



SMART CITIES AND THE FUTURE INTERNET

Innovation for All within Smart Environments

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URENIO Research, Aristotle University

Students Spring Symposium, CITY, 18 May 2012

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4. Innovation-for-All: BOWE systems

The Urban and Regional Innovation Research is a University Lab of Aristotle University of Thessaloniki for the promotion of applied research and the supply of technological services in the field of **innovation ecosystems** and **intelligent cities**.

URENIO is mainly involved in competitive projects of the European R&D framework programmes (FP), the **CIP**, the innovative actions of the **ERDF**, and the programmes of **Territorial Cooperation**.

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Intelligent City Strategies

Watch: Intelligent Cities – Smart Cities – Innovation Ecosystems

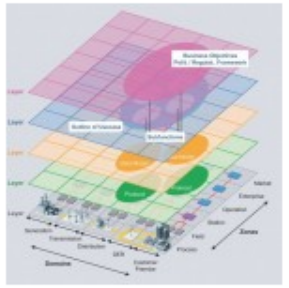
N.Y.C. has Fastest-Growing Tech Industry in U.S



Riding a wave of start-ups, New York has emerged a national leader in fields that leverage the Internet and mobile technologies—a development that has provided a key economic boost and left the city well positioned for future tech growth. Continue reading...

Posted at 14 May 2012 in [Virtual Clusters / Digital Ecosystems](#)

A European Architecture Model for Smart Grids



With the Smart Grid Architecture Model (SGAM), Siemens Infrastructure & Cities has developed a method whereby power supply companies and industry can display aspects of smart grid systems. The model can be used for the visualization, validation, and configuration of smart grid projects, and also for standardization within smart grids. Continue reading...

Posted at 14 May 2012 in [Intelligent / Smart Cities Solutions](#)

Smart City Market Growing Fast




According to a new market research report, the Smart City market is growing at an amazing pace, at 14.2% annual growth rate, and it is expected to reach more than 1\$ trillion in a few years. Continue reading...

Posted at 13 May 2012 in [Intelligent Cities / Smart Cities](#)


Vienna: A City on the Cutting Edge of the “Smart City” Movement?

“Smart cities” is the urban buzz phrase of



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 urenio.org
 Information about European funded regional and urban development, innovation, and planning tool... More
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Intelligent / Smart Cities
Open Source Community



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An Open Source Community for Intelligent / Smart Cities

ICOS website supports a community offering open source solutions in the field of intelligent cities / smart cities. The community will serve to showcase existing projects, provide a forum for discussing projects and processes, and guide developers' groups in open source creation, contribution, and release.

+ Submit your Application

or stay informed



Featured open source applications for:

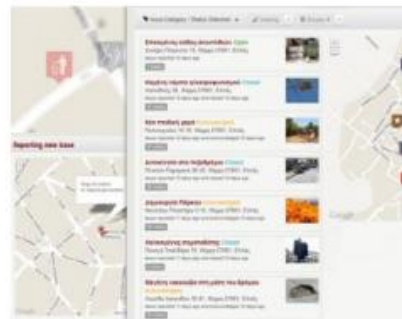
Innovation Economy of Cities



Virtual City Market

Empowers the city local marketplace by bringing together customers and merchants.

City Infrastructure – Quality



Improve my City

Improve my city allows citizens to report, vote and track non-emergency issues.

City Governance



OpenBlock

OpenBlock is a hyper-local news & data platform.

About The Intelligent Cities Open Source Community Why and how to join

Who can participate

ICOS is addressed to anyone interested on

Benefits

The continuous evolution of web technologies

How to contribute

Developers can upload open source applications

Greek **BENCHMARKING** Centre

Comparative evaluation for enterprises and institutions

[Home](#) [The Centre](#) [The technique](#) [For enterprises](#) [For Regions](#)



The Centre

The Greek Benchmarking Center is an activity of URENIO research unit, which aims at popularizing Benchmarking in corporations and organizations. [More >](#)

Other Organizations

DTI - BenchmarkIndex

The Department of Trade and Industry in Great Britain has developed the BenchmarkIndex, a tool for the application of Benchmarking in businesses. BenchmarkIndex service is provided in Greece by the Greek Benchmarking Center.

The technique of Benchmarking



It involves the comparative evaluation of technologies, production processes and products of a corporation /organization, compared to the leading organizations in the field. Benchmarking is achieved through carefully chosen indicators and allows the corporation to reorganize itself successfully, via an understanding of its strengths and weaknesses. [More >](#)

Target group

Enterprises

On-line applications for company benchmarking:

- [Manufacturing](#)
- [Tourism](#)
- [Information Technology](#)

Regions

Monitoring of regional performance in specific areas. [More >](#)

Certified Consultants

Certified Consultants

The benchmarking service for corporations is provided by a network of certified consultants.

See the [network of certified consultants](#)

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Smart Cities - FIREBALL White Paper

Call for Papers: Special Issue
Smart Applications for Smart Cities:
New Approaches to Innovation

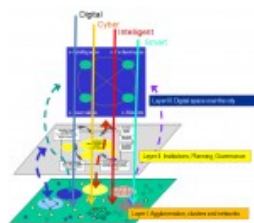


On-line Tools

- Benchmarking
- Digital Research Centre

Watch: Intelligent Cities – Smart Cities – Innovation Ecosystems

Publications on Intelligent Cities / Smart Cities



Books, Special Issues of academic journals, articles, and conference presentations dealing with theories, concepts, strategies, and applications of intelligent cities and smart cities.

BOOKS

Komninos N. (2008) *Intelligent Cities and Globalisation of Innovation Networks*, London and New York, Routledge.

Link: [Routledge](#)

Komninos N. (2002) *Intelligent Cities: Innovation, knowledge systems and digital spaces*, London and New York, Taylor and Francis, Spon Press.

Link: [Taylor and Francis](#)

JOURNAL SPECIAL ISSUES

Komninos, N. (ed.) (2009) "Intelligent Clusters, Communities and Cities: Enhancing innovation with virtual environments and embedded systems", *International Journal of Innovation and Regional Development*, Vol.1, No4.

Link: [IJIRD](#), [Inderscience](#)

Komninos, N. and Schaffers, H. (eds) (2012) "Smart Cities and the Future Internet in Europe", *Journal of the Knowledge Economy*, Vol.3, No 2.

Link: [JKEC](#), [Springer](#)

ARTICLES

Komninos, N., and Tsarchopoulos, P. (2012) "Towards Intelligent Thessaloniki: from an agglomeration of apps to smart districts", *Journal of Knowledge Economy*, [Springer Online First](#).

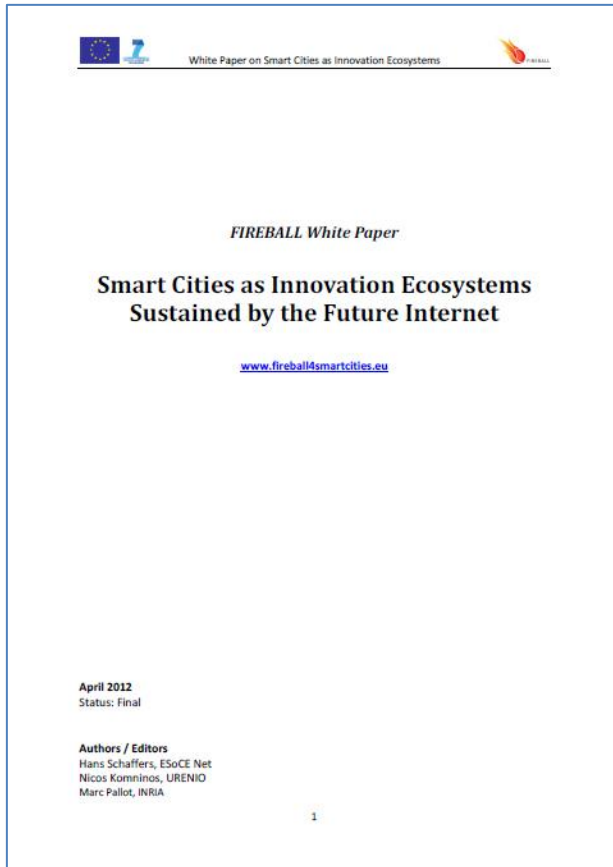
Komninos, N., Dallet, M., and Schaffers, H. (2012) "Special Issues on



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 - Business Models
 - IntelCities Measurement

1. Intelligent Cities and the Future Internet



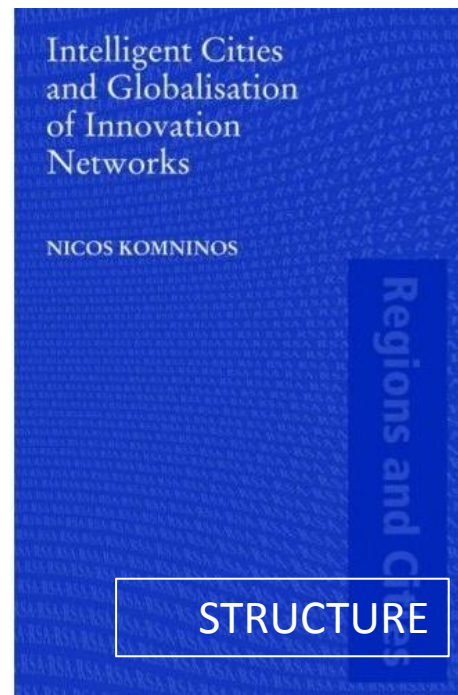
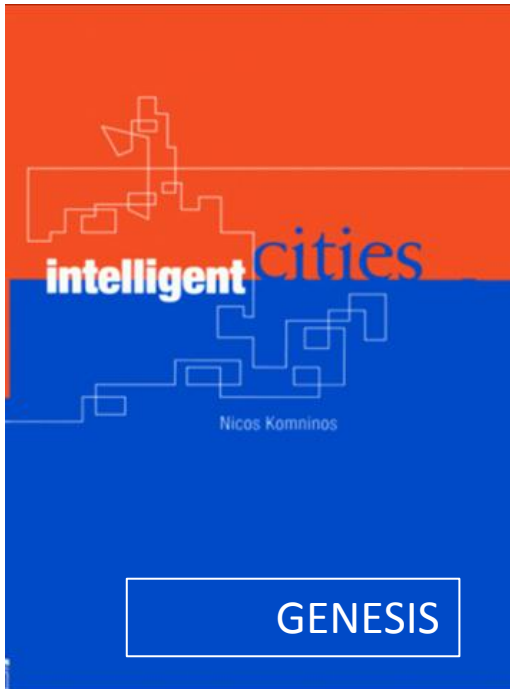
The smart city concept is multi-dimensional. It is a future scenario (what to achieve), even more it is an urban development strategy (how to achieve it). It focuses on how (Internet-related) technologies enhance the lives of citizens.

This should not be interpreted as drawing the smart city technology scenario. Rather, the smart city is how citizens are **shaping** the city in using this technology, and how citizens are enabled to do so. The smart city is about how **people are empowered**, through using technology, for contributing to urban change and realizing their ambitions. The smart city provides the conditions and resources for change. In this sense, the smart city is an urban laboratory, an **urban innovation ecosystem**, a living lab, an agent of change.

