VALTIOVARAINMINISTERIÖ

(Digitaalisen) turvallisuuden iso kuva

5.6.2017 Aarne Hummelholm

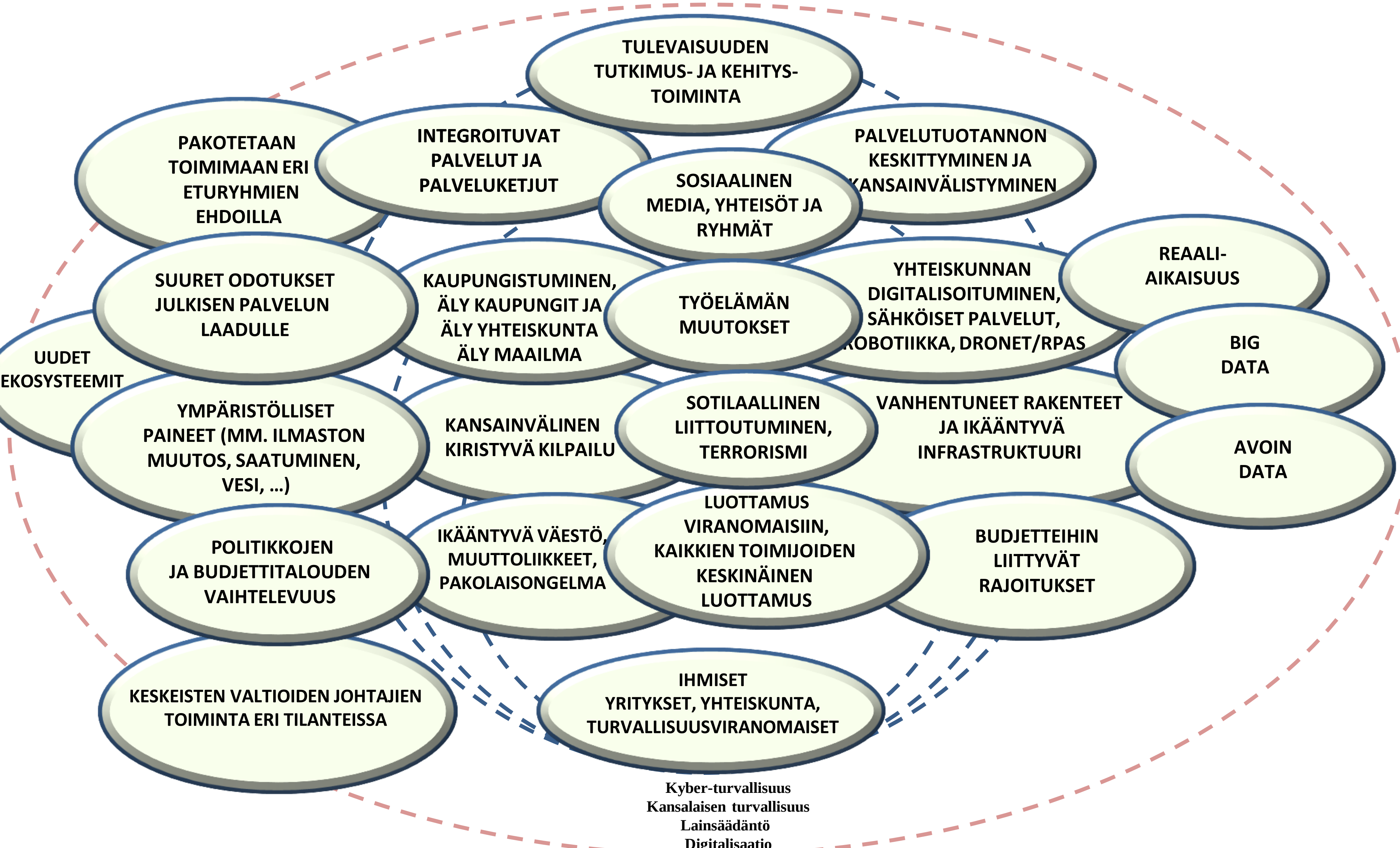
SISÄLTÖ

1. TULEVAISUUDEN YHTEISKUNTAAN VAIKUTTAVAT MUUTOSTEKIJÄT
2. IOT JA VIESTINTÄVERKO
3. PALVELUIDEN ERIYTTÄMINEN
4. INFRASTRUTUURIEN VIRTUALISOINNIT
5. JA LOPUKSI…

TARNINA JATKUU ….

TULEVAISUUDEN YHTEISKUNTAAN VAIKUTTAVAT MUUTOSTEKIJÄT

TULEVAISUUDEN YHTEISKUNTAAN VAIKUTTAVAT MUUTOSTEKIJÄT



MODIFIED FROM MARC JADOUL AND JACQUES VERMEULEN | NOVEMBER 20, 2014 | ARTICLES, BUSINESS

TULEVAISUUDEN YHTEISKUNTA

VISIO:

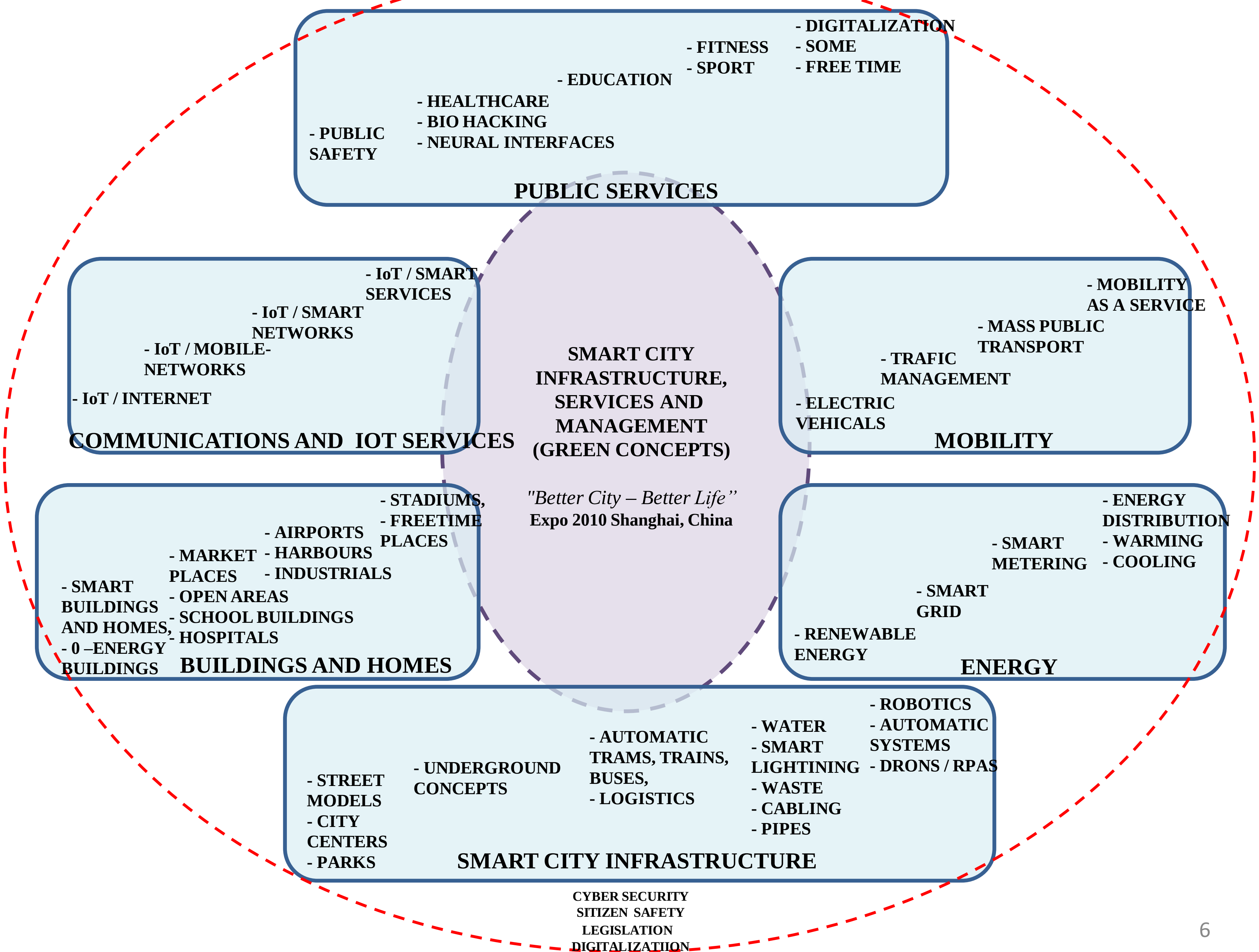
1. **TULEVAISUUDESSA KAIKKI ON YHDISTETTYNÄ KAIKKEEN**

   (INTERNET OF EVERYTHING => IoE = THE INTELLIGENT CONNECTION OF PEOPLE, PROCESS, DATA AND THINGS) (=> KYTKETTY YHTEISKUNTA, KYTKETTY MAAILMA)

2. **KANSALAISET JAKAVAT KAIKEN (MAHDOLLISEN) KESKENÄÄN**

3. **KANSALAISET SAAVAT KAIKEN TIETONSA REAALIAIKAISESTI MISSÄ TAHANSA, MILLOIN TAHANSA, (AJASTA JA PAIKASTA RIIPPUMATTA)**

SMART CITY SERVICES (PART OF SMART SOCIETY)
INFRASTRUCTURE WHOLENESSES



SMART ... SOCIETY

Quantum world

- computer programming, languag
- secure cybernetic communicatio
- quantum computing
- quantum encryption
- quantum communication
- neural interfaces
- bio hacking
- Quantum teleportation

Covernmental / administrative directing

- legislation
- digitalization
- economy and budgeting
- cyber security
- co-operations
- co-ordinations
- follow-up and supervision
- base economy, service bases

-..

Changes and challenges in wireless technology

- outdoor – indoor interferencies
- indoor interferencies
- use of frequencies
- zero-energy houses
- impulse response and simulation
- energy efficiency
- capacity efficiency
- cost efficiency
- caching, artificial intelligence
- blockchain

... AS A SERVICE

Citizen records?

- Customer credit card transacti
- Customer mailing and email lis
- Customer support information
- Customer warranty information
- Sitizen tax Information
- Patient health or medical records
- Employee payroll records
- Employee email lists
- Employee health and medical re
- Business and personal financial
- Marketing plans
- Business leads and enquiries
- Product design and development
- Legal, tax and financial correspo
- Building informations
- Car, Motorbike, Ships informa
- Summercottage Information
- Forest information
- Electric line Information
- ...

Digital world

- Connected ubiquitous world
- Connected public services
  - Voice control
- Connected public safety
  - Voice control
- Connected public healthcare
  - Voice control
- Connected mobility
  - Voice control
- Connected smart city
- Connected smart buildings and homes
- Connected smart grid
- Connected smart energy systems
- Connected smart logistics
- Connected smart utilities
- Connected digital educations
- Connected smart economy
- …

Other challenges in IoT concepts

architecture of IoT sensors
harmonization of IoT sensors
nterfaces for network and platforms
security architectures of IoT
license policy of IoT
updating, managements
millions of IoT sensors
cyber attacks ..

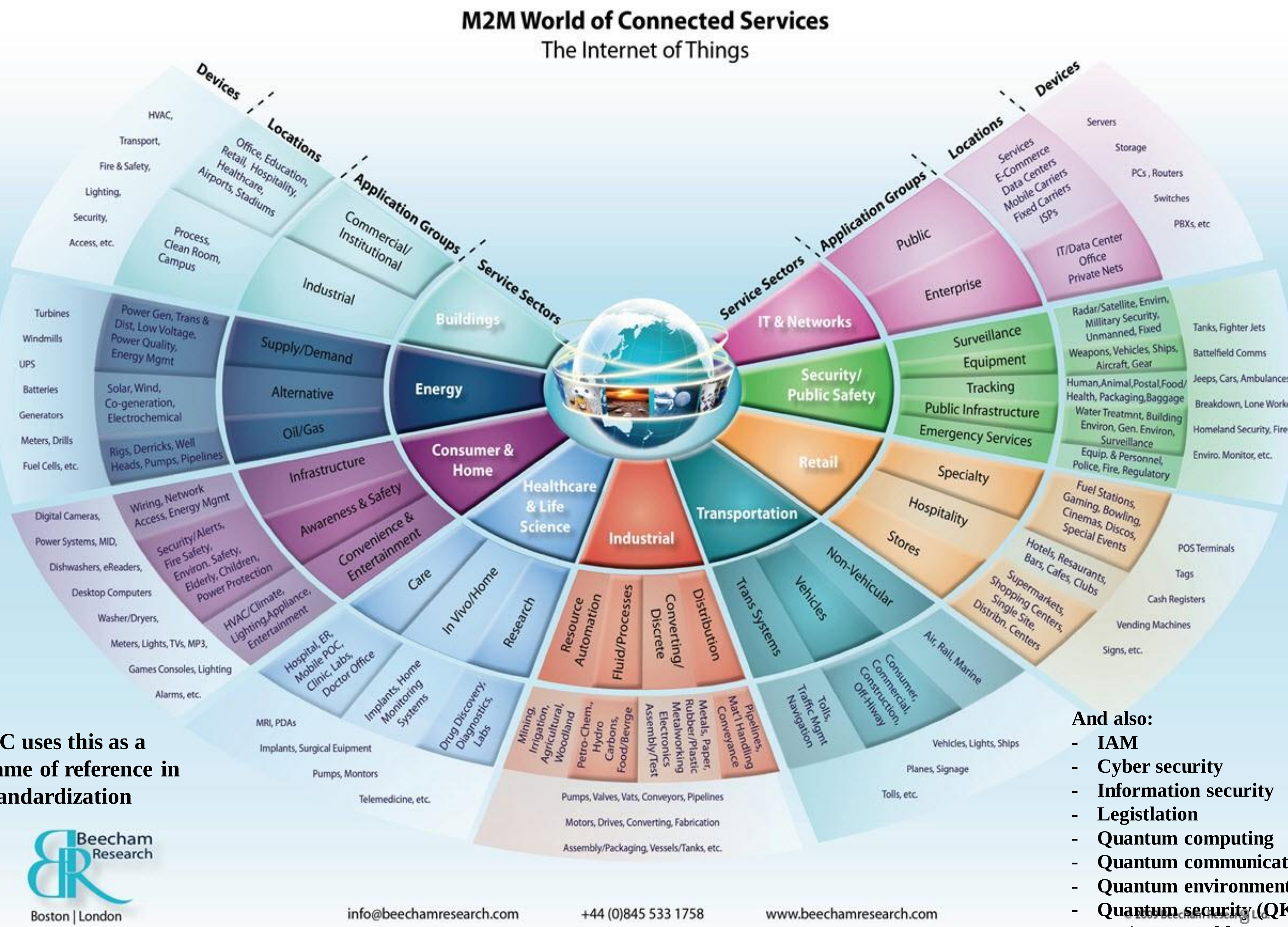
..

