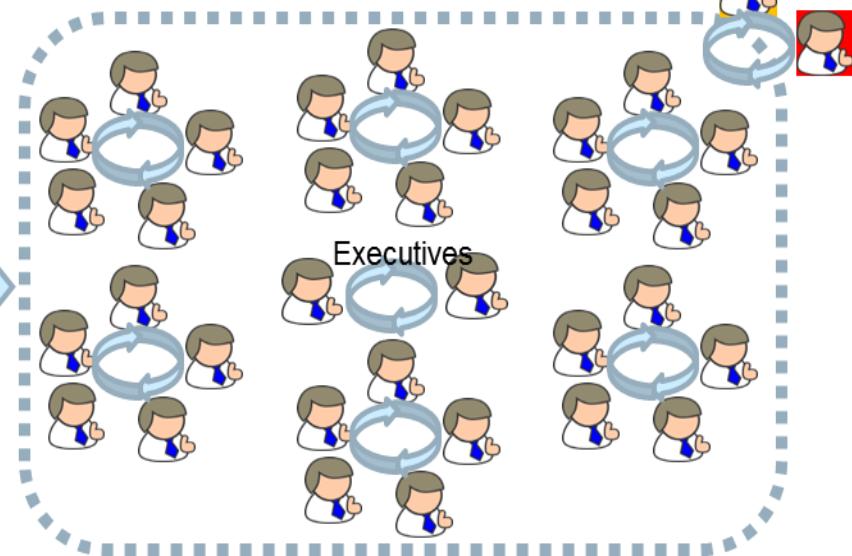
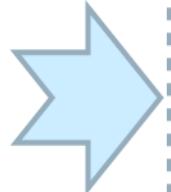
5. Would you like to see new technologies tested around the city and be part of the experiment?

		Response Percent	Response Count
	Yes	82.8%	138
	No	2.0%	3
	Don't know	5.4%	9
answered question		140	
skipped question			3

Agile Organizations and Agile Methods



- Management Hierarchies
- 'Command and Control'
- Organisational 'Silos'
- Protecting ones own turf.....



- Small teams
- Devolved decision making
- Specialist shared teams
- Mutually supportive.....

Agile Methods: Iterative Development and Testing between Dublin and London



Source: Intel



**Transform the way
public and private
sector organizations
manage IT for value
and innovation**



IVI Consortium Members

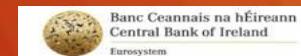
Steering Patrons



Patrons



Contributors



Associates





Consortium of **90+** organisations



**EUR14+mln
(USD18+mln)**
funding to date



100,000+ hours of
member SME
contribution
towards IT-CMF



500+ contributors



4,000+ training
days, **1,500+**
learners, **800+**
qualifications



500+ formal
assessments, plus
'000s of informal ones



IEEE **200+ publications**
Advancing Technology & whitepapers
for Humanity



**50+ CIO events (f2f,
virtual)**

IVI QUICK-HITS



**20+ central staff
members**

Open Innovation 2.0: It is all about culture!

- The technology is ready.. Are we?