Much less do we see a smart city in terms of a Ranking. This ranking is a moment in time, a superficial result of underlying changes, not the mechanism of transformation. The smart city is the engine of transformation, a generator of solutions for wicked problems, it is how the city is behaving smart.”

<http://www.urenio.org/2012/04/23/smart-cities-fireball-white-paper/>

Intelligent Cities: Internet supported Innovation Ecosystems



● Komninos, N. (2002) *Intelligent cities: Innovation, knowledge systems and digital spaces*, London and New York: Taylor and Francis.

● Komninos, N. (2008) *Intelligent cities and globalisation of innovation networks*, London and New York: Routledge.

Part I: Clusters: Innovation as Spatial Proximity.

Chapter 2. Districts and Technopoles in Europe. Chapter 3. Technology Poles in the Less Favoured Regions of Europe. Chapter 4. The Weak Link.

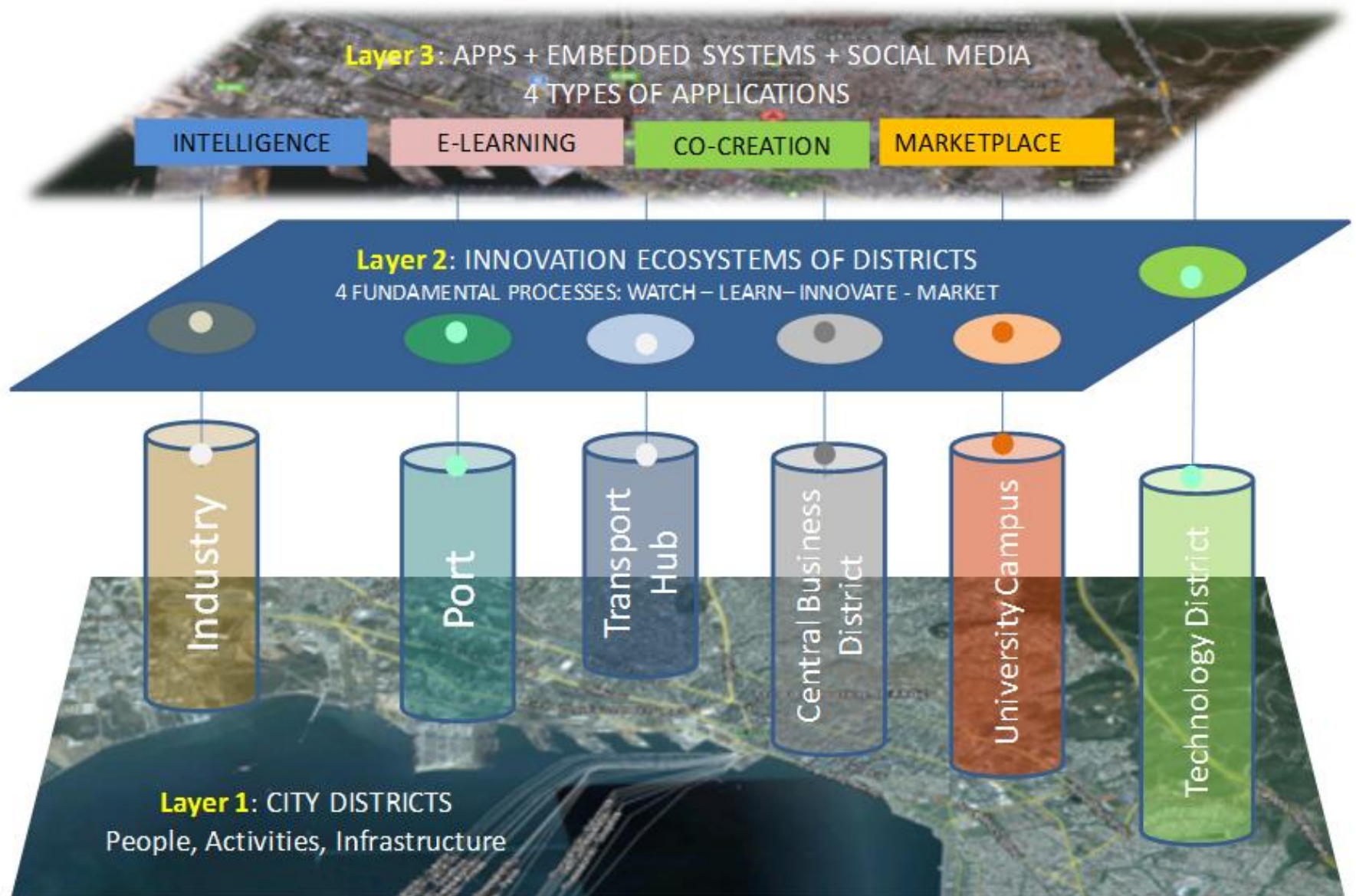
Part II: Innovating Regions: Innovation as an Institution.

Chapter 5. Regional Innovation Strategies in Europe. Chapter 6. Regional Versus National Innovation Strategies. Chapter 7. Technology Intelligence in Innovating Regions.

Part III: Intelligent Cities: Islands of Innovation Meet the Digital World.

Chapter 8. Intelligent Cities: Islands of Innovation Become Digital. Chapter 9. Real-Virtual Technopoles. Chapter 10. Real-Virtual Regional Innovation Systems

Smart city: An agglomeration of Urban Innovation Ecosystems



Smart City: Digital Spaces - Applications Domains



Innovation Economy

- City sectors: Manufacturing, commerce, business services, financial services, education, research, health, tourism, primary sector activities
- Clusters: Various groups of interconnected organisations and activities specific to the city



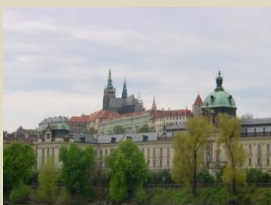
City Infrastructure – Utilities

- Mobility, transport and parking
- Energy networks, saving, smart grid
- Water networks management and saving
- Broadband, wired and wireless



Living in the city

- Quality of life
- Social and digital divides
- Environment
- Social care services
- Safety and security



City Governance

- Decision making / citizens participation / democracy
- Government services to citizens
- City planning / city management
- Monitoring and benchmarking

Embedded spatial intelligence: Sensors Networks / IoT

04 A UNIVERSE OF APPLICATIONS FOR GETTING INSPIRED...	05 SMART CITIES	06 SMART ENVIRONMENT	07 SMART WATER	08 SMART METERING	09 SECURITY & EMERGENCIES
10 RETAIL	11 LOGISTICS	12 INDUSTRIAL CONTROL	13 SMART AGRICULTURE	14 SMART ANIMAL FARMING	15 DOMOTIC & HOME AUTOMATION
16 eHEALTH	17 APPLICATIONS / SENSOR BOARD / SENSORS INTEGRATED	23 THE LIBELIUM EXPERIENCE: THINK, DEVELOP, GO!	27 TECHNOLOGY: WASPMOTE & MESHLIUM	33 LIBELIUM'S VALUE CHAIN	34 LIBELIUM'S CASE STUDIES

Sensor networks allow monitoring of any environment that seems inaccessible and hidden. They consist of a group of small electronic devices that capture data from outside via sensors, processes these data, and generate and send alerts.

Cloud: Economies of scale and scope

The Cloud Computing Stratosphere

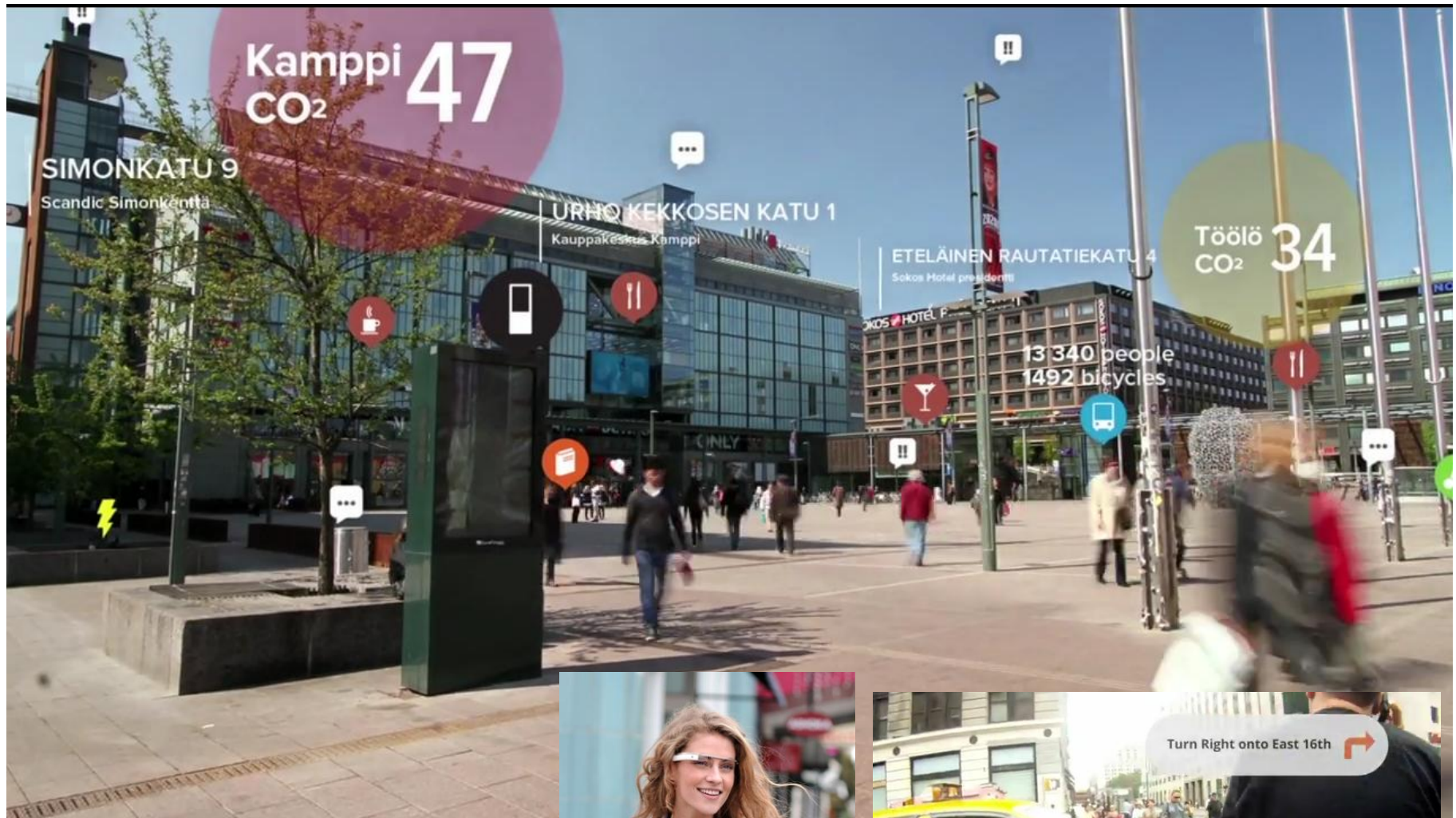
There is an ever-growing number of companies providing "cloud-based" services for businesses. These range from communications and social applications to deployment platforms that form backbone of a company's infrastructure. As new offerings emerge, customers, marketers and the industry at large may each have a different view of the strata. Here is one take on where the major players fit into the shifting cloud atmosphere.