hanges in the communications

lexible joining services; walking,
ar, train, market places, stadiums,..
cell, picocell, femtocell
nergy, capacity and cost efficienci
ow power systems and devices
nd to end cyber security
service chains are complicated

- …

SMART CITY SERVICES (PART OF SMART SOCIETY), SERVICE WHOLENESSES

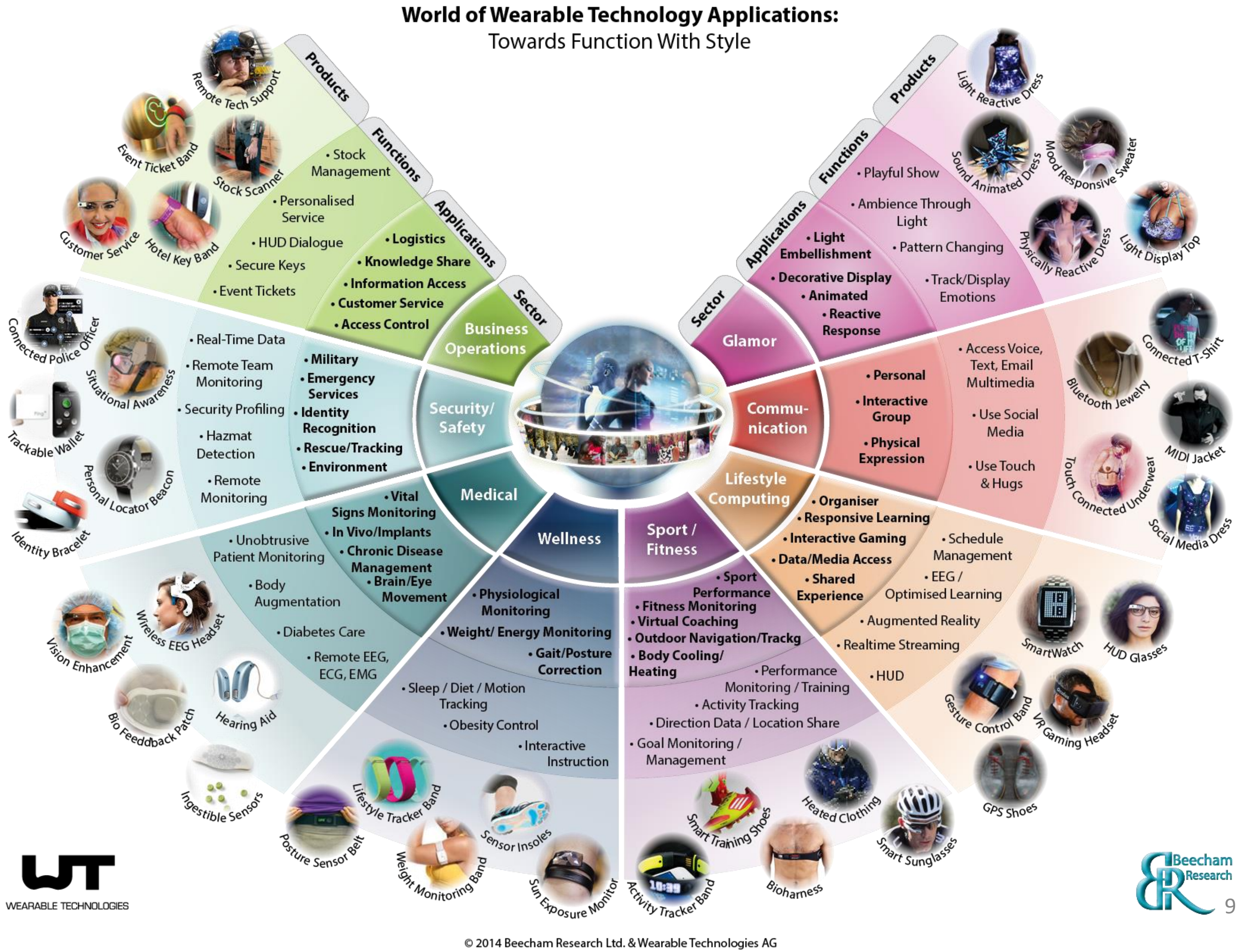


IEC uses this as a frame of reference in Standardization

And also:

- **IAM**
- **Cyber security**
- **Information security**
- **Legislation**
- **Quantum computing**
- **Quantum communications**
- **Quantum environment**
- **Quantum security (QKD)**
- **Business World**
- **….**

SMART CITY SERVICES (PART OF SMART SOCIETY), SERVICE WHOLENESSES, (WEARABLE TECHNOLOGIES)



World of Wearable Technology Applications Beecham Recearch Ldt. & Wearable Technologies AG 2014 (modified):

Sector: Business operations
Applications:

- Logistics
- Knowledge Share
- Information Access
- Customer Services
- Access Control

Sector: Security and Safety
Applications:

- Military
- Emergency Services (Police, Boarder Guards, Resque)
- Identity Recognition
- Rescue / Tracking
- Environment Supervision
- Supervision of the Radiation

Sector: Medical
Applications:

- Vital Signs Monitoring
- In Vivo / Implants
- Chronic Disease Monitoring
- Brain / Eye Movement

Sector: Communication
Applications:

- Personal
- Interactive Group
- Physical Expression

Sector: Wellness
Applications:

- Physiological Monitoring
- Weight / Energy Monitoring
- Gait / Posture Correction

Sector: Sport and Fitness
Applications:

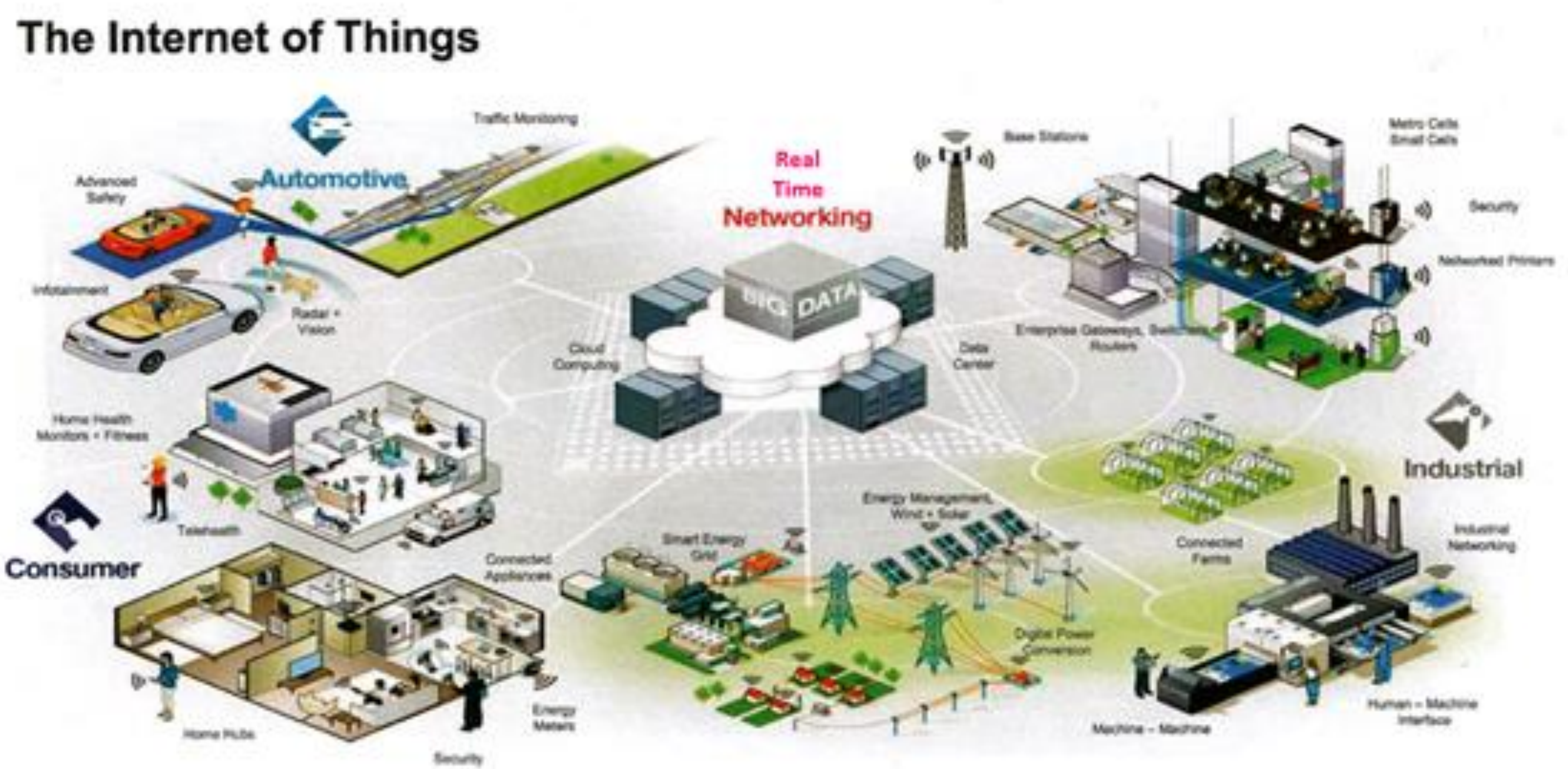
- Sport Performance
- Fitness Monitoring
- Virtual Coaching
- Outdoor Navigation / Tracking
- Body Cooling / Heating

Sector: Lifestyle Computing
Applications:

- Organiser
- Responsive Learning
- Interactive Gaming
- Data / Media Access
- Shared Experience

Sector: Glamor
Applications:

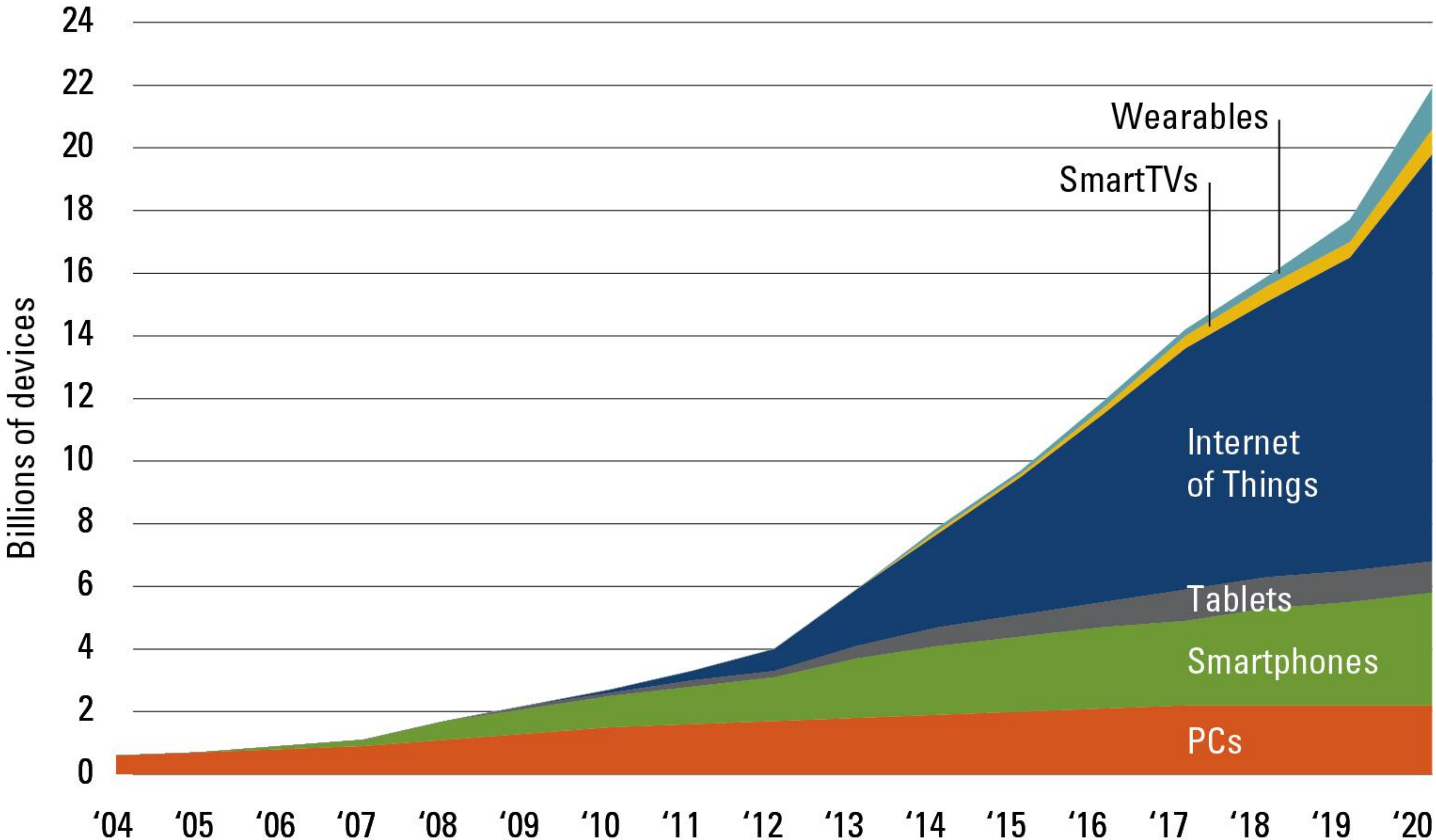
- Light Embellishment
- Decorative Display
- Animated
- Reactive Response



Tulevaisuuden tieto- ja viestintäjärjestelmien toimintaympäristöjä, ns. älykaupunkiympäristö (Smart City Concept). (Googletechinfo, http://www.googletechinfo.com/internet-things)