HORN GROUP
horngroup.com



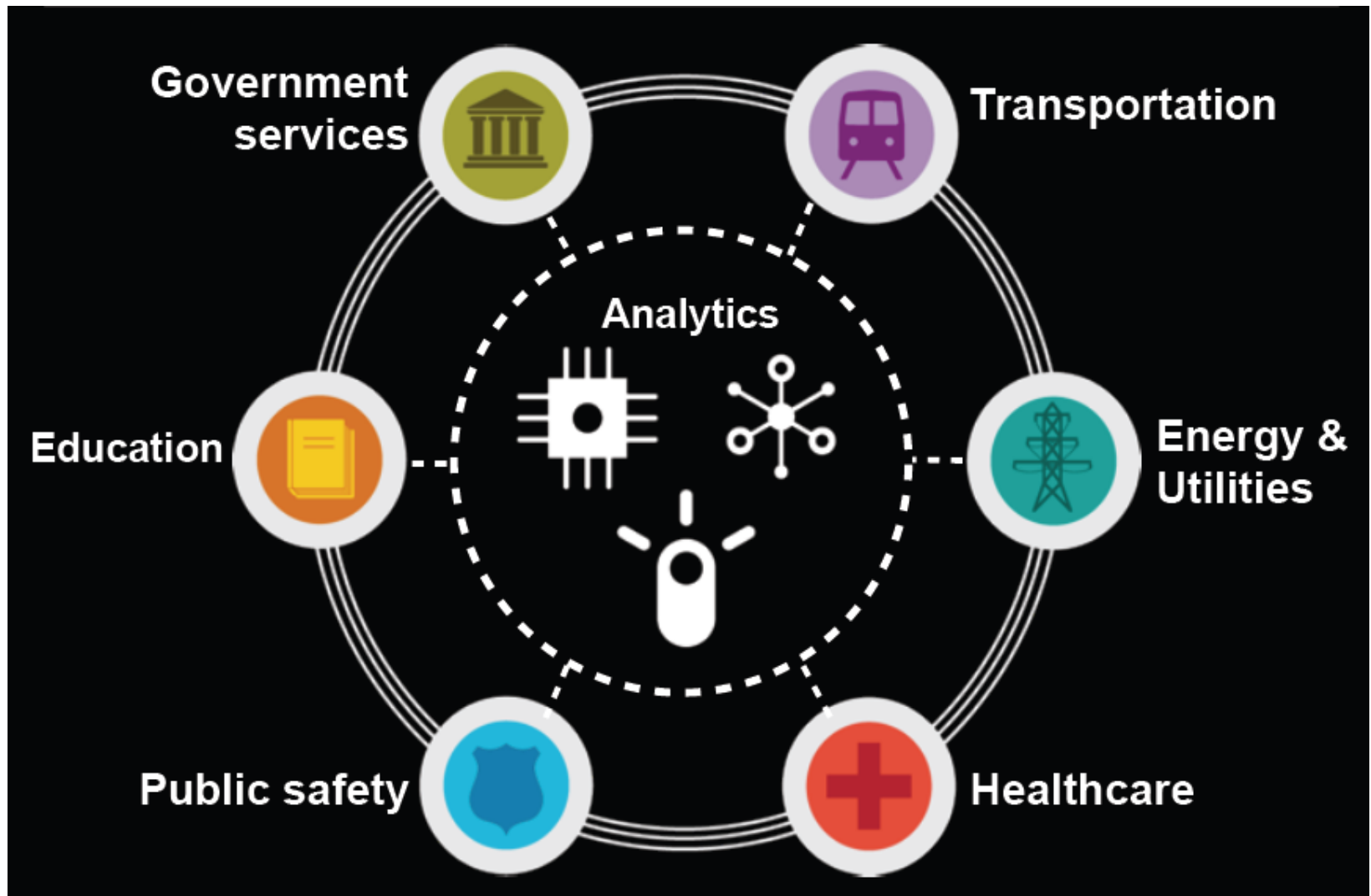
Source:
<https://www.readwriteweb.com/cloud/2011/04/the-cloud-stratosphere-infogra.php>

Augmented reality



Interactive services everywhere
Source: Urbanscale

IBM smart cities: Interconnection – Instrumentation - Intelligence



IBM Smart City concept

Creating a Smarter Planet, One Collaboration at a Time

Dr. Matthias Kaiserswerth, Vice President and Director of IBM Research - Zurich

CISCO: Urban Operation System

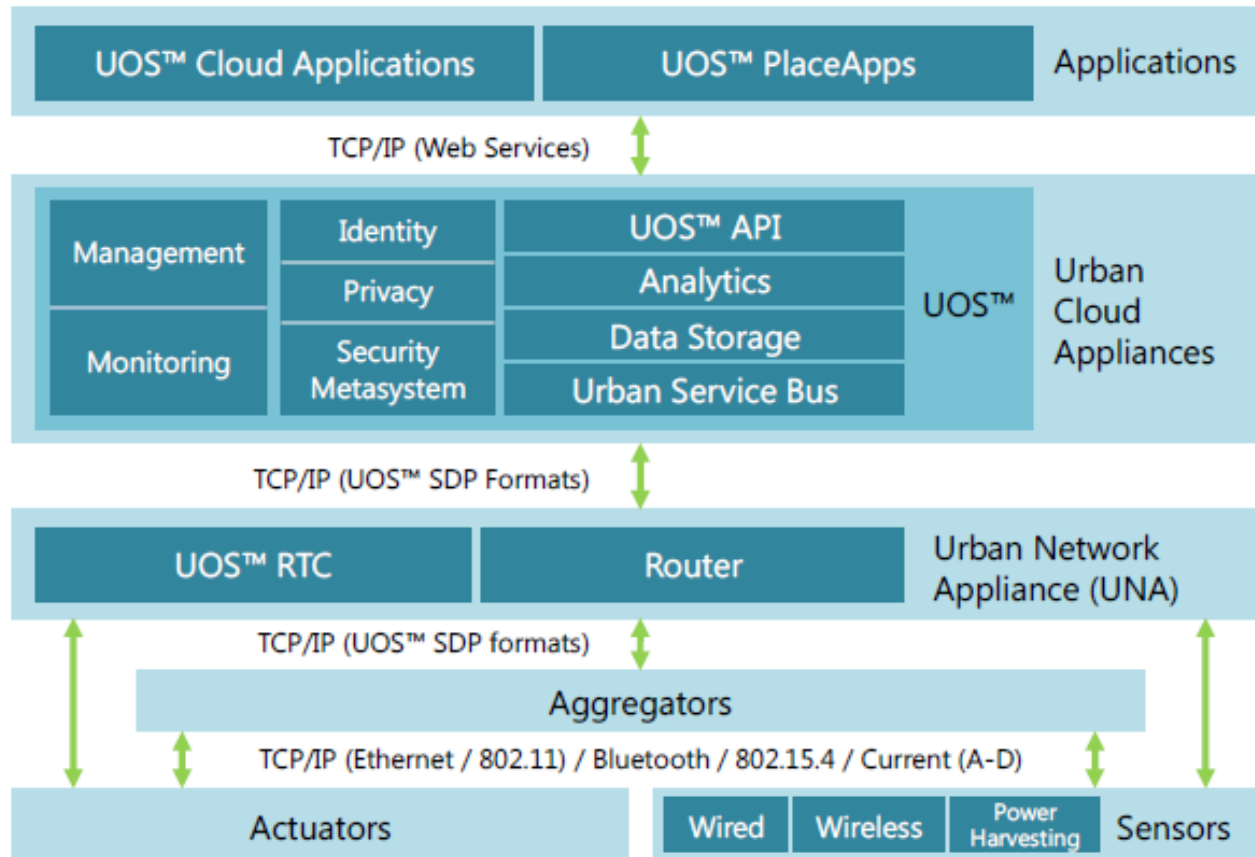


CISCO Intelligent X

Source: IDC, 2011



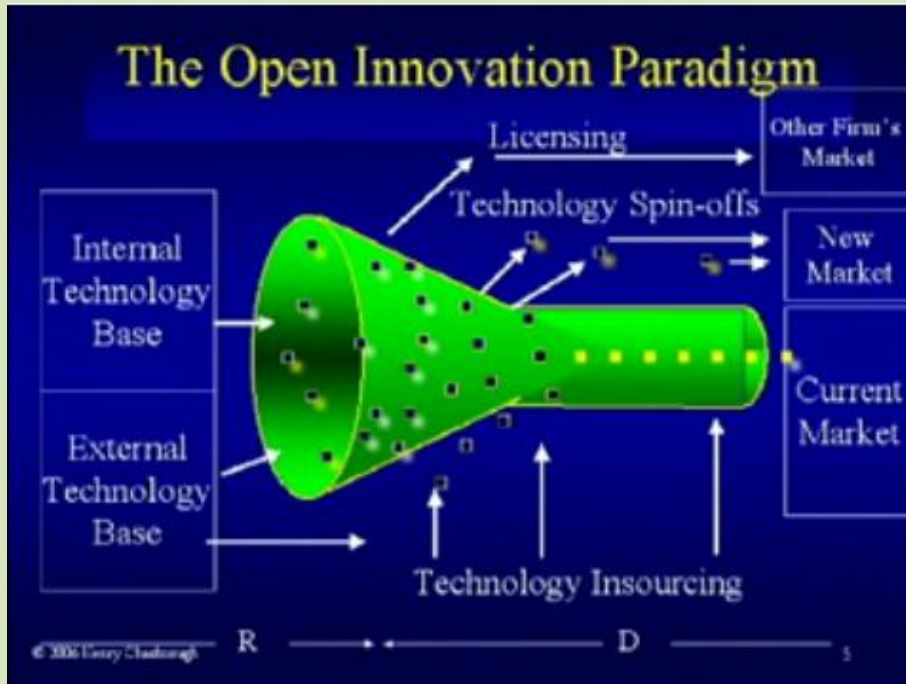
UOS™ high-level architecture



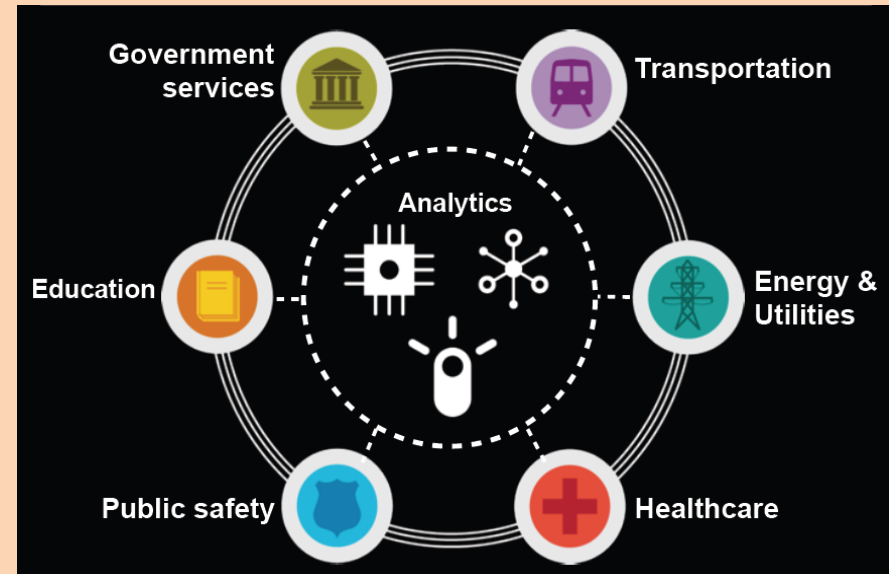
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Smart cities: Connecting two stories – HOW???

INNOVATION ECOSYSTEMS supported by INTERNET TECHNOLOGIES



EMBED INTERNET TECHNOLOGIES into CITIES



Urban Operating System (UOS™)

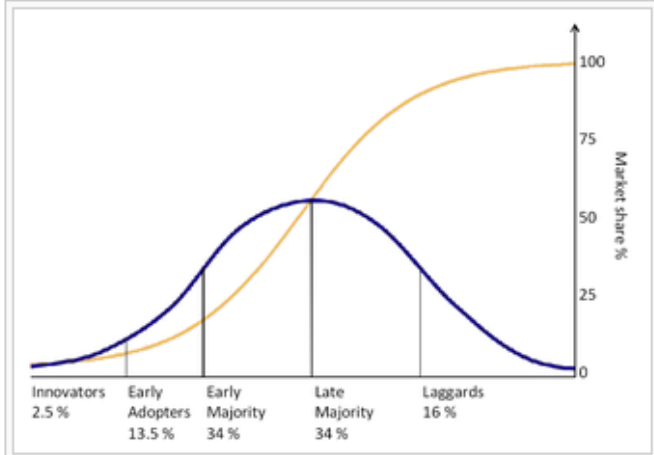
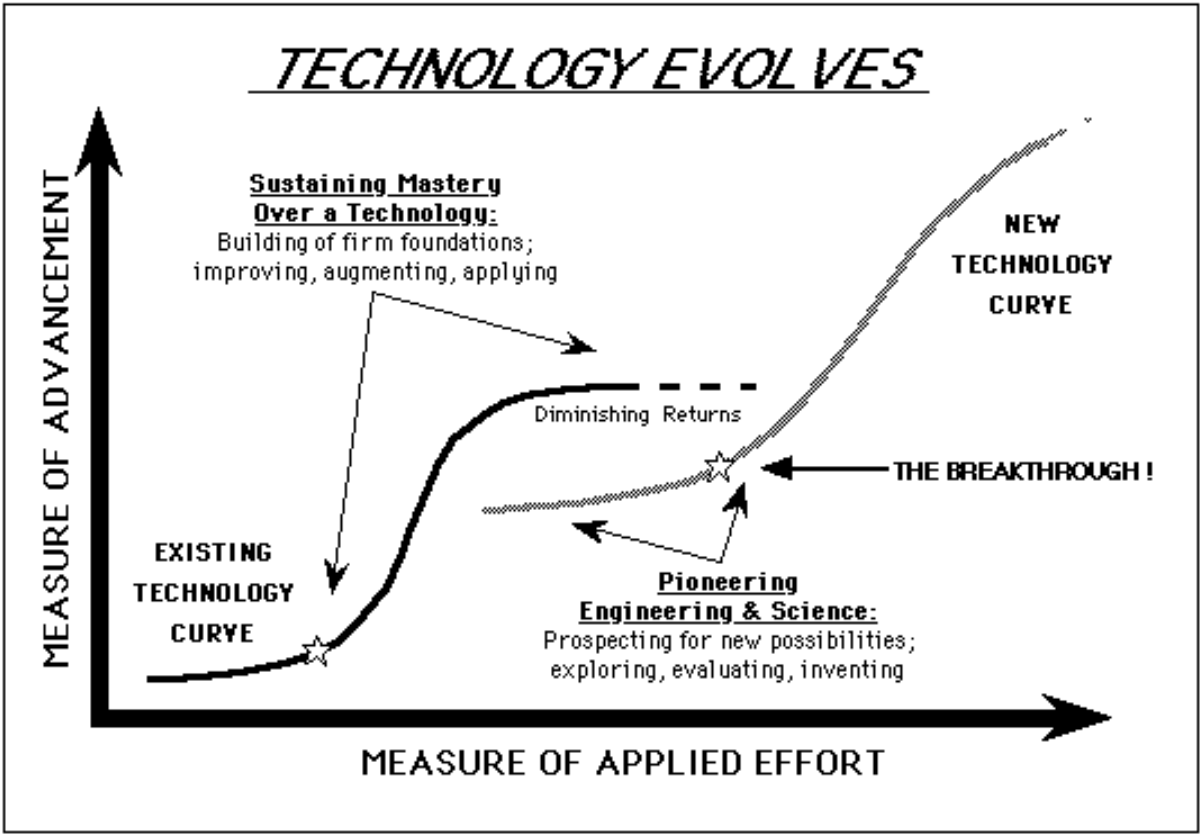
Living PlanIT's Urban Operating System (UOS) provides a unified platform for the instrumentation, control, and optimization of urban environments, based on Cisco network and data center hardware. UOS software allows a Cisco ISR router to supplant traditional building controllers, which are normally single-purpose devices. The building benefits from a shared infrastructure that supports deep sensing, responsive real-time control, and high-speed flexible networking.

A wide range of sensors and actuators, supplied by Living PlanIT and Cisco partners, communicate over IPv6 and allow a complete picture of building state, usage, and operations to be continually maintained, allowing constant optimization of energy, resources, environment, and occupant support and convenience systems. The UOS provides near-real-time communication of events across an entire city and beyond, meeting multi-level control needs via applications such as energy generation / storage / distribution / demand shaping and traffic and transportation management.

2. Current Trends: Towards glocal and hybrid innovation ecosystems

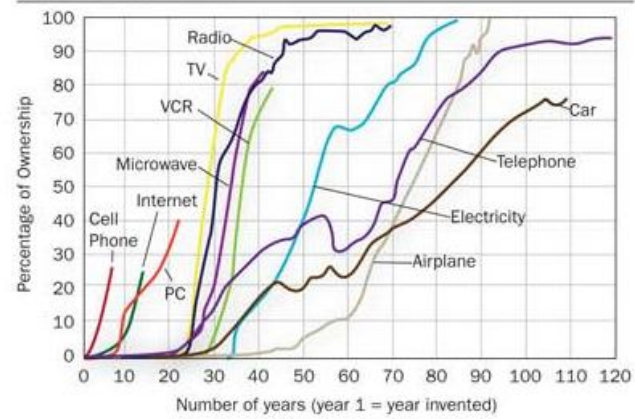
INNOVATION

TECHNOLOGY EVOLVES



The diffusion of innovations according to Rogers. With successive groups of consumers adopting the new technology (shown in blue), its market share (yellow) will eventually reach the saturation level.

Technology Adoption



Source: Forbes Magazine

THE LINEAR INNOVATION MODEL

Schumpeter's theory of innovation

- Mark I model (1934): Introduced the distinction between 'invention-discovery' and 'innovation-commercialization'. The separation of invention from innovation characterized the typical innovation model of the late nineteenth century, in which independent inventors provided new product and process inputs to entrepreneurial firms.
- Mark II model (1943): Schumpeter became aware of the rise of in-house R&D departments in large companies. Innovation was seen envisaged as a more routinised process within large companies.



Source: <http://www.affinnova.com/blog/bid/65223/The-Innovation-Funnel-Bringing-Ideas-To-Life>

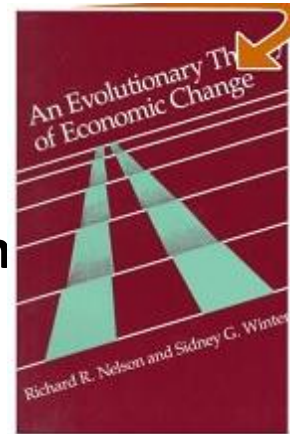
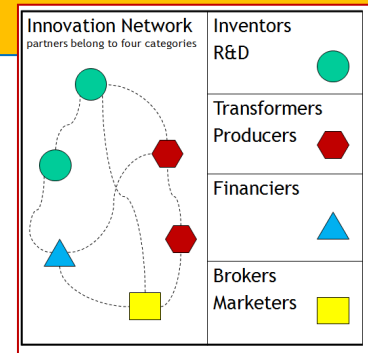
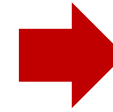
SYSTEMS OF INNOVATION (1979-1995)

● Griliches (1979) innovation input-output model :

$$\ln PATs = \beta_1 \ln IR\&Ds + \beta_2 \ln UR\&Ds + \beta_3 \ln Cs + POPs + \varepsilon$$

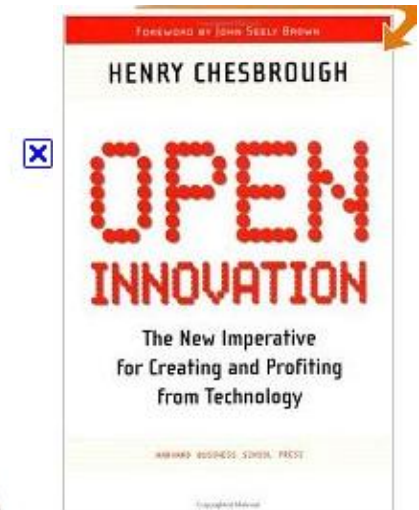
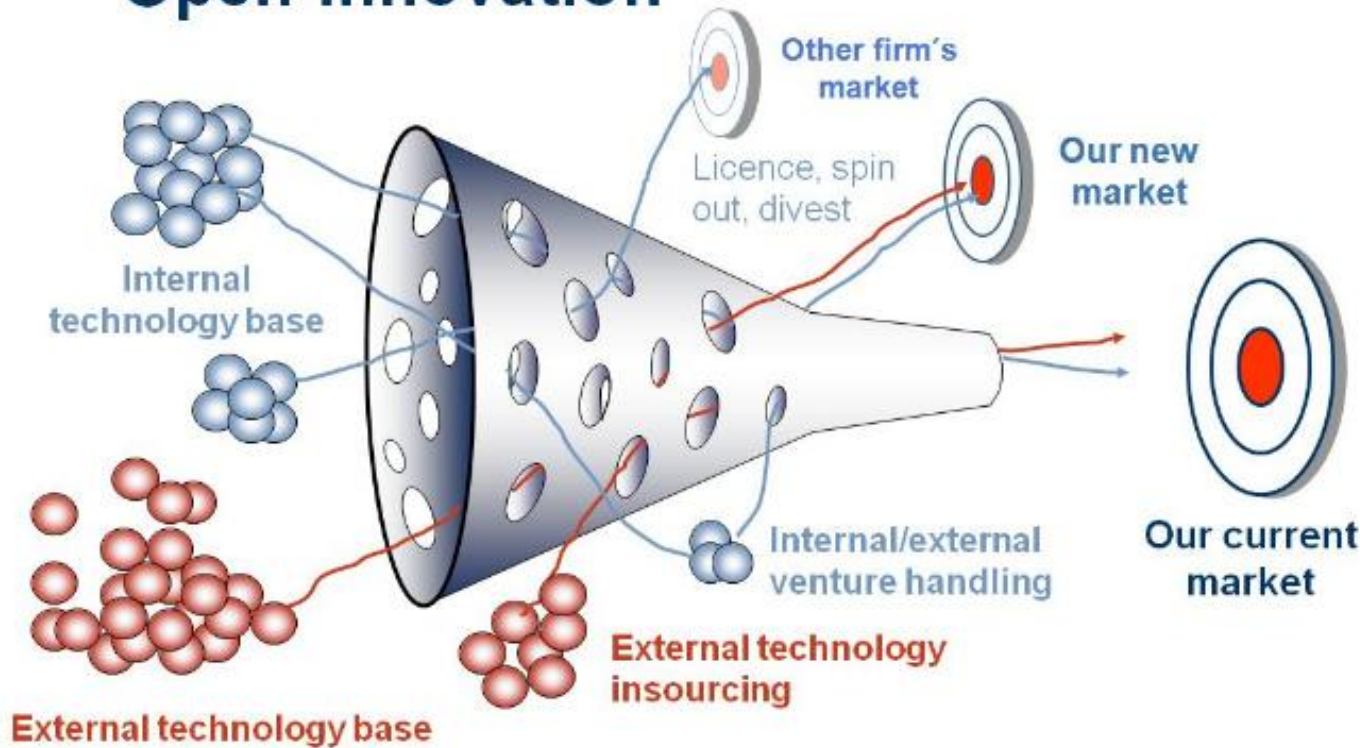
● Nelson and Winters (1982) evolutionary metaphor: (1) Companies follow organizational routines, (2) Innovation starts by search activities, which challenge established routines leading their modification and/or replacement, (3) **The modification of routines is influenced by an external selection environment**, which is formed by organizations that affect the transformation of knowledge to products (consulting, marketing, finance).