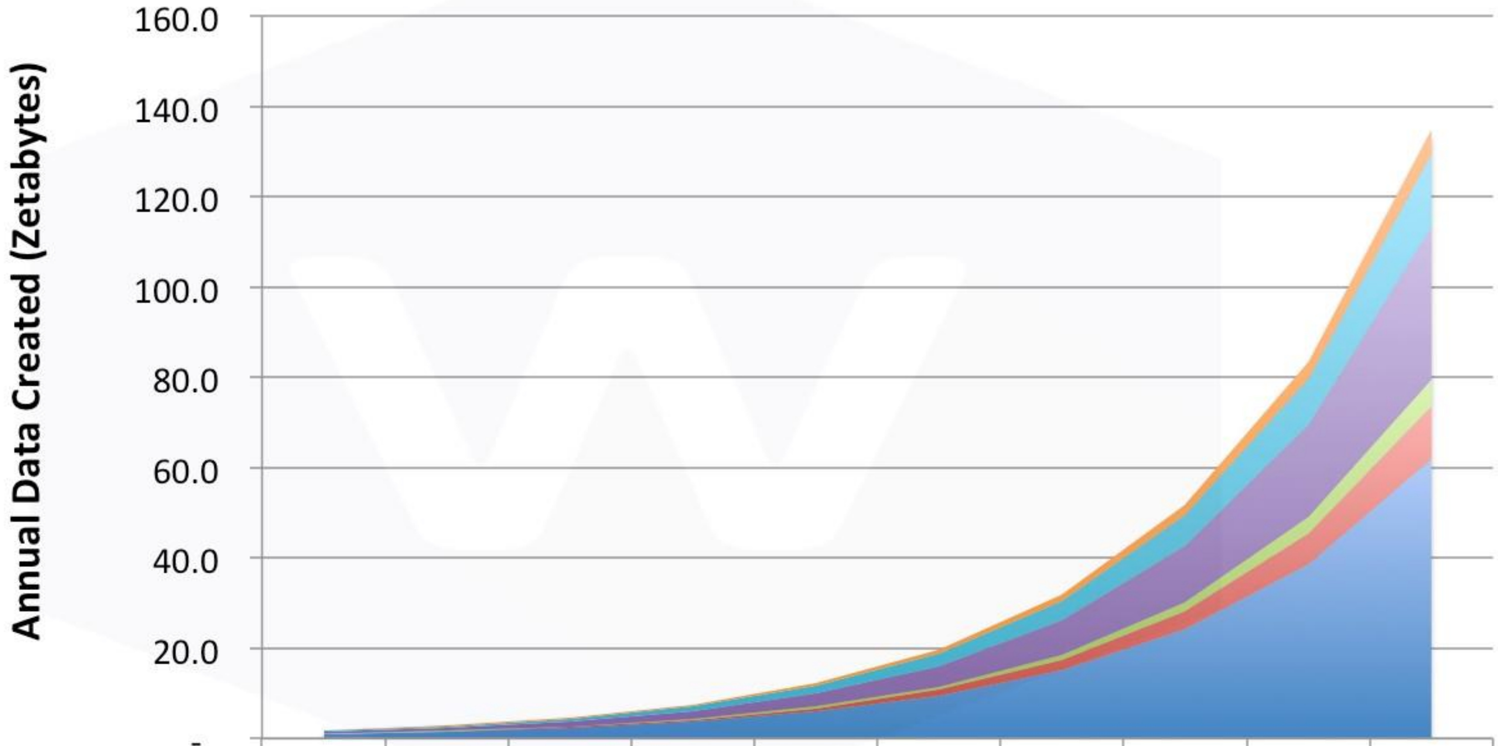
SMART CITY SERVICES (PART OF SMART SOCIETY)
IEC ROLE IN THE IOT (2017),
SMART GRID

FIGURE 1: Global internet device installed base forecast



Sources: Gartner, IDC, Strategy Analytics, Machina research, company filings, BII estimates

All Data Created by Category 2011-2020 (Zetabytes)

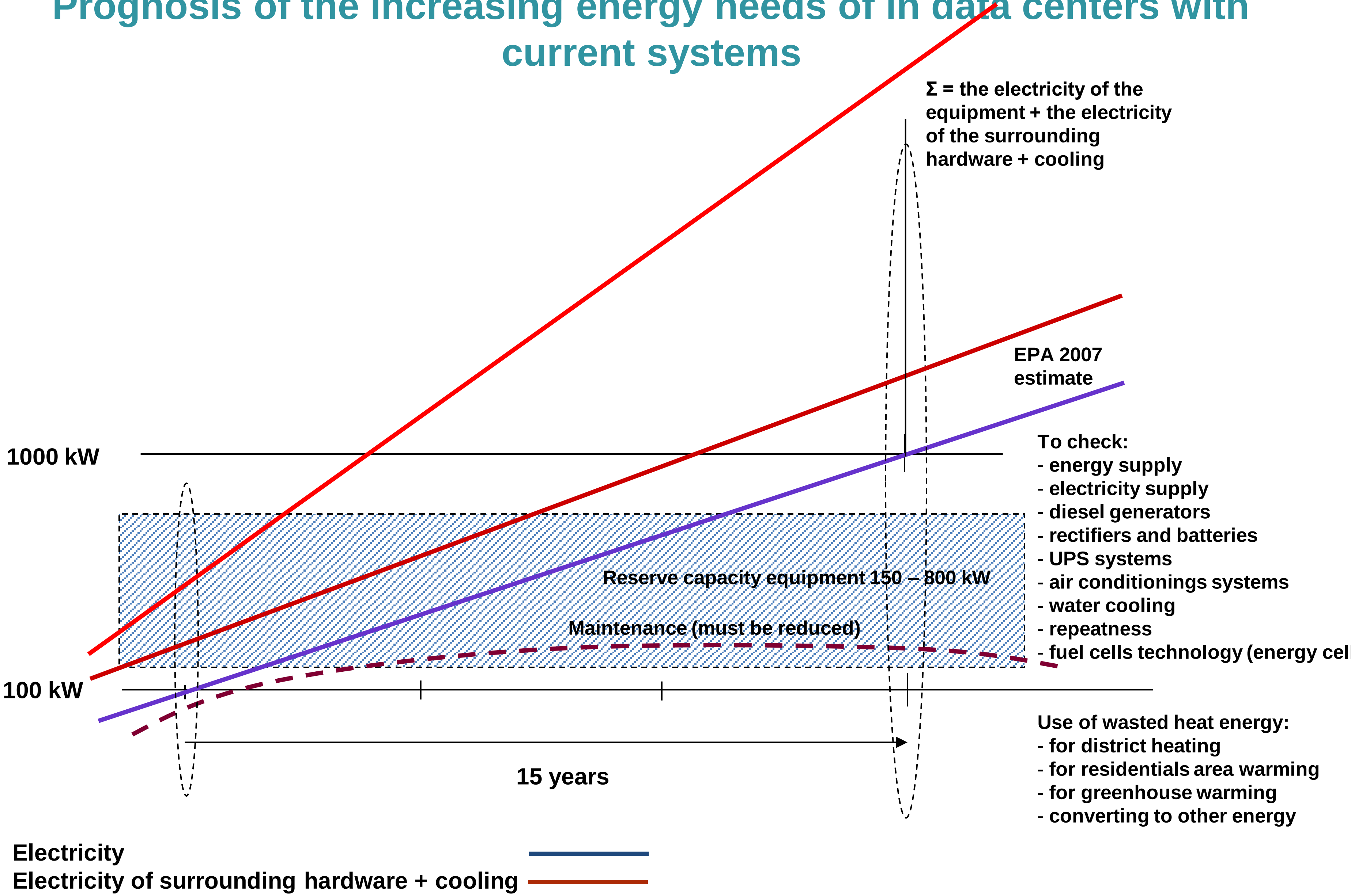


	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Consumer Images, Voice & Video	0.1	0.2	0.3	0.4	0.6	1.0	1.5	2.3	3.5	5.4
Entertainment & Social Media	0.3	0.5	0.7	1.1	1.7	2.7	4.3	6.7	10.4	16.2
Data Processing	0.4	0.6	1.0	1.7	2.8	4.6	7.6	12.5	20.5	33.7
Medical	0.0	0.1	0.1	0.2	0.4	0.7	1.2	2.0	3.5	6.1
Internet of Things	0.1	0.2	0.3	0.5	0.8	1.4	2.3	4.0	6.8	11.5
Surveilance	0.9	1.4	2.3	3.7	5.9	9.5	15.1	24.2	38.8	62.0

Source: © Wikibon 2015, based on Wikibon 2013 Projections

http://techtub.in/how-to-fix-iot-experts-talk-cost-security-and-scale/

Prognosis of the increasing energy needs of in data centers with current systems



EPA = United States Environmental Protection Agency

Data Centers and energy
(based on informations of Cisco and Taloustieto)

- Information handling efficiency grows 3x in 2 years
- Energy efficiency grows 2x in 2 years

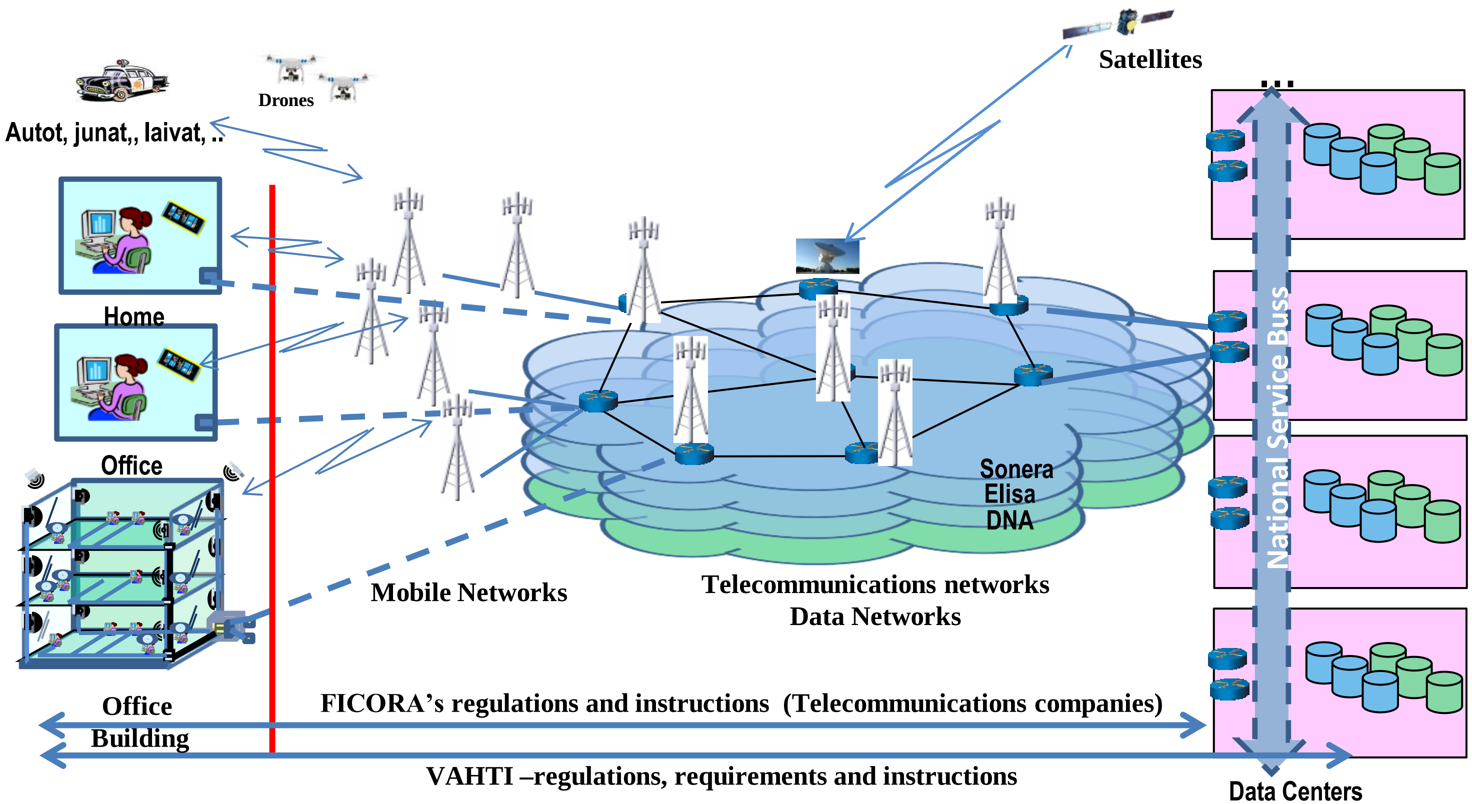
- If we looking for 15 years ahead
  - Informations handling grows 2187x
  - Energy efficiensy grows 128x
- **=> Energy needs grows about 17.08x in 15 years**

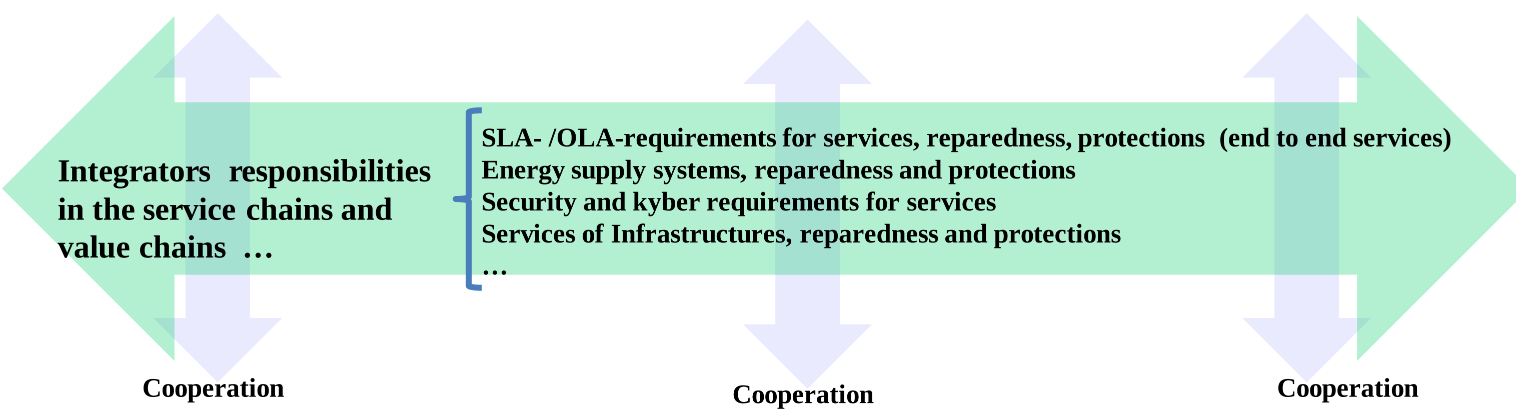
- One research says that total amount of data informations doubles every two years. We get 50 times more data in the year 2020 than now into our use **(Taloustieto, 30.6.2011)**
- The number of the files increases more faster than data. After ten years we have 75x more files in the our use than today.**(Taloustieto, 30.6.2011)**

- Based on also U.S Environmental Protection Agency ja U.S. Department of Energy => ENERGY STAR, (EPA), informations