● 'National Innovation Systems' Freeman (1987): 'The rate of technological change in any country ... does not depend simply on the scale of their R&D... The national system of innovation may enable a country with limited resources.... to make progress through appropriate combination of imported technology and local adaptation and improvement.'



OPEN INNOVATION (2003)

Open innovation



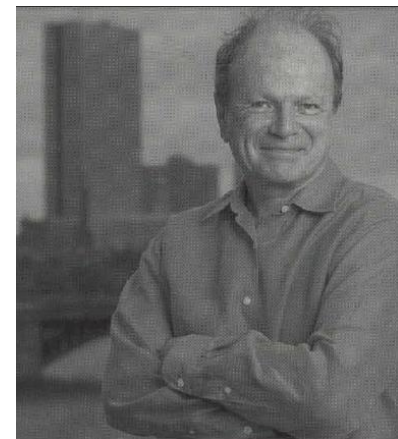
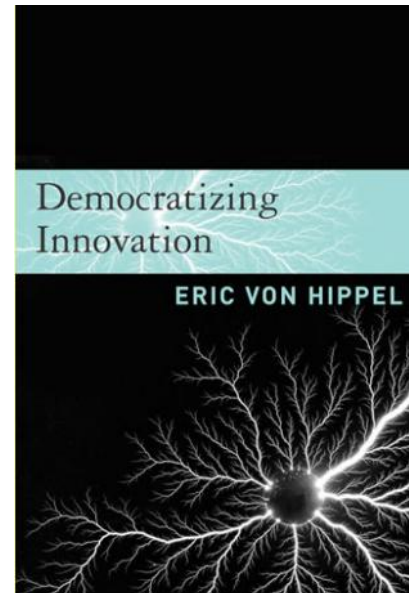
Stolen with pride from Prof Henry Chesbrough UC Berkeley, *Open Innovation: Renewing Growth from Industrial R&D*, 10th Annual Innovation Convergence, Minneapolis Sept 27, 2004



DEMOCRATIZING INNOVATION (2005)

Free copy <http://web.mit.edu/evhippel/www-old/democ1.htm>

Innovation is rapidly becoming democratized. Users, aided by improvements in computer and communications technology, increasingly can develop their own new products and services. These innovating users—both individuals and firms—often freely share their innovations with others, creating user-innovation communities and a rich intellectual commons. In *Democratizing Innovation*, Eric von Hippel looks closely at this emerging system of user-centered innovation. He explains why and when users find it profitable to develop new products and services for themselves, and why it often pays users to reveal their innovations freely for the use of all.





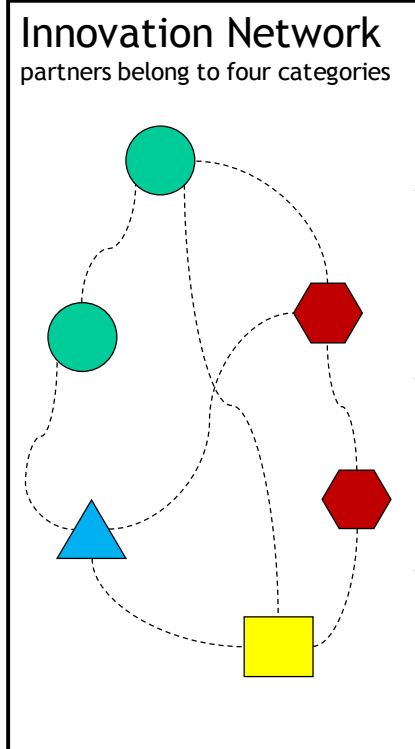
The Open Innovation Marketplace





The Open Innovation Marketplace, published in the Spring of 2011, introduces groundbreaking strategies and models for leveraging the world's best innovation sources to drive far more value from new products, services, and business models – and do it with far less risk. Drawing on their experience building InnoCentive, authors Alph Bingham and Dwayne Spradlin show how to dramatically increase the flow of high-value innovations your organization can discover—and deliver.

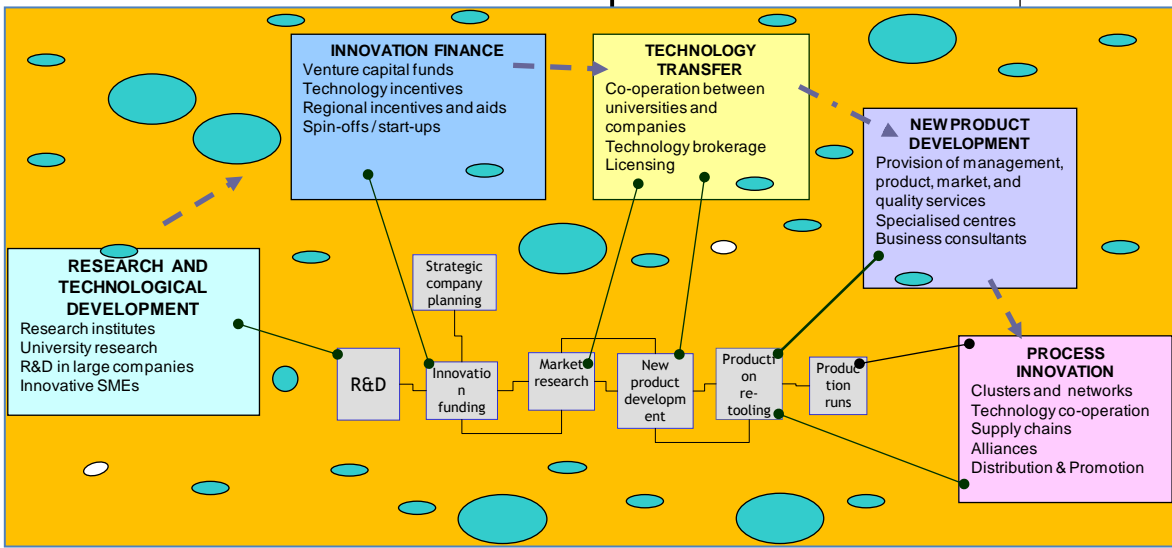
Through detailed case studies, from leading innovators such as Procter & Gamble, Eli Lilly, and NASA, Bingham and Spradlin demonstrate open innovation at work in pharmaceuticals, consumer products, software, aeronautics, and beyond. They show how to construct Challenges that focus innovation on critical business needs, can attract breakthrough strategies and solutions, and how to transform your enterprise to do it over and over again.

Alpheus Bingham, Innocentive founder &
Dwayne Spradlin, InnoCentive CEO

INNOVATION ECOSYSTEMS become GLOCAL + HYBRID

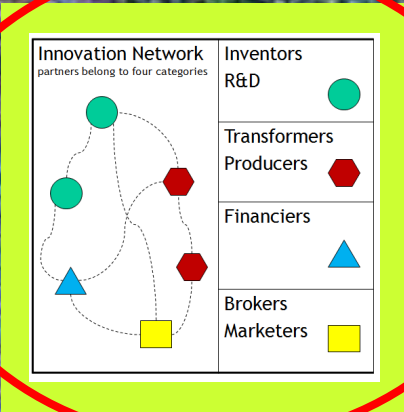
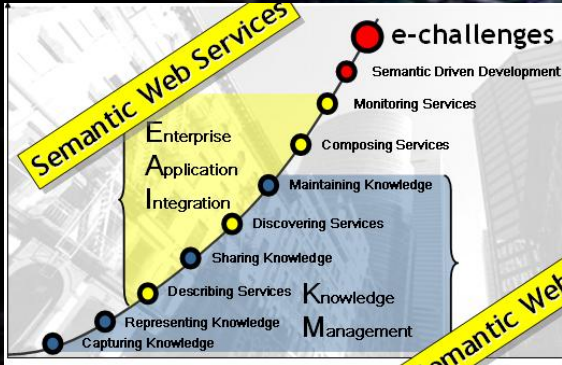


Inventors		Intellectual powerhouses (like MIT, Oxford, HP Labs) that conduct basic research and design products and services that result in patentable inventions.
Transformers		Multifunction production and marketing companies (like Dell, IBM, Infosys) that convert inputs from Inventors and other Transformers into innovations.
Financiers		Funding sources (VCs, Vulcan, ICICI Bank) for Innovation Network service providers especially Inventors and start up Transformers.
Brokers		Market makers (yet2.com, InnoCentive) that find and connect Innovation Network service providers, buying and selling or enabling service delivery.