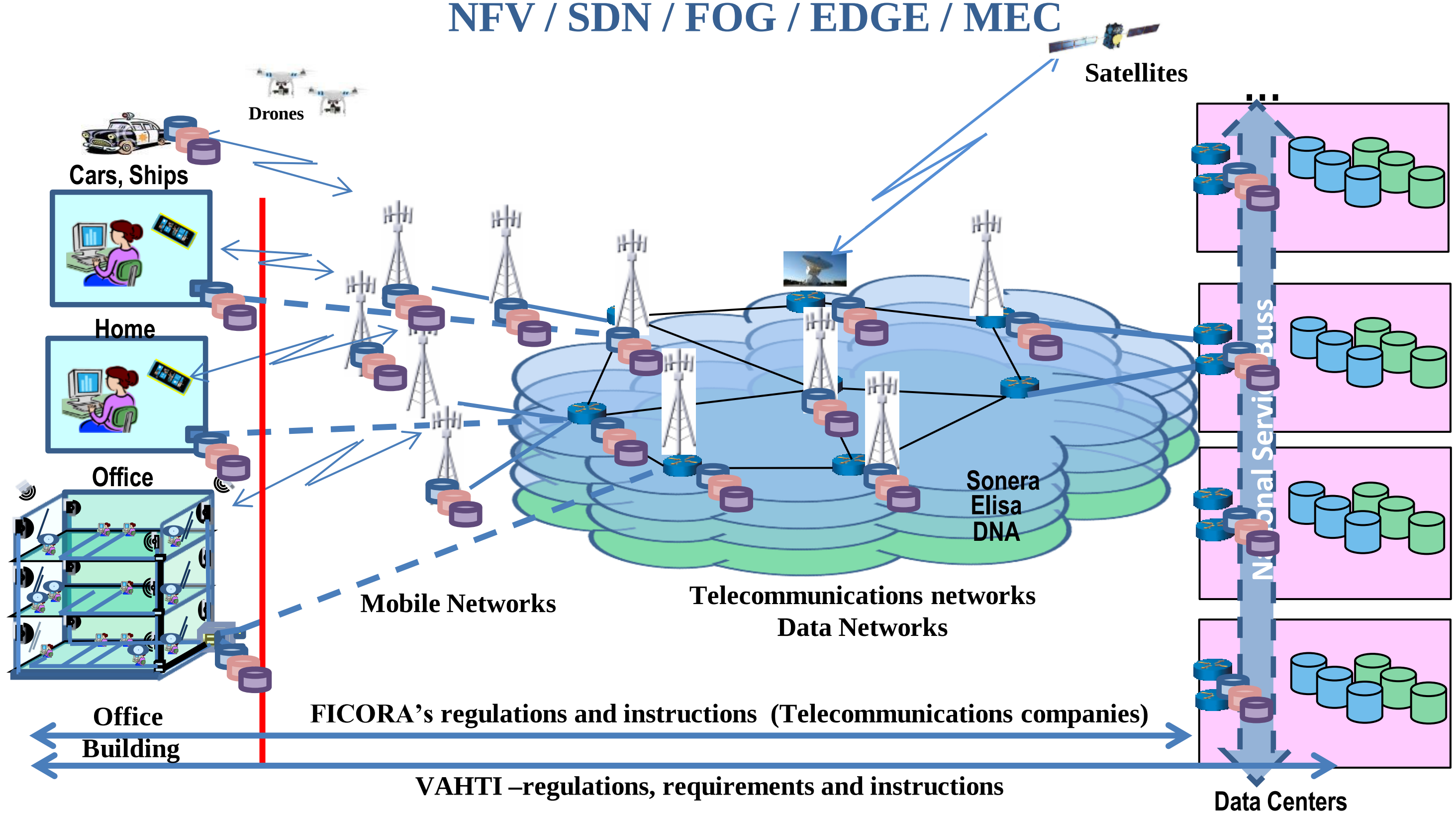
IOT JA VIESTINTÄVERKOT

NETWORK ARCHITECTURE AND RESPONSIBILITIES





NEW NETWORK ARCHITECTURE AND RESPONSIBILITIES WITH NFV / SDN / FOG / EDGE / MEC



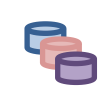
Integrators responsibilities in the service chains and value chains …

- SLA- /OLA-requirements for services, reparedness, protections (end to end services)
- Energy supply systems, reparedness and protections
- Security and kyber requirements for services
- Services of Infrastructures, reparedness and protections
- …

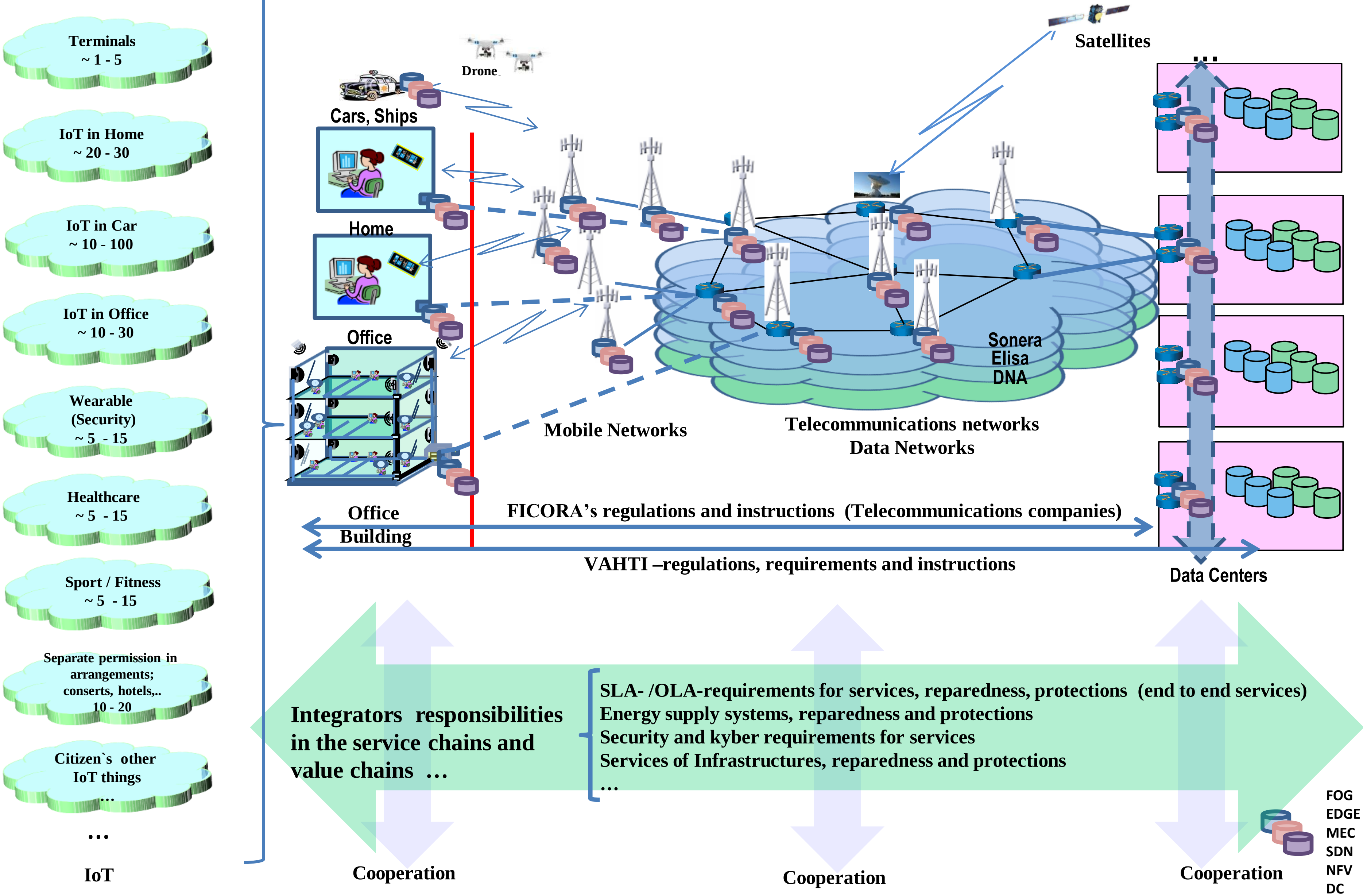
Cooperation

Cooperation

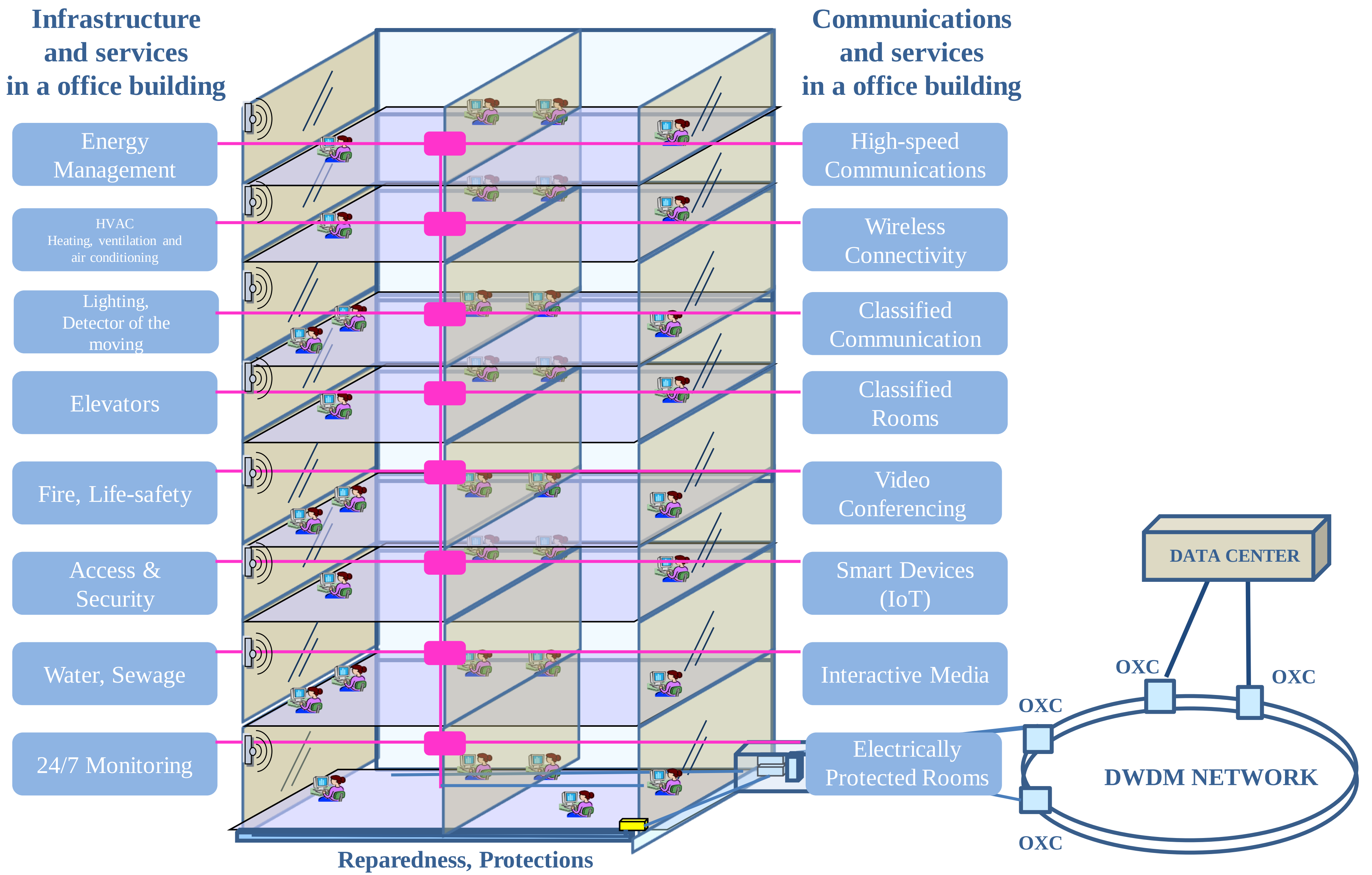
Cooperation



NEW NETWORK ARCHITECTURE AND RESPONSIBILITIES WITH IOT / NFV / SDN / FOG / EDGE / MEC

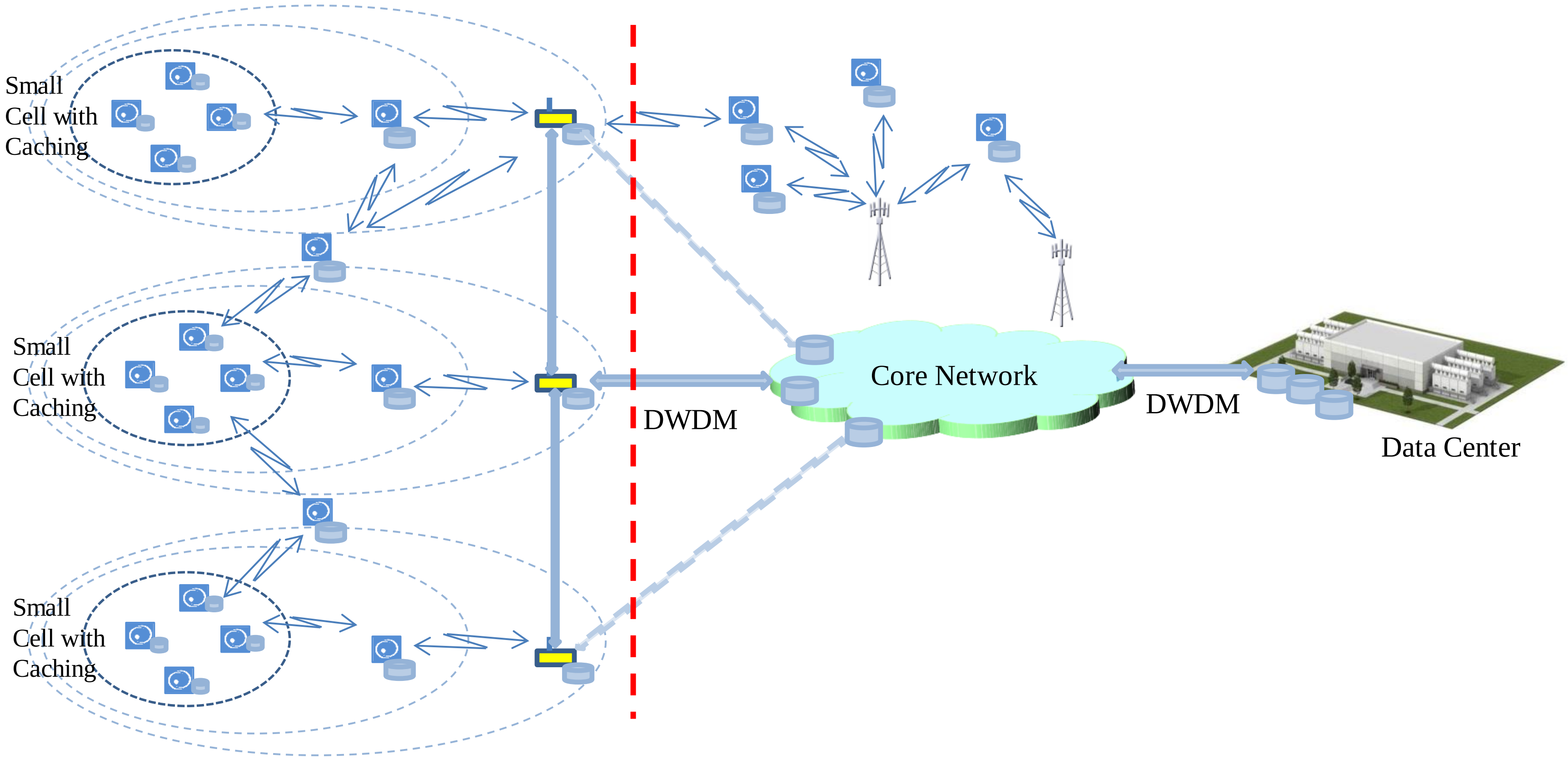


OFFICE BUILDING In the FUTURE (SMART BUILDING INTEGRATION)