3. Innovation Ecosystems into the Future Internet

INNOVATION ECOSYSTEMS into the INTERNET: micro NETWORKS meet digital mega NETWORKS



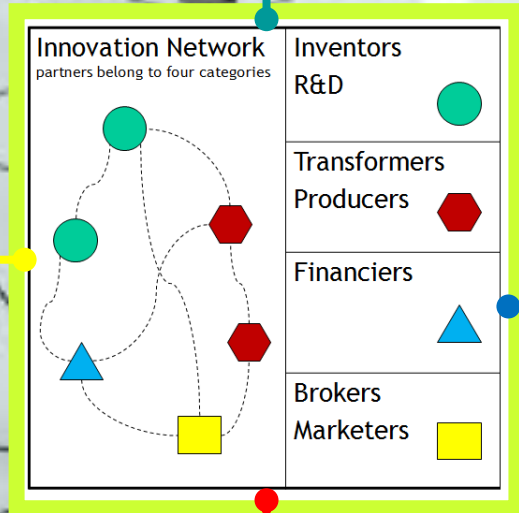
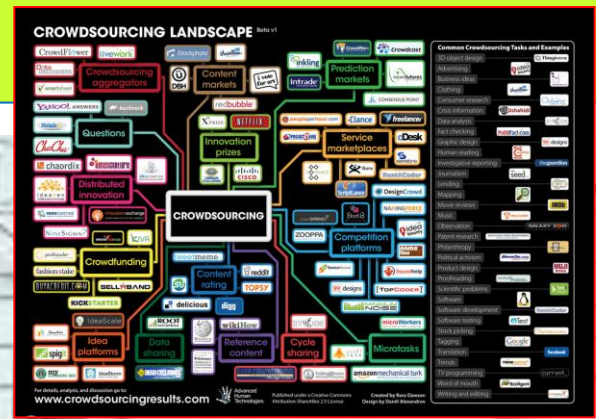
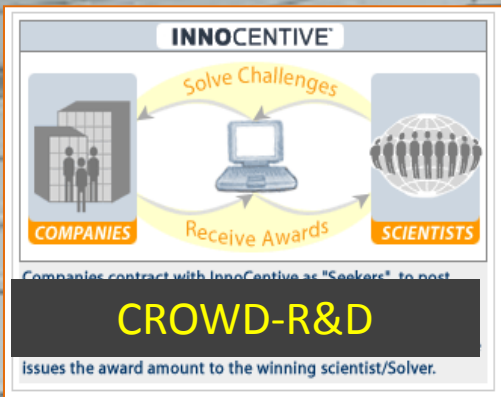
**QR CODES –
AUGMENTED REALITY**



INTERNET OF THINGS

1. ECOSYSTEMS DEVELOP HUNDREDS OF NODES

The power of crowdsourcing!



CrowdFlower

The world's largest enterprise crowdsourcing platform.

With access to more than 1.5 Million Contributors worldwide, our technology platform offers quality assured crowdsourcing at unprecedented scale.

PICK A SOLUTION

Microsoft TOSHIBA YAHOO!

Why Enterprise Crowdsourcing?

- Flexibility
- Speed
- Accuracy
- Cost

Ebay Chooses Crowdsourcing over Outsourcing

CROWD-SOURCING

amazonmechanical turk

Mechanical Turk is a marketplace for work.

199,063 HITS available.

Make Money by working on HITS

Get Results from Mechanical Turk Workers

CROWD-TASKS

tuscoprod

introducing tuscoprod the video

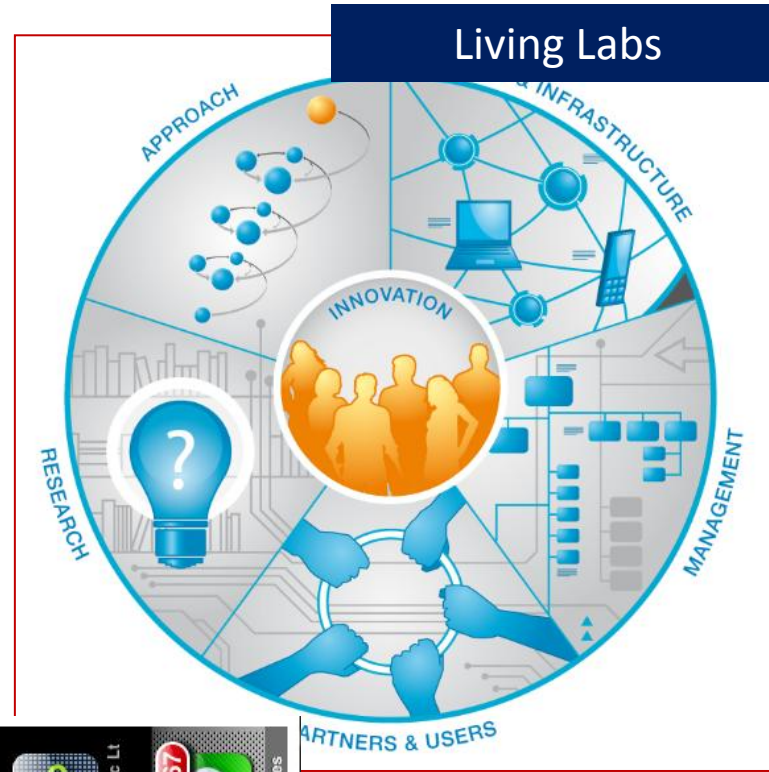
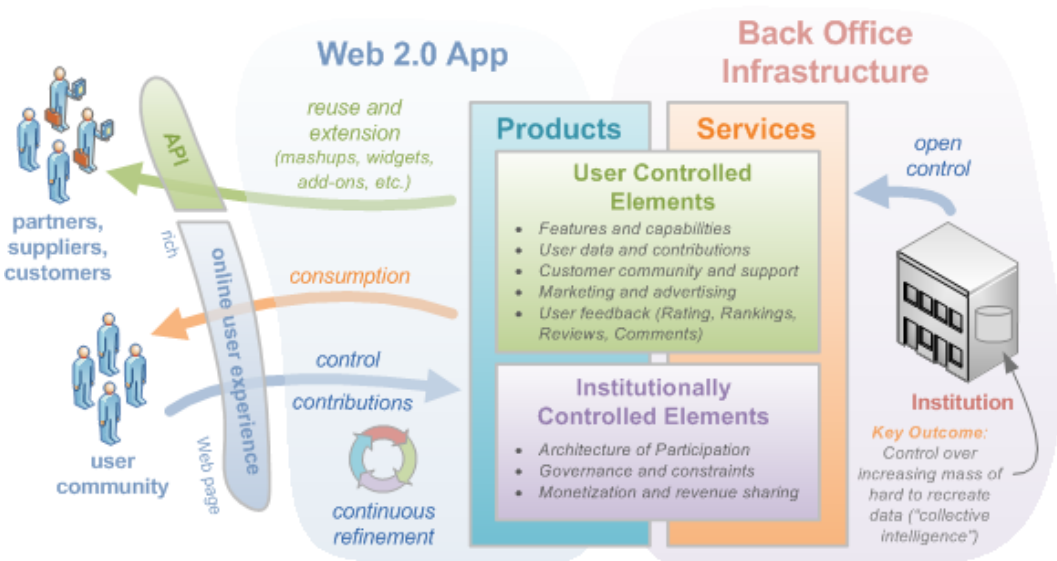
Confession of a child of the century

medianeras

CROWD-FUNDING

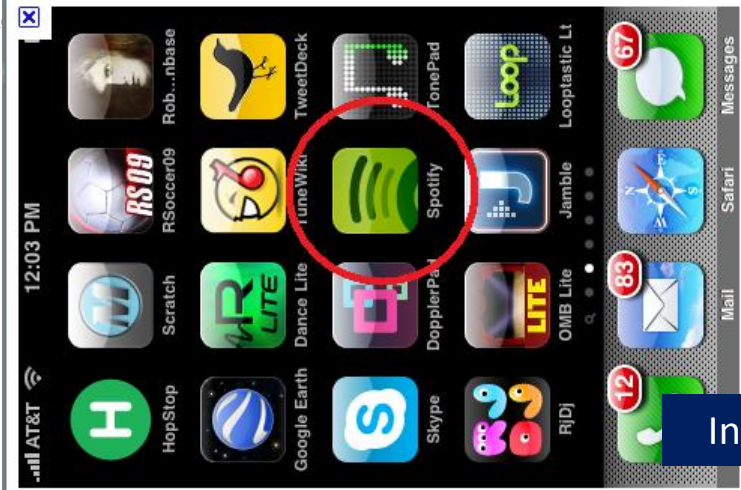
2. ECOSYSTEMS OF USER-DRIVEN INNOVATION: From passive to active nodes - Consumers turn to producers

Product Development 2.0: Using the Web to Put Users in Control and Co-Create Better, Richer Products Faster



Web 2.0 NPD

Source: <http://web2.0>



Innovation platforms

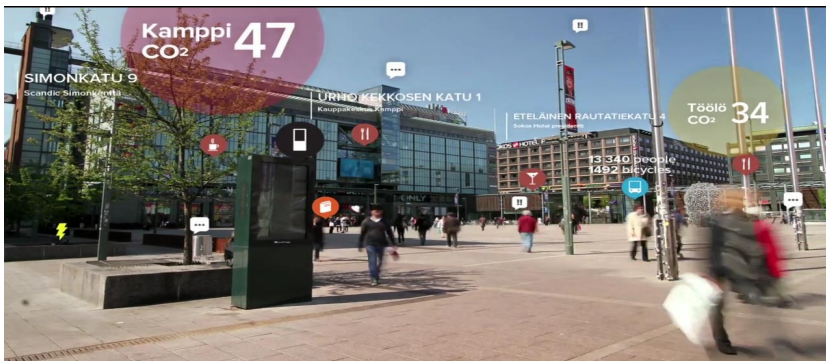
3. INNOVATION ECOSYSTEMS BECOME HYBRID: Digital identities drive innovation / commercialization !

*All products become hybrid:
Physical - virtual (web) presence*

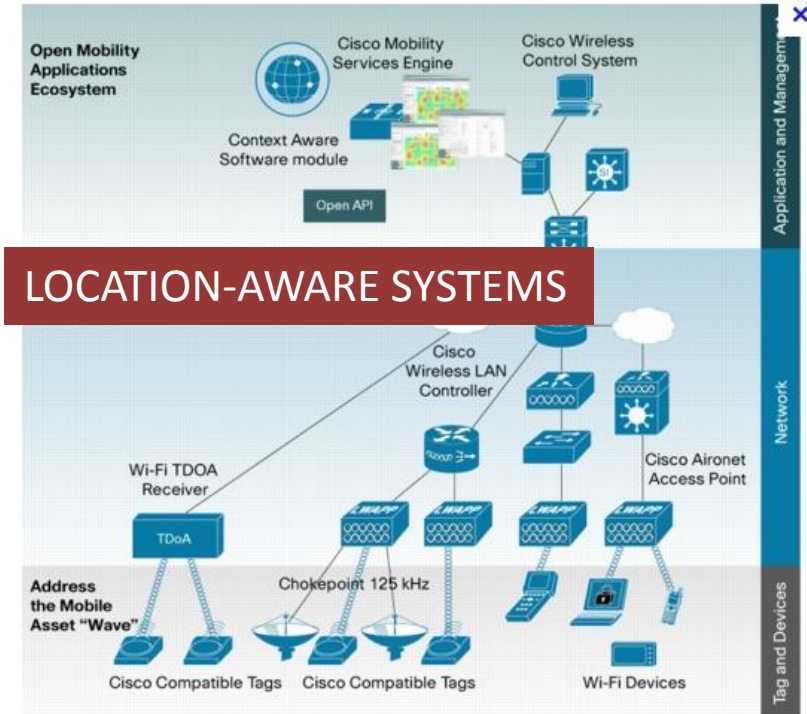
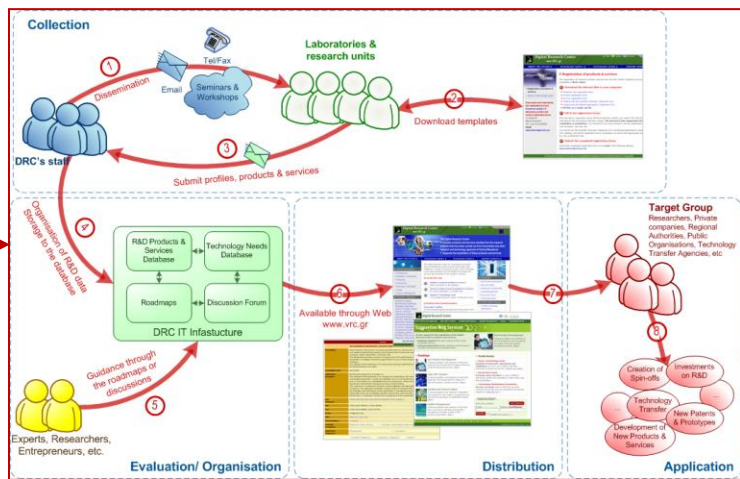
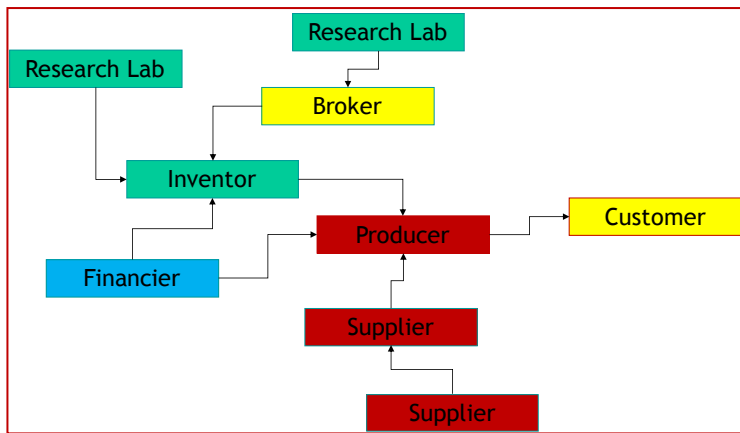
- Spread of augmented reality solutions
- Internet-of-Things
- All objects become hybrid: physical – virtual identity
- Generation of a sea of digital identities