PALVELUIDEN ERIYTTÄMINEN

A FRAMEWORK OF 3C-ORIENTED SMALL CELL NETWORKS WITH CACHING

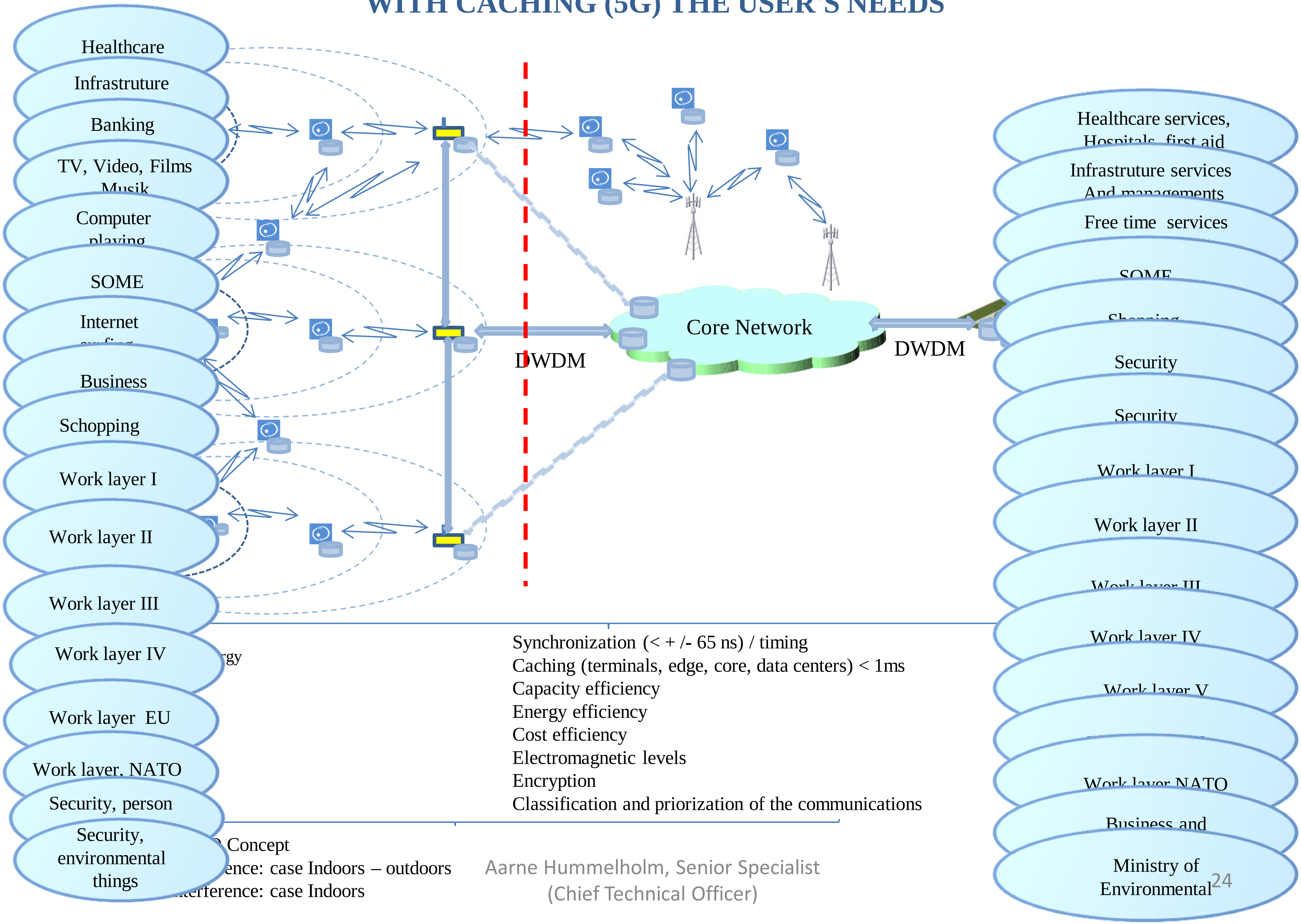


0-energy

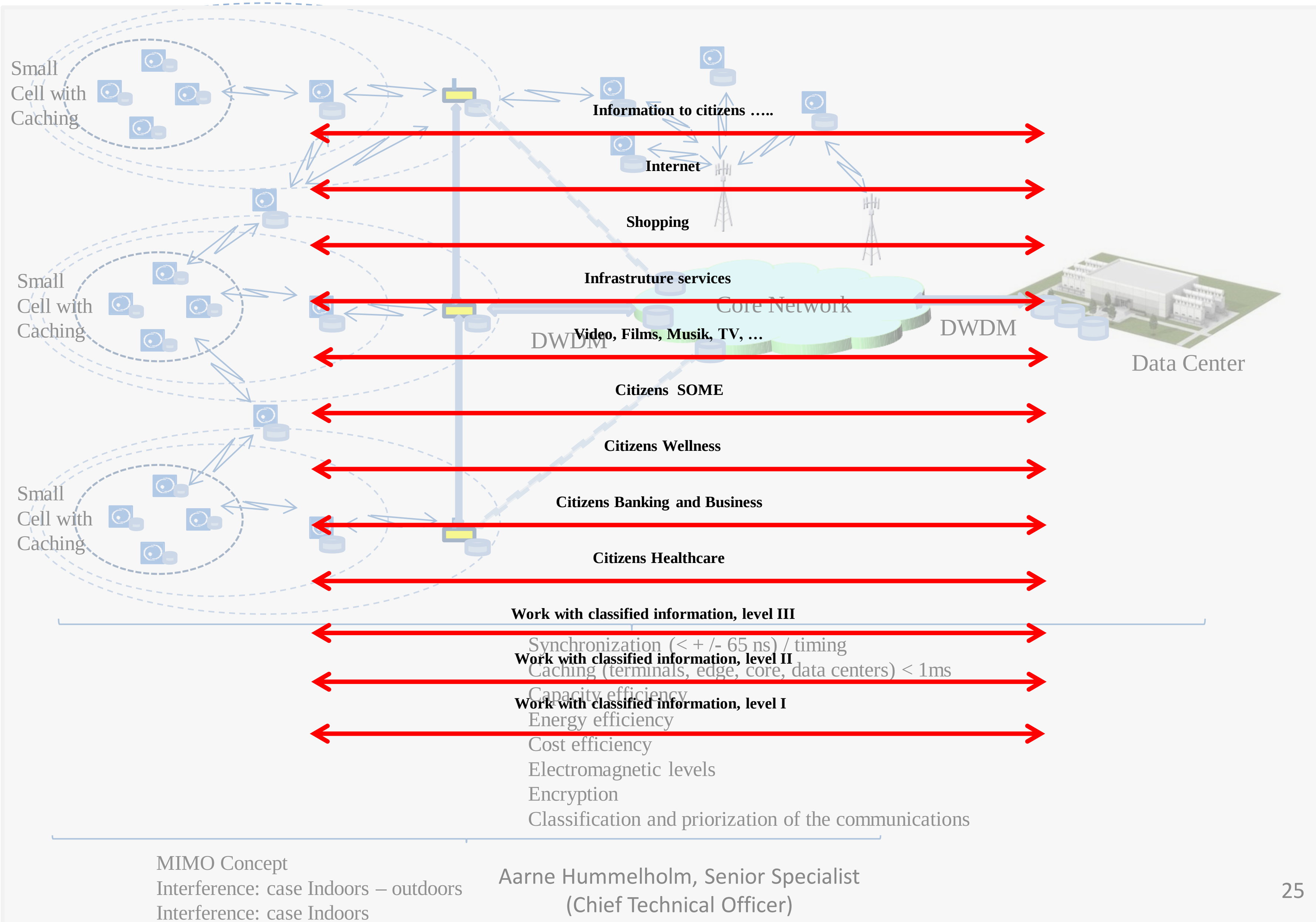
Synchronization (< + /- 65 ns) / timing
Caching (terminals, edge, core, data centers) < 1ms
Capacity efficiency
Energy efficiency
Cost efficiency
Electromagnetic levels
Encryption
Classification and priorization of the communications

MIMO Concept
Interference: case Indoors – outdoors
Interference: case Indoors

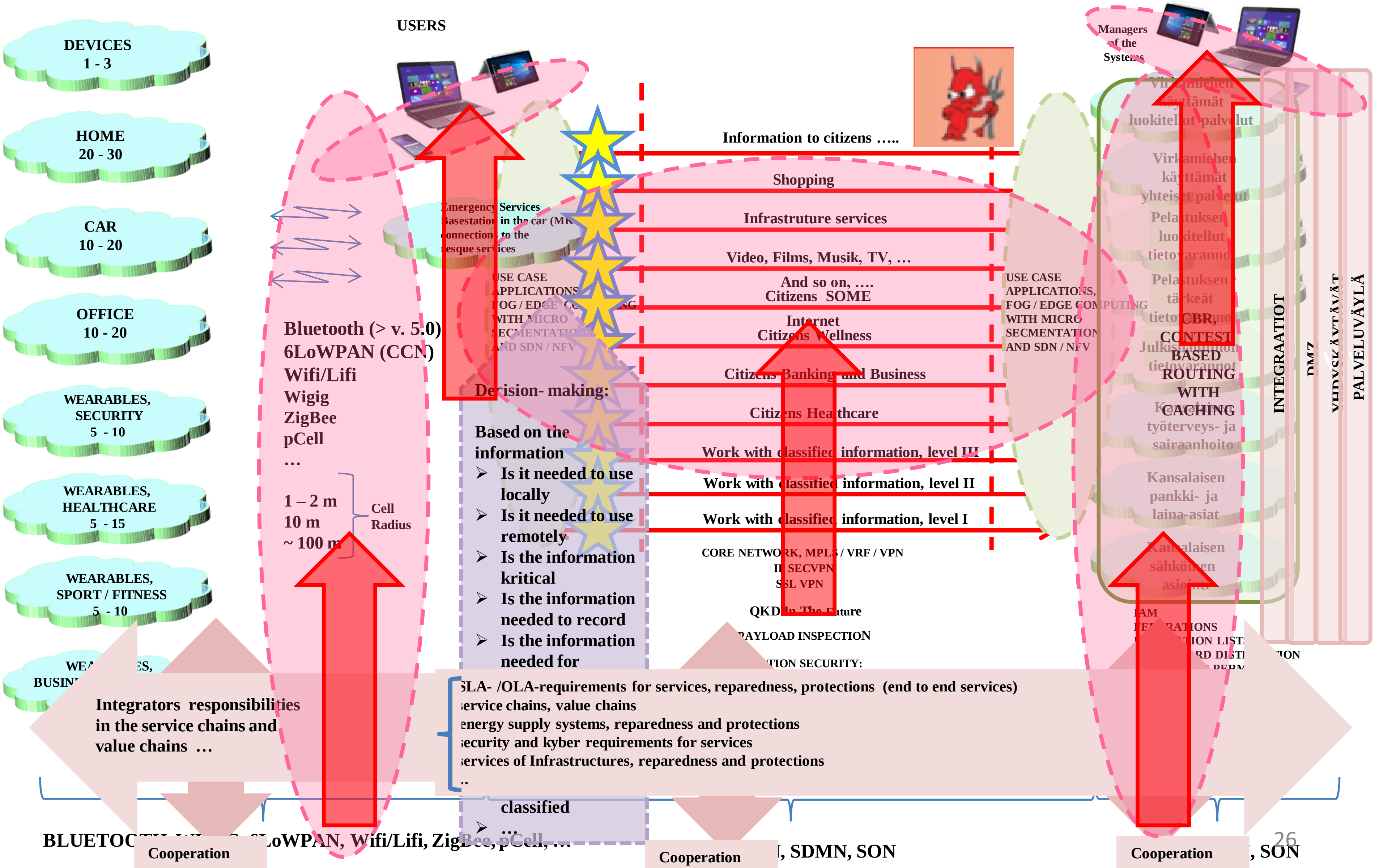
A FRAMEWORK OF 3C-ORIENTED SMALL CELL NETWORKS WITH CACHING (5G) THE USER'S NEEDS



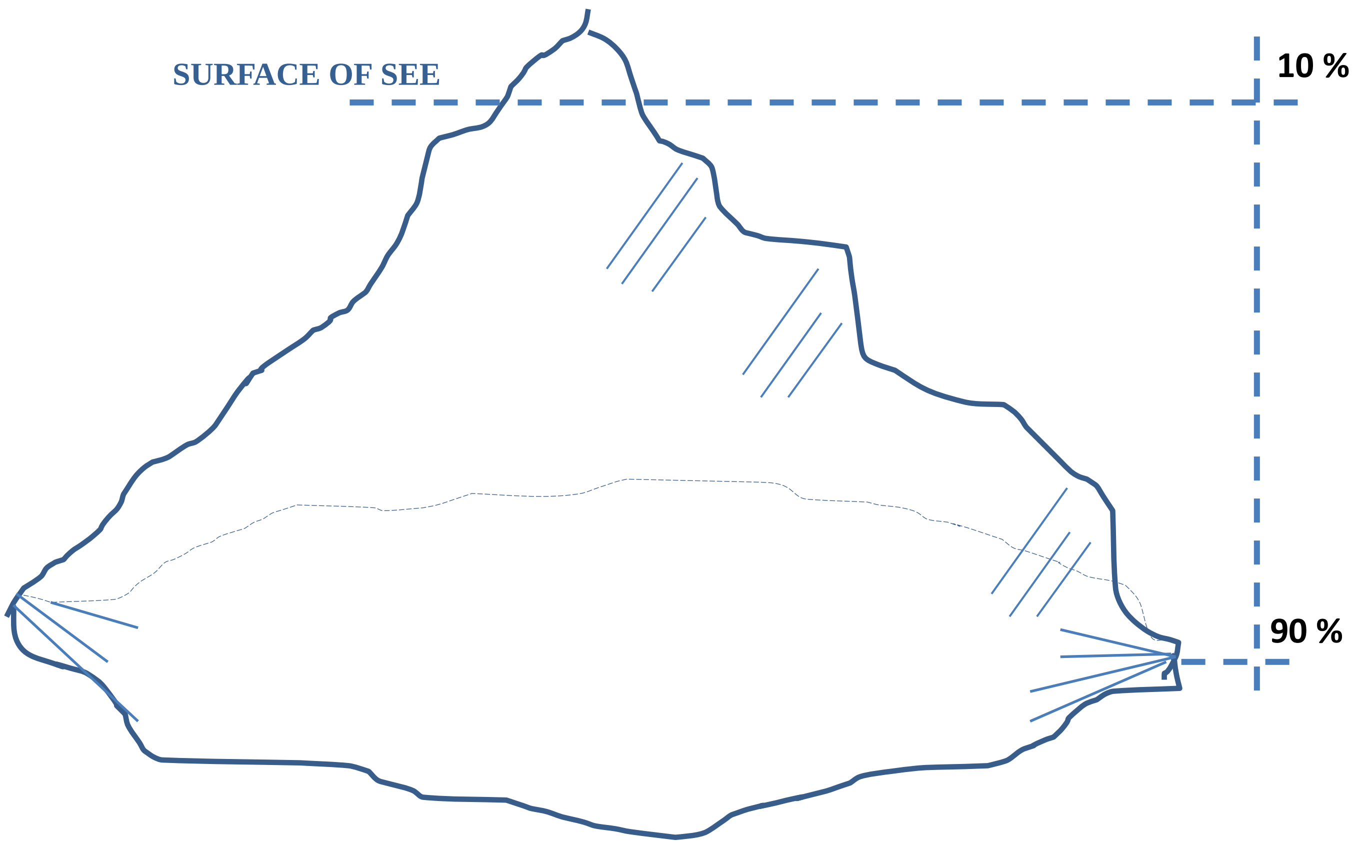
A FRAMEWORK OF 3C-ORIENTED SMALL CELL NETWORKS WITH CACHING (5G), THE USER'S NEEDS AND MICRO SEGMENTATION / SLICING / SECURE VPN



A FRAMEWORK OF 3C-ORIENTED SMALL CELL NETWORKS WITH CACHING (5G), FOG / EDGE COMPUTING, MOBILE EDGE COMPUTING (MEC), (WEARABLES WITH BLUETOOTH)

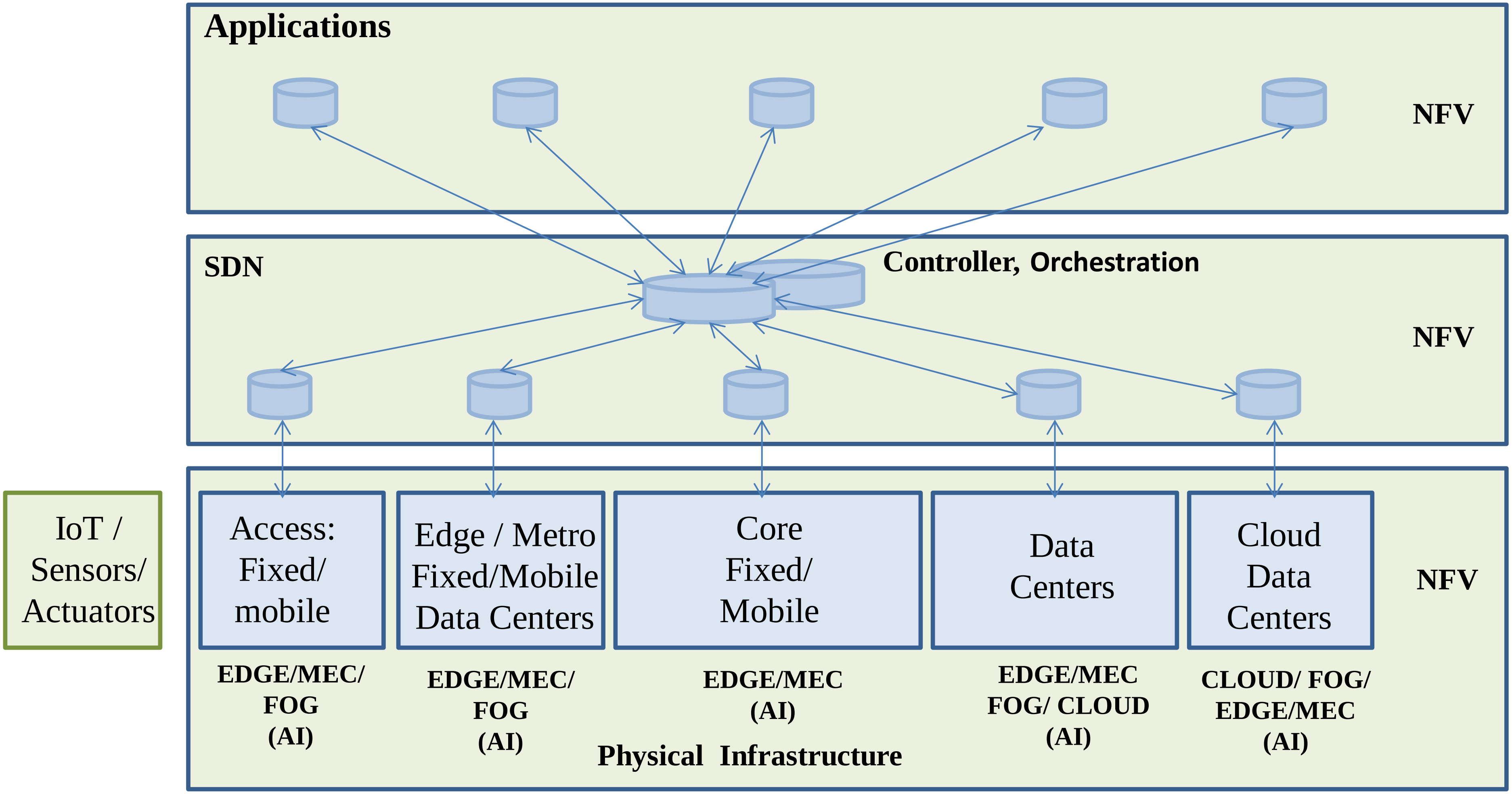


ICEBERG

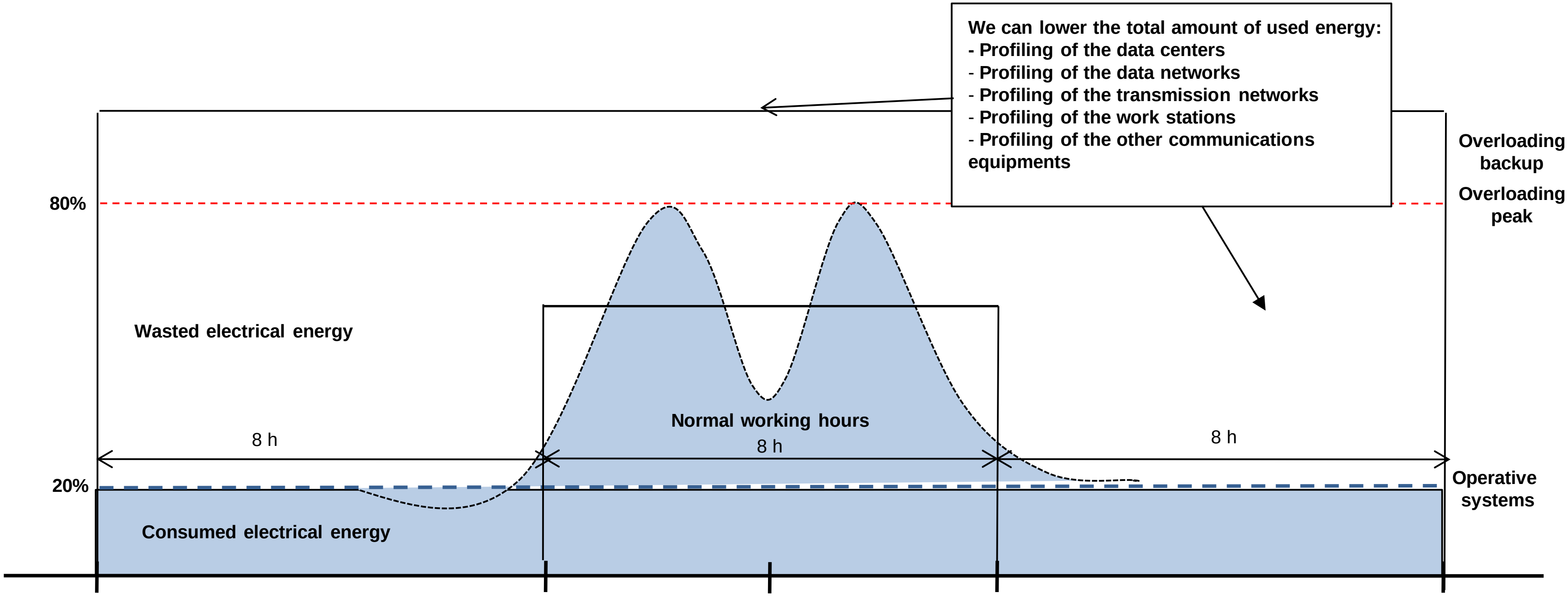


INFRASTRUTUURIEN VIRTUALISOINNIT

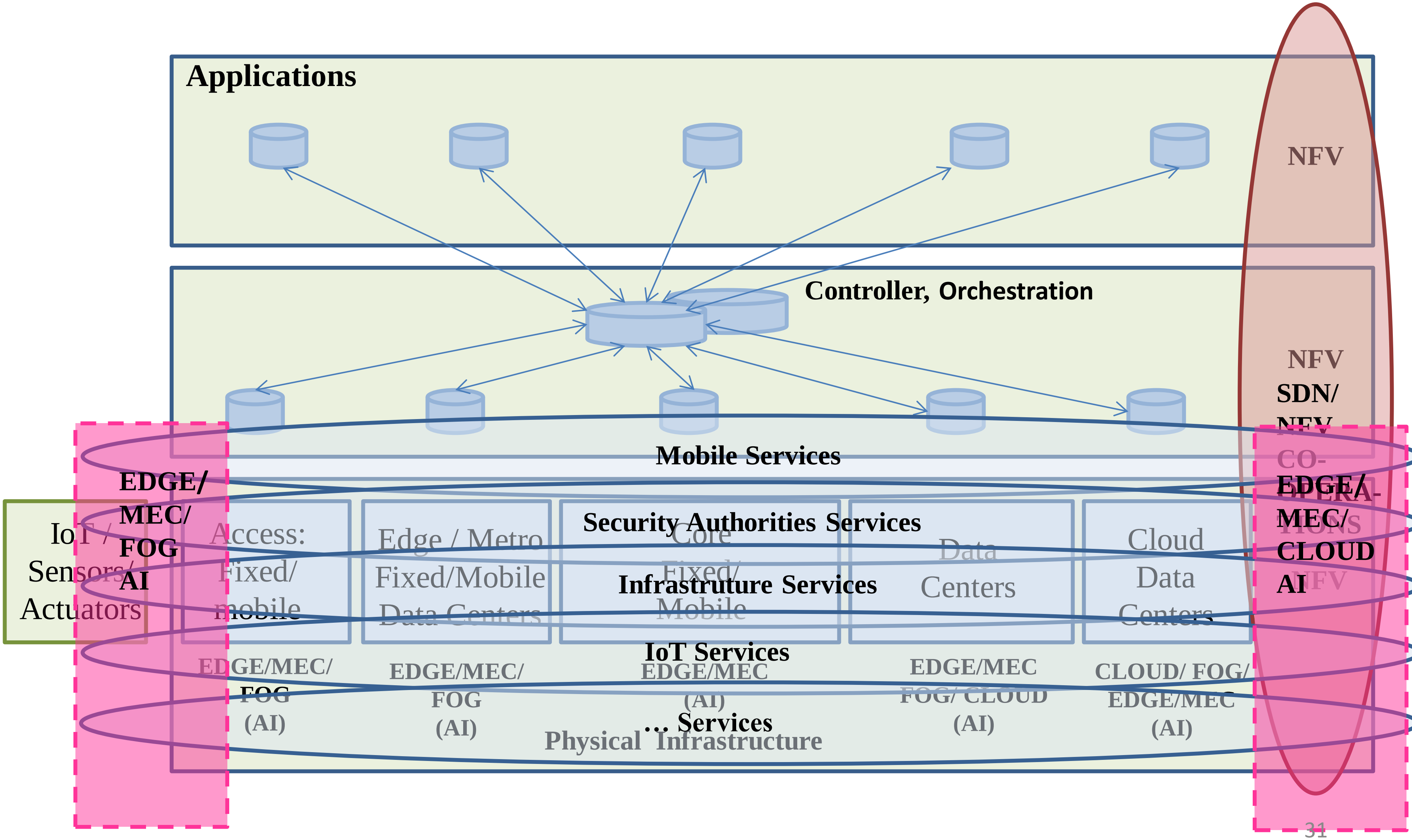
Architecture of The Future Networks, Virtualization