*Web presence becomes key factor of
innovation / commercialization*

- Web applications + apps on smart phone / social media guide commercialization / innovation diffusion
- Few platforms / Thousands of developers
- Common technology base
- Common marketplace
- Low developers control
- **Low intellectual property protection**



4. TRACKING OF INNOVATION NODES AND IDENTITIES: Location and profile aware ecosystems and strategies



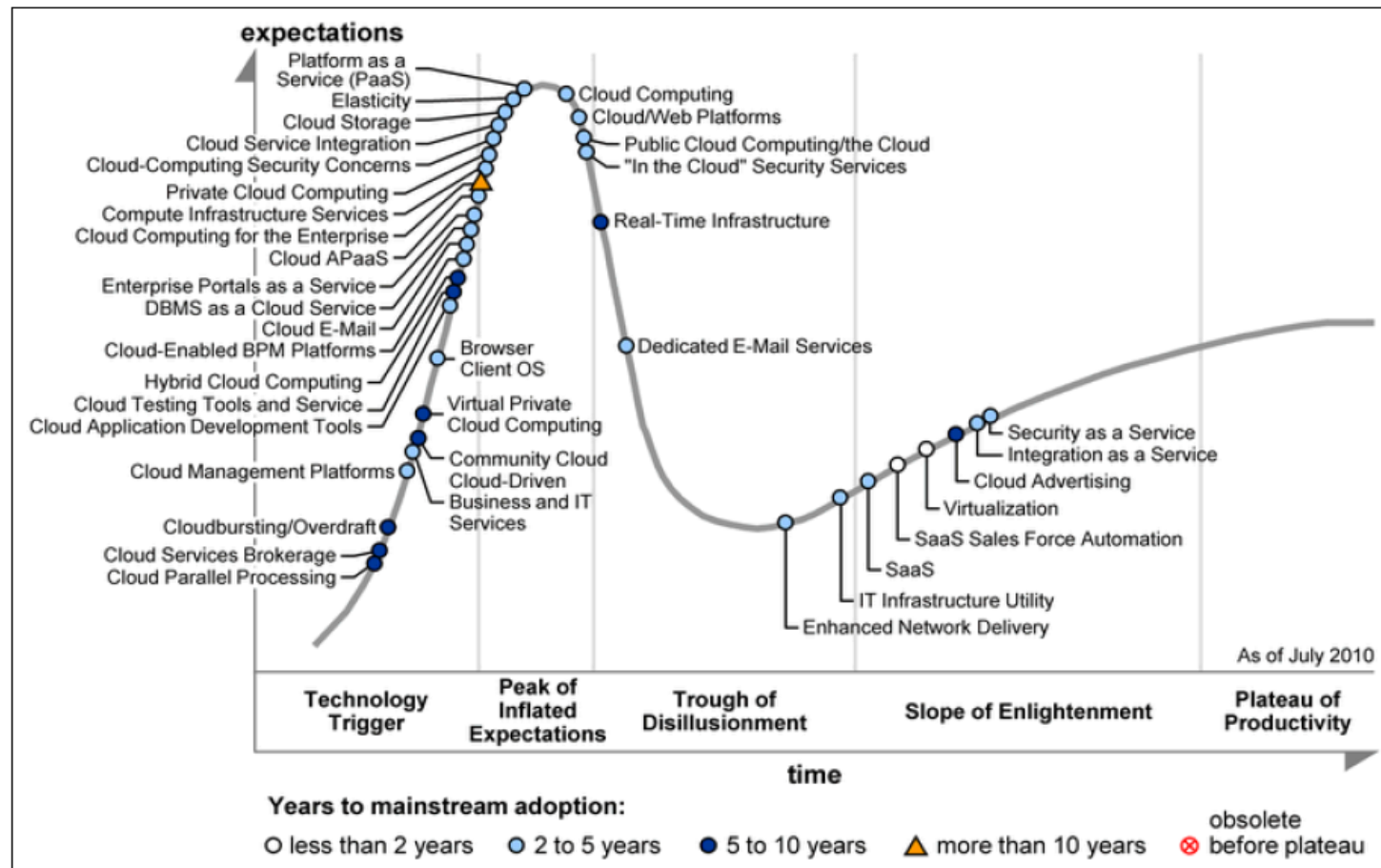
	IDEATION	PROJECT SELECTION	PRODUCT DEVELOPMENT	COMMERCIALIZATION
NEED SEEKERS Identify unmet customer needs through direct feedback and strive to be the first to market with breakthrough products. Example: DeWalt (power tools)	Gather customer insights and analyze customer needs Segment customer base	Rigorously manage return on innovation investment	Design products that respond to customers' priorities	Successfully launch, position, and price wholly new products
MARKET READERS Focus on incremental changes to products and use a second-mover strategy to keep risk low. Example: Plantronics (audio equipment)	Conduct market research Gather competitive intelligence	Maintain strong process discipline	Bring products quickly to market with an emphasis on increased modularity and simplicity	Carefully manage product life cycle and retirement
TECHNOLOGY DRIVERS Rely on technological breakthroughs from internal R&D efforts and seek to meet their customers' unarticulated needs. Example: Siemens (engineering and electronics)	Scout new technologies Map emerging technologies and analyze trends	Manage risks	Test rigorously for quality	Capture customer feedback

Source: Booz Allen Hamilton

INTELLIGENCE-LED STRATEGIES

5. LOWERING OF INNOVATION ENTRY COSTS

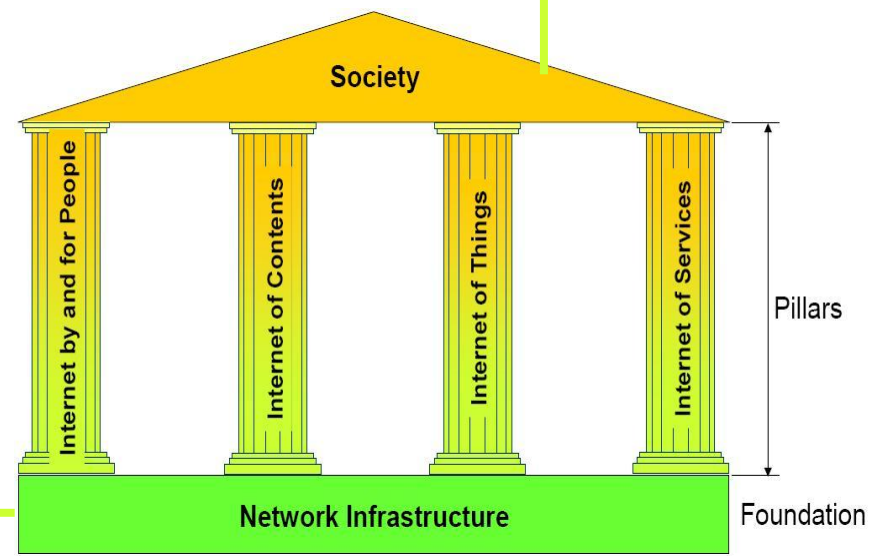
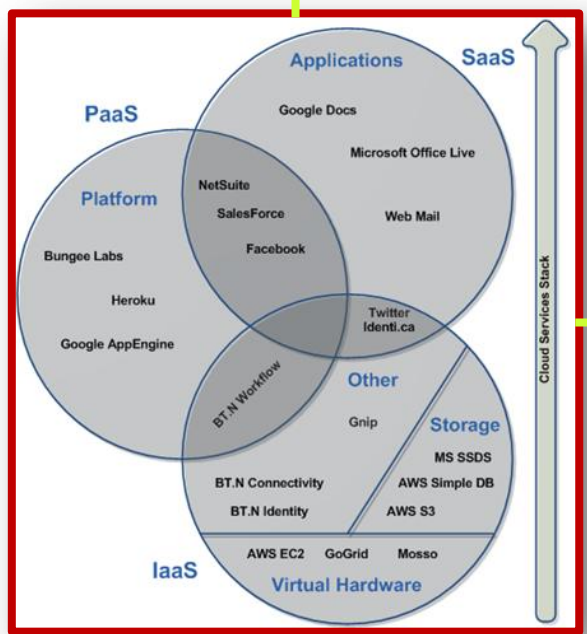
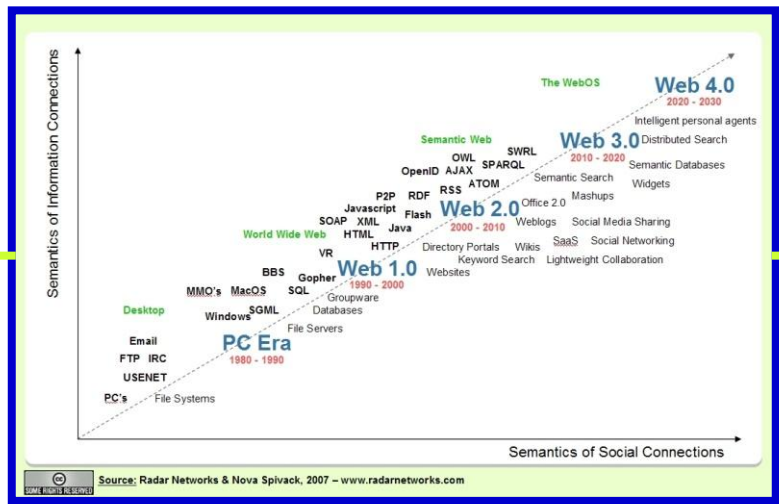
Cloud-based business models