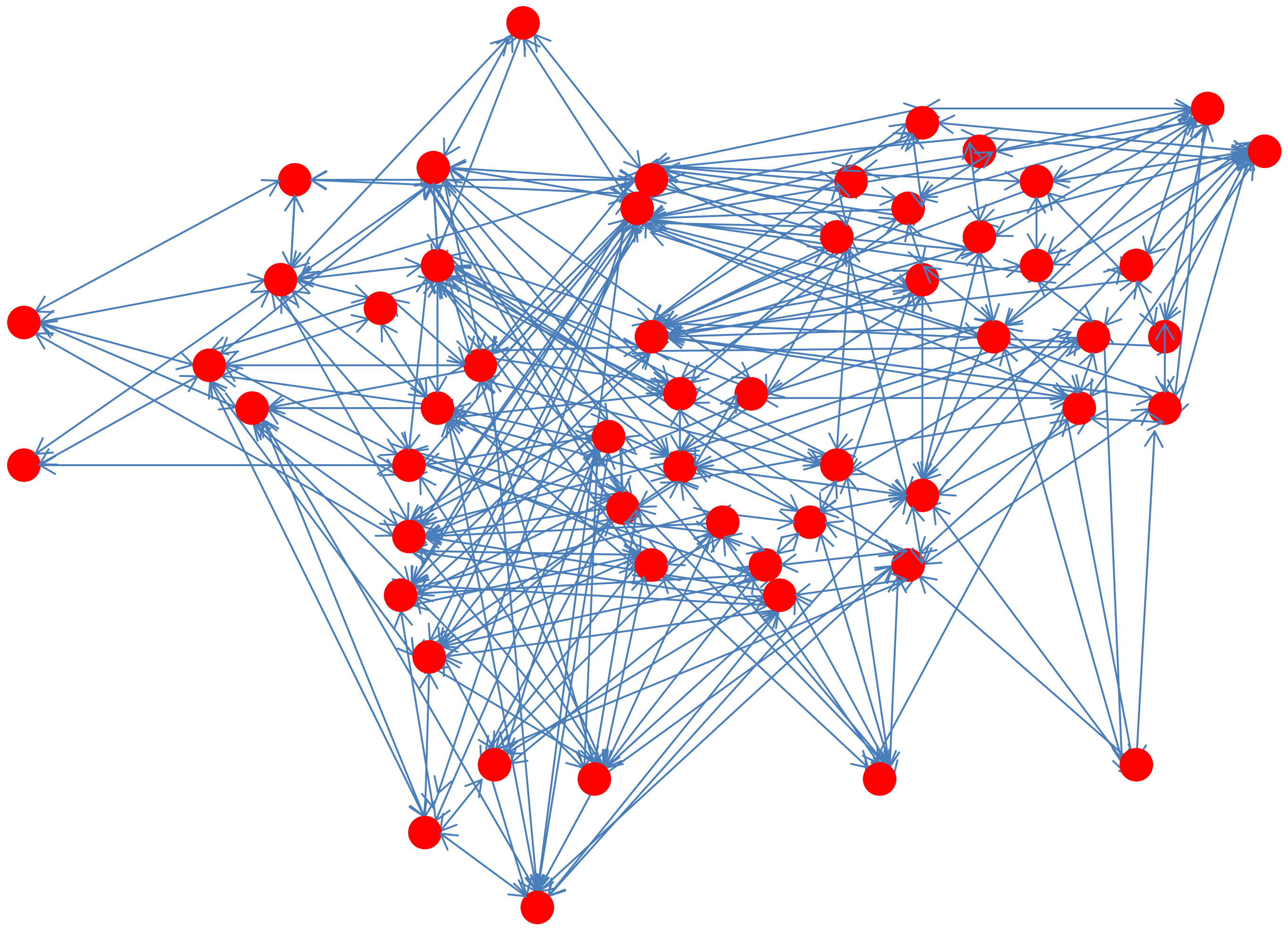
The distribution of services during the day and night, the decreasing amount of used energy by profiling, example



Architecture of The Future Networks, Virtualization and Slicing

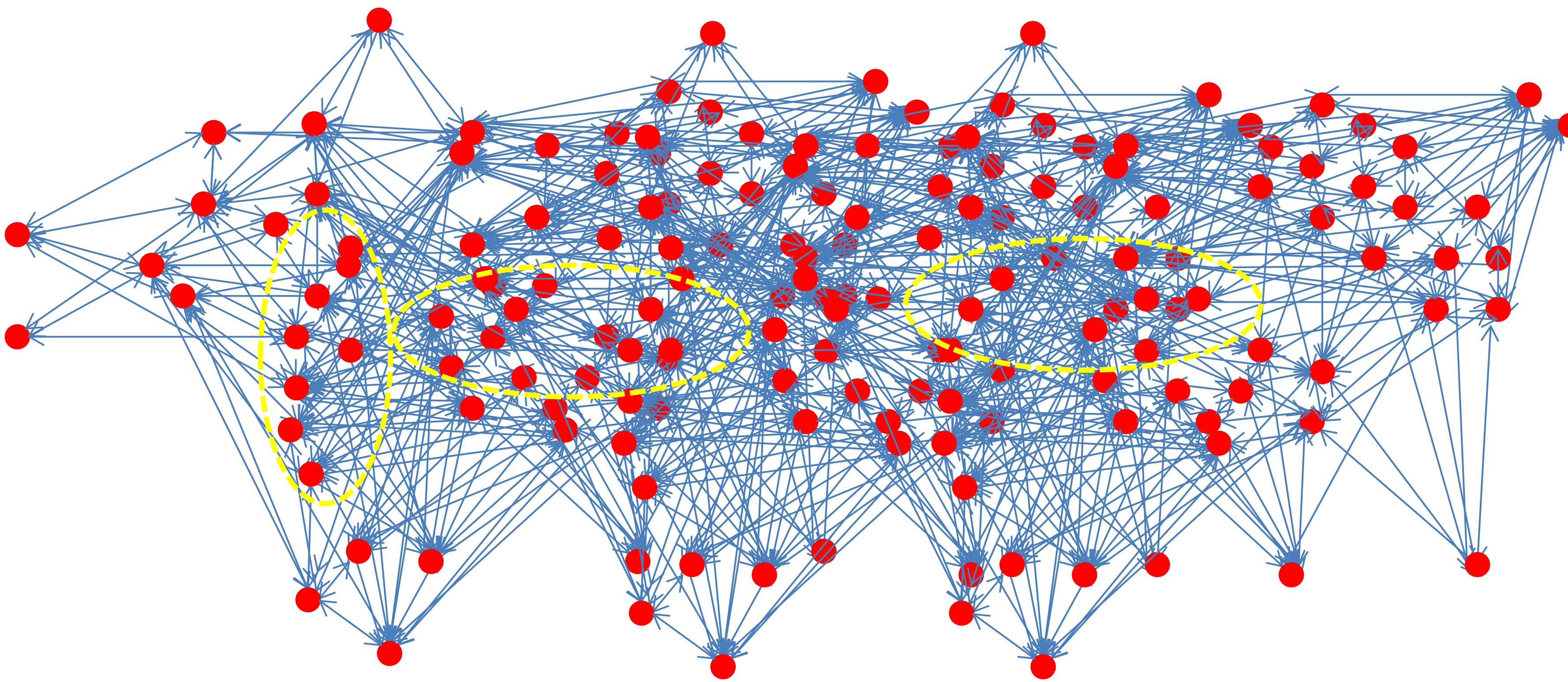


Active nodes of ecosystems and informations flows



Active nodes of ecosystems and informations flows with AD HOC groups

Integrations, federations, cooperations, security, …



Public Ecosystem

STIV Ecosystem

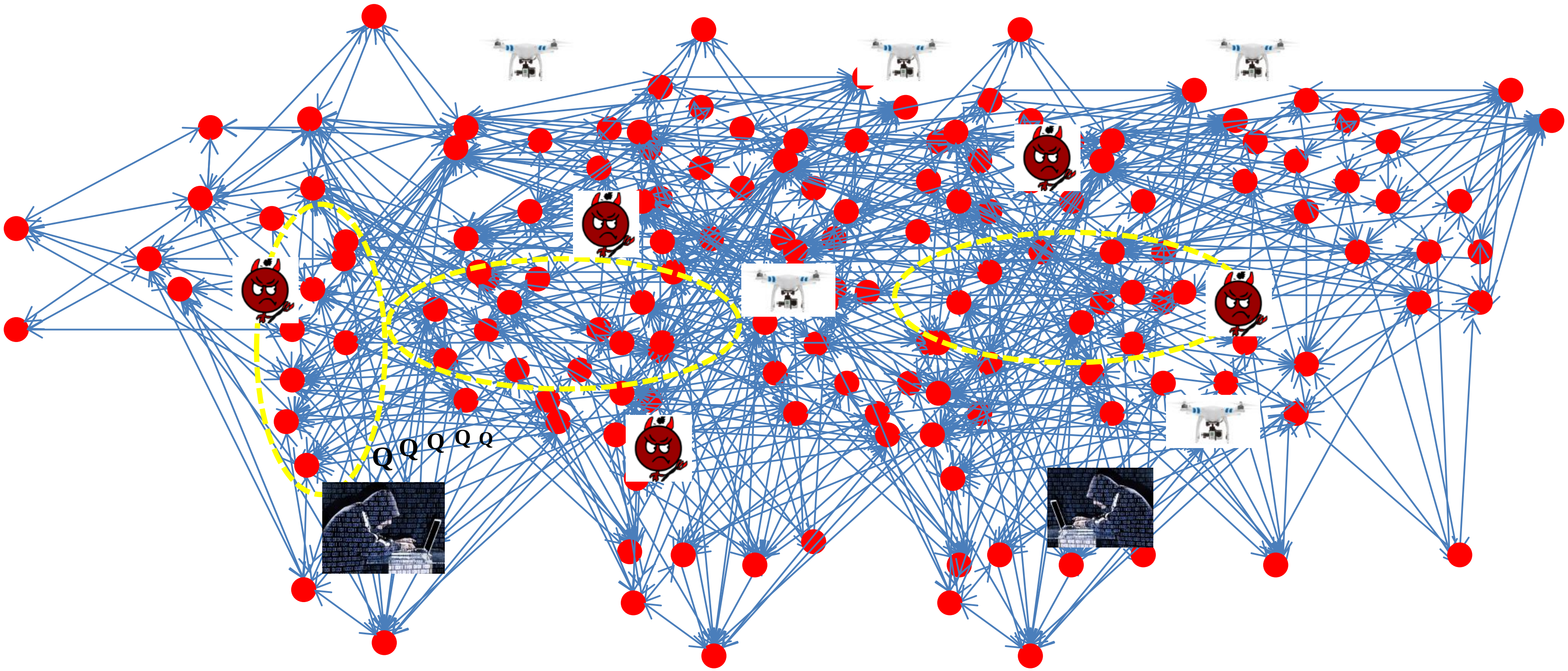
STIII Ecosystem

(STII) Ecosystem

(STI) Ecosystem

Active nodes of ecosystems and informations flows with AD HOC groups

Integrations, federations, cooperations, security, …



Public Ecosystem

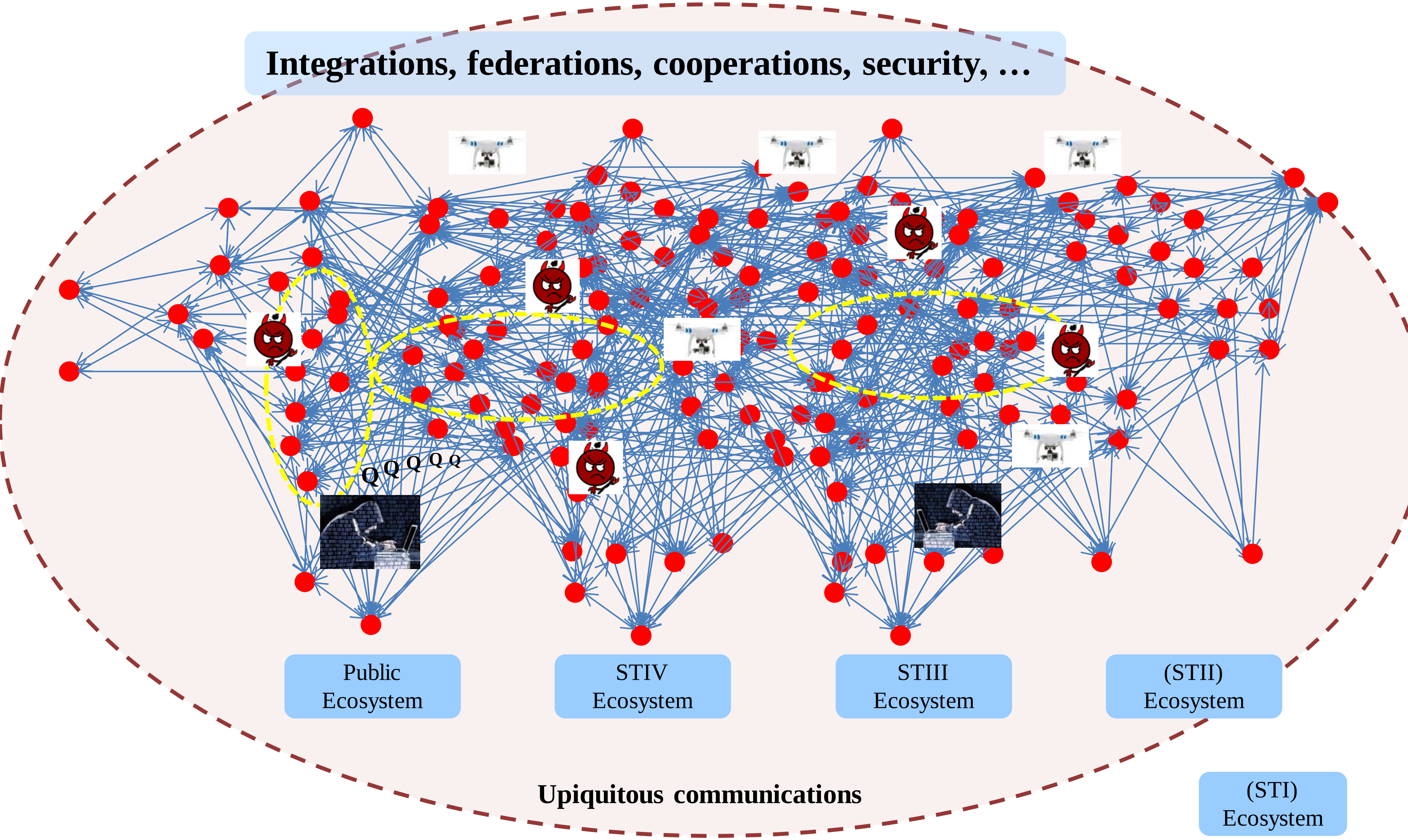
STIV Ecosystem

STIII Ecosystem

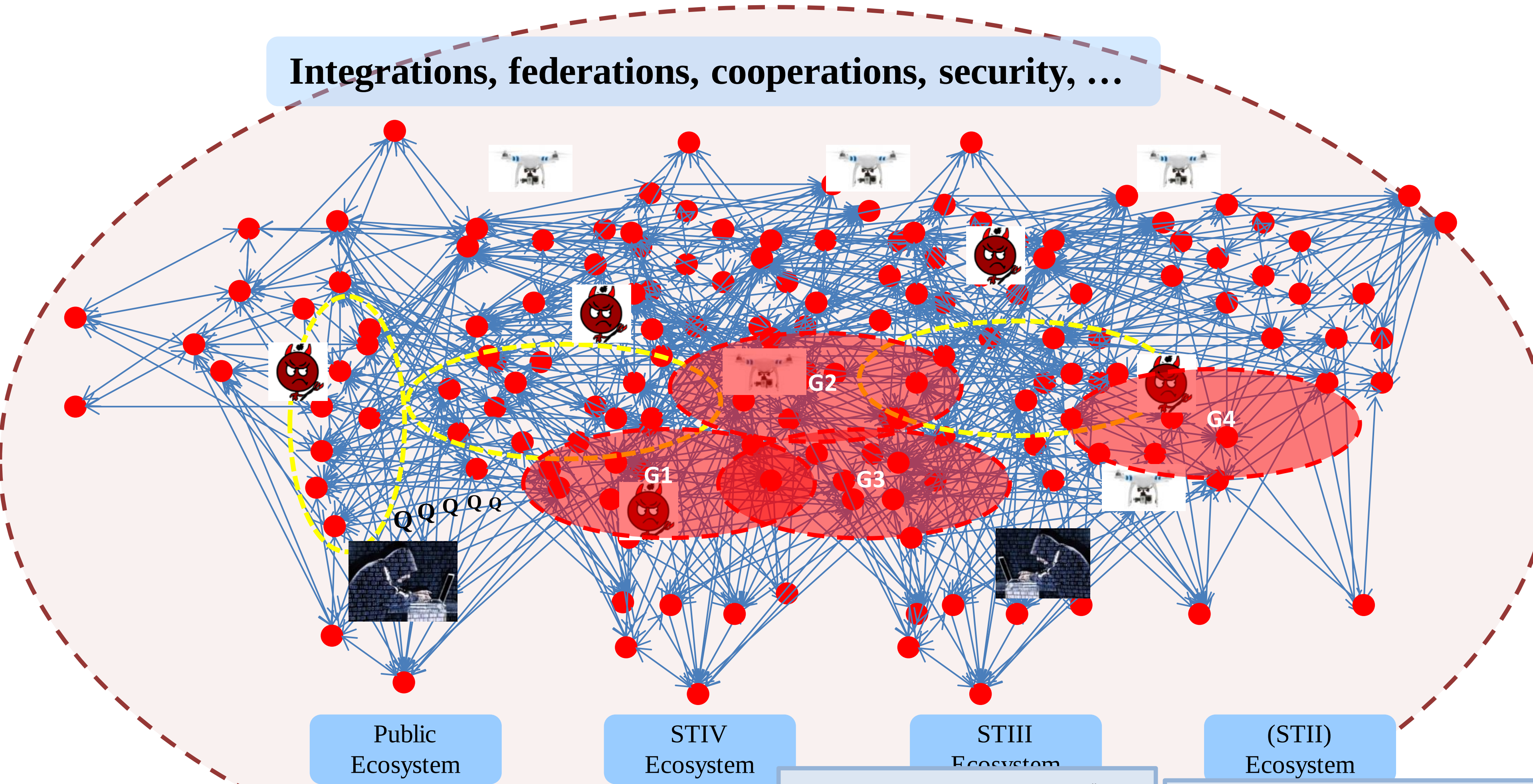
(STII) Ecosystem

(STI) Ecosystem

Active nodes of ecosystems and informations flows in hyber connected world



Active nodes of ecosystems and informations flows in hyber connected world, case military