Cloud computing: **Three service models** (software as a service-SaaS, platform as a service-PaaS, and infrastructure as a service-IaaS), **four deployment modes** (private, community, public and hybrid clouds), **five essential characteristics** (on-demand self service, ubiquitous network access, metered use, elasticity, and resource pooling), (Mell and Grance 2011)

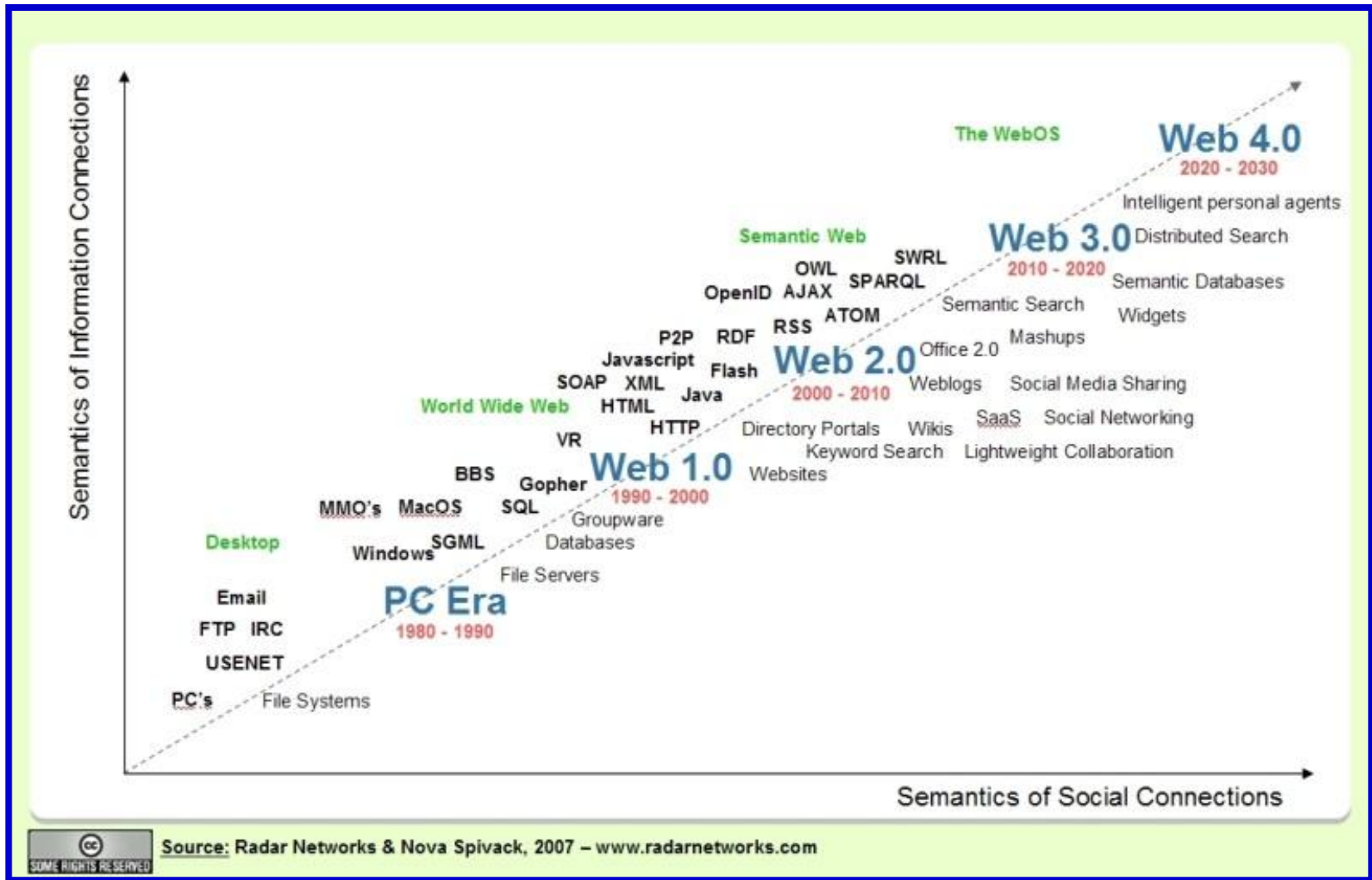
4. Innovation-for-ALL: BOWE Systems

NEW INNOVATION MODEL COMPONENTS: Knowledge base (WEB) – Funding (CLOUD) – Markets (FIRE)



KNOWLEDGE / TECHNOLOGY BASE

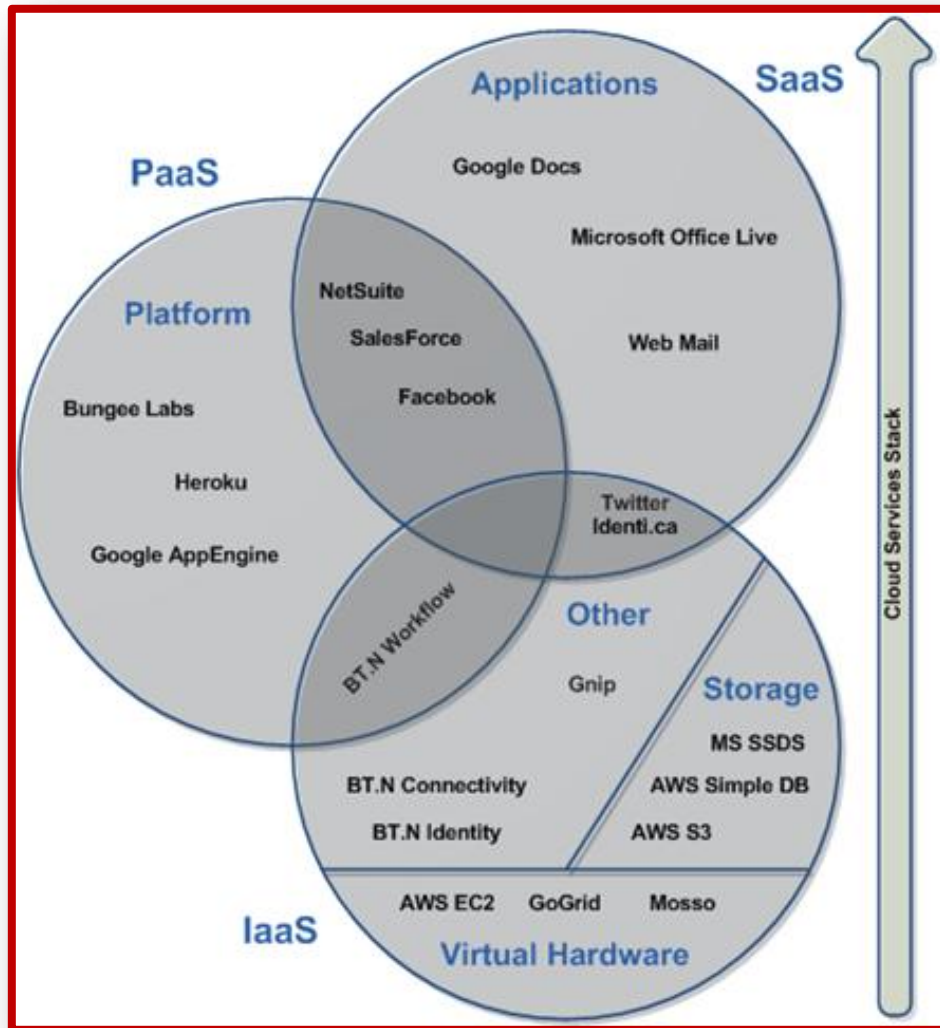
Web 1.0 -> Intelligent Web



- Web technology as basic training for all science and technology disciplines
- Web technology + sector specific technology sustaining innovation in any sector

BUSINESS MODEL

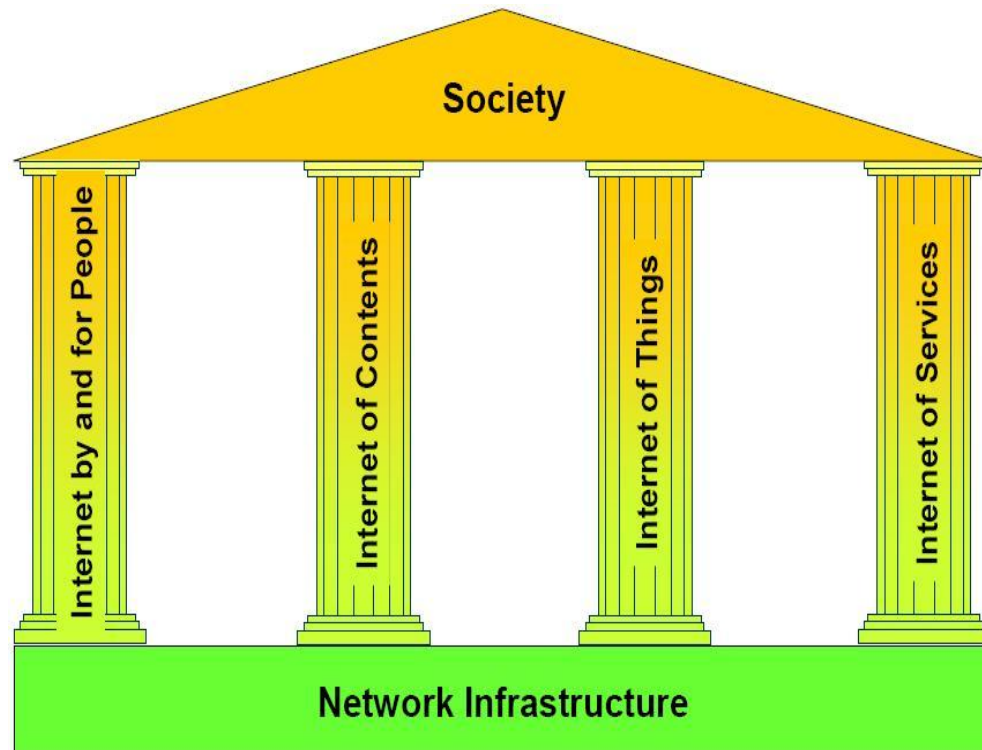
The Cloud



- Virtualization and lowering entry costs
- Self service on demand
- Metered use
- Scalability of costs and charging
- Platform-based innovation
- Direct access to global market
- Open entry, low cost, hyper competition, low IP protection

MARKETS

Future Internet based global services



- **Creative users:** new tools to allow final users to create and share personalised services (not only contents, but also applications)
- **Semantically tagged content and knowledge:** applications not only provide information but also intelligently process information
- **A world-wide network of uniquely addressable and interconnected objects,** based on standard communication protocols.
- **A multitude of connected IT services,** which are offered, bought, sold, used, repurposed, and composed by a worldwide network of service providers, consumers, aggregators, and brokers

BOWE systems: BUILD YOUR OWN ECOSYSTEM

A NEW INDUSTRY ECOSYSTEM TO CHANGE THE EFFECT C