KESKITETTY/HAJAUTETTU KÄYTTÄJÄN- JA PÄÄSYNHALLINTAHALLINTA, LUVITUS ROOLIEN / TEHTÄVIEN / VASTUIDEN MUKAAN,

SERVICE DESK PYSTYY PALVELEMAAN KÄYTTÄJÄÄ KÄYTTÄJÄLLE LUODUN KÄYTTÄJÄN- JA PÄÄSYNHALLINNASSA TEHTYJEN ROOLIEN / TEHTÄVIEN /

SIEM JA LOGITUS VOIDAAN TEHDÄ MM. HUOMIOIDEN SERVICE DESK / KÄYTTÄJÄN –- JA PÄÄSYNHALLINAN TOIMINNALLISUUDET KÄYTTÄJÄLLE KÄYTTTÄJÄN- JA PÄÄSYNHALLINNASSA TEHTYJEN ROOLIEN / TEHTÄVIEN /

SDN AVULLA HALLITAAN NFV, EDGE, MEC, FOG, CLOUD, KÄTKÖMUISTEJA, LOHKOKETJUJA JNE. RESURSSEJA SDN ON LIITETTYNÄ KÄYTTÄJÄN- JA PÄÄSYNHALLINTAAN, SERVICEDESK TOIMINTOON, CMDB

AIKA- JA SYNKRONOINTIPALVELU

Ote arkkitehtuurikuvauksesta “Puolustusvoimien viestintäverkon tavoitearkkitehtuuri 2012” vuodelta 2007 modifioituna

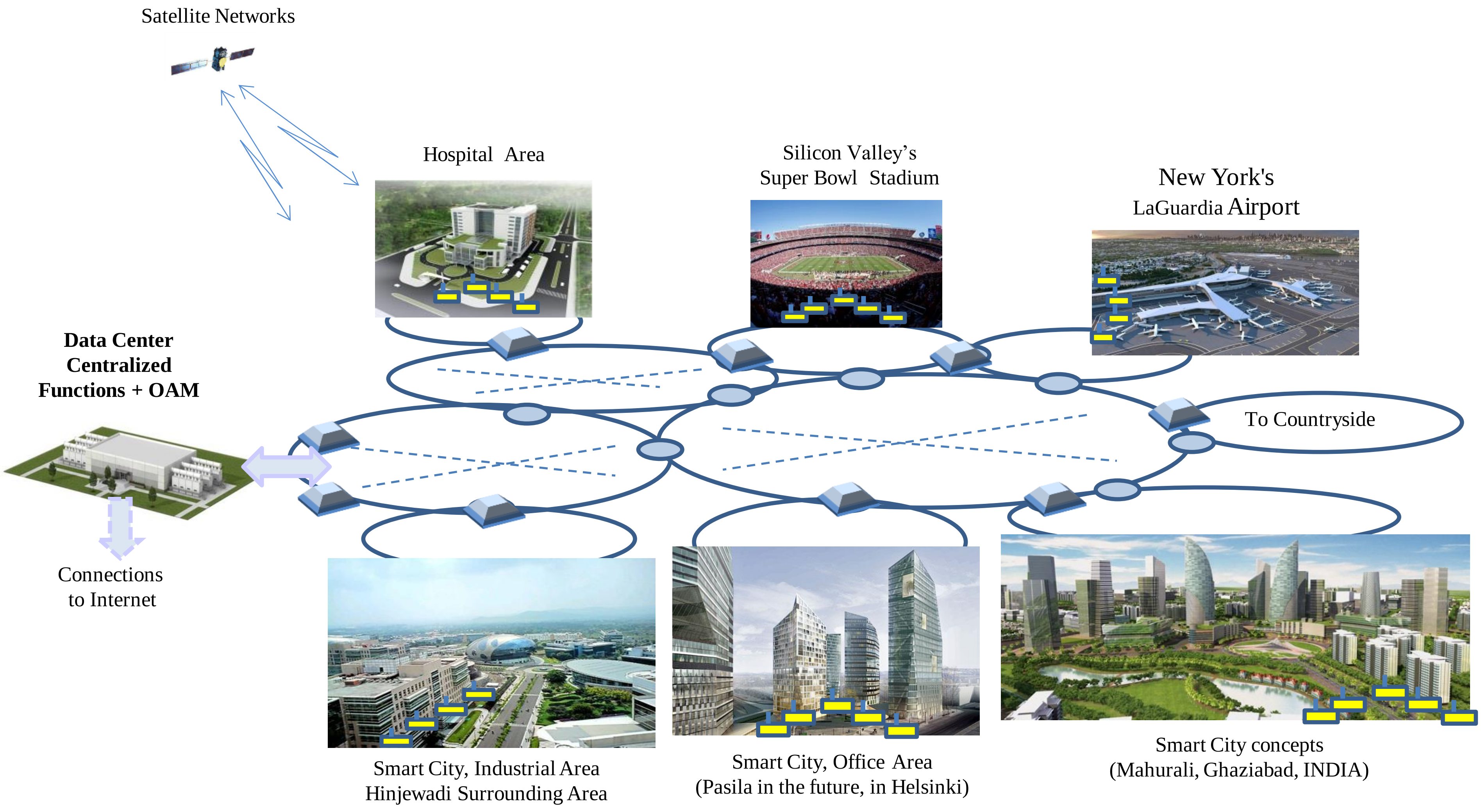
”Yhteisen tietoliikennealustan sovelluksineen pitää skaalautua kaikille viestintäverkon verkkokerroksille ja antaa mahdollisuus yhteistoiminta-operaatioihin alueella kuin alueella verkon topologiasta ja verkon osa-alueesta riippumatta horisontaalisesti ja vertikaalisesti taktisten verkkojen tarpeet huomioiden.

Kun katsotaan NGN-verkon tulevaisuuden topologiaa, turvallisuusviranomaiset joutuvat tekemään siviiliverkoista poiketen omaan ratkaisuunsa ns. **”ÄLYKKÄÄN LIITYNTÄVERKKO-OSUUDEN”**, jotta JOINT-operaatiot olisivat viestintäverkon puolesta mahdollisia millä verkon osa-alueella tahansa, jos valtakunnalliset tuotantoverkon palvelinhotellit tuhoutuvat tai ne menetetään kokonaan kriisitilanteessa. **Viestintäverkkoon tarvitaan ”sielu” (uusia Middleware -tason palveluja, älyä verkon reunalle), jotka hoitavat asiat automaattisesti kuntoon tilanteessa kuin tilanteessa?** Tämä ”sielu” löytyy tulevaisuuden kognitiivisista/adaptiivisista tietoliikenneverkoista, joissa on käytössä joko optista tai langatonta tiedonsiirtotekniikkaa ja joissa kognitiivisuus/adaptiivisuus on integroituna ominaisuutena verkossa sisälle.”

Uusi virtuaalinen toimintaympäristö vaatii tilannetajua /-tietoisuutta

= Tarjottavien palveluiden täytyy olla tietoturvallisia ja mukautua / reagoida reaaliaikaisesti virtuaalisen toimintaympäristön muutoksiin.

Data Networks and Services in the Future (Universal Network)



Technologies in the Future: SDN, SDMN, SON, ASON, QDK, Quantum Computing, Containerization, Virtualization, 0-energy

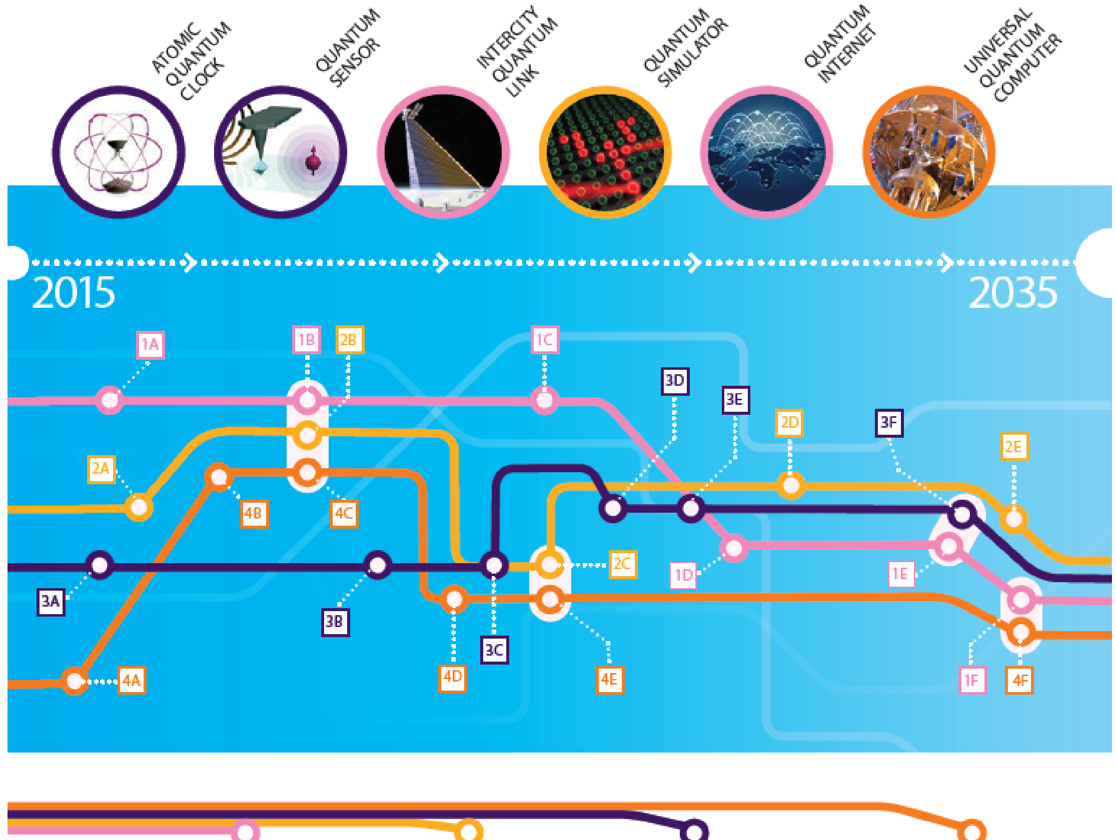
Data center (DC)

Intelligent Access Node

EU Quantum Manifesto, A New Era of Technology

Draft – March 2016

Quantum Technologies Timeline



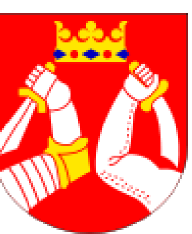
	1. Communication	2. Simulators	3. Sensors	4. Computers
0 – 5 years	A Core technology of quantum repeaters B Secure point-to-point quantum links	A Simulator of motion of electrons in materials B New algorithms for quantum simulators and networks	A Quantum sensors for niche applications (incl. gravity and magnetic sensors for health care, geosurvey and security) B More precise atomic clocks for time stamping of high-frequency financial transactions	A Operation of a logical qubit protected by error correction or topologically B New algorithms for quantum computers C Small quantum processor executing technologically relevant algorithms
5 – 10 years	C Quantum networks between distant cities D Quantum credit cards	C Development and design of new complex materials D Versatile simulator of quantum magnetism and electricity	C Quantum sensors for larger volume applications including automotive, construction D Handheld quantum navigation devices	D Solving chemistry and materials science problems with special purpose quantum computer > 100 physical qubit
> 10 years	E Quantum repeaters with cryptography and eavesdropping detection F Secure Europe-wide internet merging quantum and classical communication	E Simulators of quantum dynamics and chemical reaction mechanisms to support drug design	E Gravity imaging devices based on gravity sensors F Integrate quantum sensors with consumer applications including mobile devices	E Integration of quantum circuit and cryogenic classical control hardware F General purpose quantum computers exceed computational power of classical computers

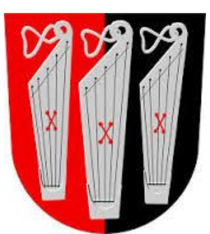
JA LOPUKSI…

PALJON KIITOKSIA MATKASTA VAHTI –TOIMINNAN PIIRISSÄ KAIKILLE VAHTI- TOIMINTAAN OSALLISTUNEILLE JA OSALLISTUVILLE

TARINA JATKUU…

MINUN OSALTANI MATKA JATKUU
KYBER – JA TIETOTEKNISTEN HAASTEIDEN
TUTKIMUKSEN PUOLELLA …






Moskovan rauhan raja
Hattuvaara
RajaJP 3
Korentovaara
176. Divisioona
JP 6
Ilajanjärvi
289. Divisioona
ILOMANTSI
Kuolismaa
III/21 Pr.
Möhkö


TURVALLISTA MATKAA 100 VUOTIAALLE SUOMELLE
KIITOKSIA
Aarne Hummelholm