

What will Silicon Valley driven High Tech. industries do to change personalized health? Inflammation, Infection and Diet

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June 3rd , 2014

Aging Well: Philips Lifestyle View

- Philips is a major healthcare company
- However, there are limits to growth in health care costs: i.e. 1/5 of GDP is invested in health
- Investment in health will continue to give great returns
- However, other pathways emerge, Golden days of medical imaging in developed economies are past, other technologies emerge such as Stem cells.
- Example: massive investment in AZ treatment give no useful clinical result.
- What next? New business cases emerge

Power of Google, Ebay, Amazon, LinkedIn,

- Search and the ability to match **need to supply**
- Metadata of Life: what is going on in the world
 - Creating a System of logistics and transport
 - Experiment with new models for real-time systems and quantum computing
- Real power is in HATEOAS : using the Internet via data analytics
- Google driving society to Lifestyle 6.0

Also the Internet drives the Human Condition : HATEOAS

- **HATEOAS**, an abbreviation for **Hypermedia as the Engine of Application State**, is a constraint of the [REST application architecture](#) that distinguishes it from most other network application architectures. The principle is that a client interacts with a network application entirely through [hypermedia](#) provided dynamically by application servers. A REST client needs no prior knowledge about how to interact with any particular application or server beyond a generic understanding of hypermedia.
- Not only metadata but also captures the state-machines of human interaction with people and services, and now the service to service interaction.
- Essence of Industry4.0 and CPS or Cyber Physical System

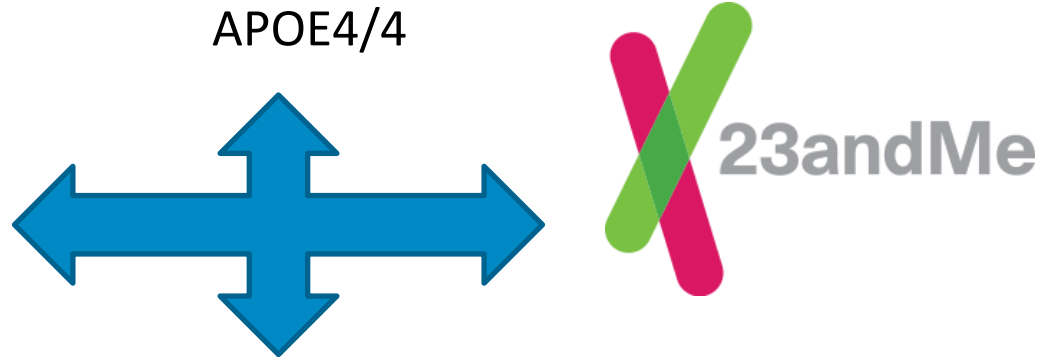
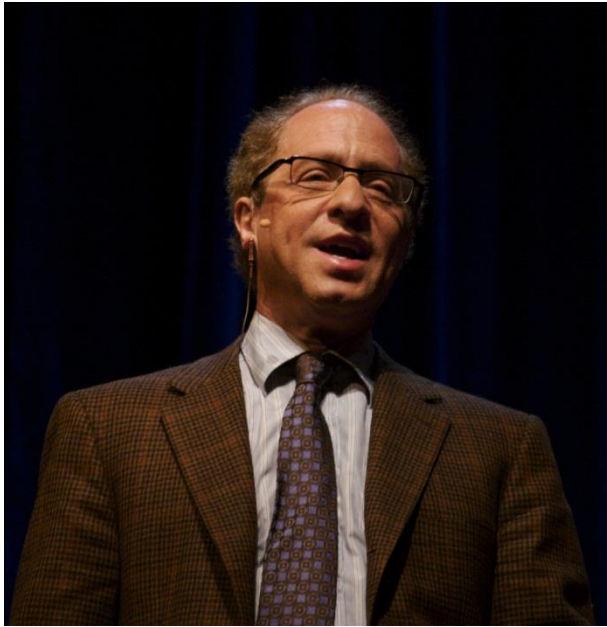
Google and Silicon Valley have a lot of influence.

- Google and Lifestyle: Ray Kurzweil
- Ray Kurzweil is Dr. Singularity:
- Exponential growth of AI: beyond that of human intelligence
- Ray Kurzweil is APOE4/4: which gives him a unique perspective on genes and lifestyle: Epigenetics.
- Ray is guessing what Lifestyle6.0 is like, but he sets his nets very wide.

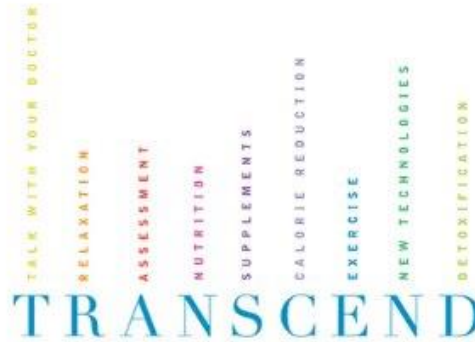
Human lifestyle Inflammation, Infection and Diet

- Lifestyle 0.0 : pre-modern: doom of bipeds and the basic tools
 - The simple life
- Lifestyle 1.0: Modern humans: The spear and fats; APOE2/3
 - The death of the mega fauna
- Lifestyle 2.0: Domestication of animals and plants
 - A bitter necessity:
- Lifestyle 3.0: Age of empires
 - Give them corn
- Lifestyle 4.0: Black death and a ice age to industry
 - The deadly infections
- Lifestyle 5.0: Modern industrial: Obesity problem
 - Low level systemic inflammation: metabolic syndrome, CVD, AZ
- Lifestyle 6.0 : Next phase : Transcend : to live for ever

Human lifestyle and Google: Chronic Disease



Wojcicki founder of 23andme is married to [Google](#) co-founder [Sergey Brin](#)



RAY KURZWEIL AND
TERRY GROSSMAN, MD

What is the problem: Chronic disease



Ageing CRISIS? *Trends and outlook*

Medical and health outcomes in the EU

Multiple chronic conditions

=>80% of people over 65 affected with heart failure, diabetes, depression, hypertension, osteoarthritis, osteoporosis etc.

=>75% of health spending on chronic illnesses (large direct & indirect costs; e.g. IT on diabetes >6% of health exp.)

Neurological degeneration

=> **Alzheimer's disease** - 60% of aged 65+ with dementia

=> dementia incidence in 2030 - 40% (from 9.9 mio to 13.95 mio)

=> €160.3 bio total EU care costs of dementia, €22.194/per (dementia)

Loss of physical functions

=>**musculoskeletal conditions** (MSCs): 150 diseases and syndromes

=>economic burden of >€ 240 bio/y on state budgets (health care costs, work-disability, sick leave and premature retirement)

Incidence of falls and fractures

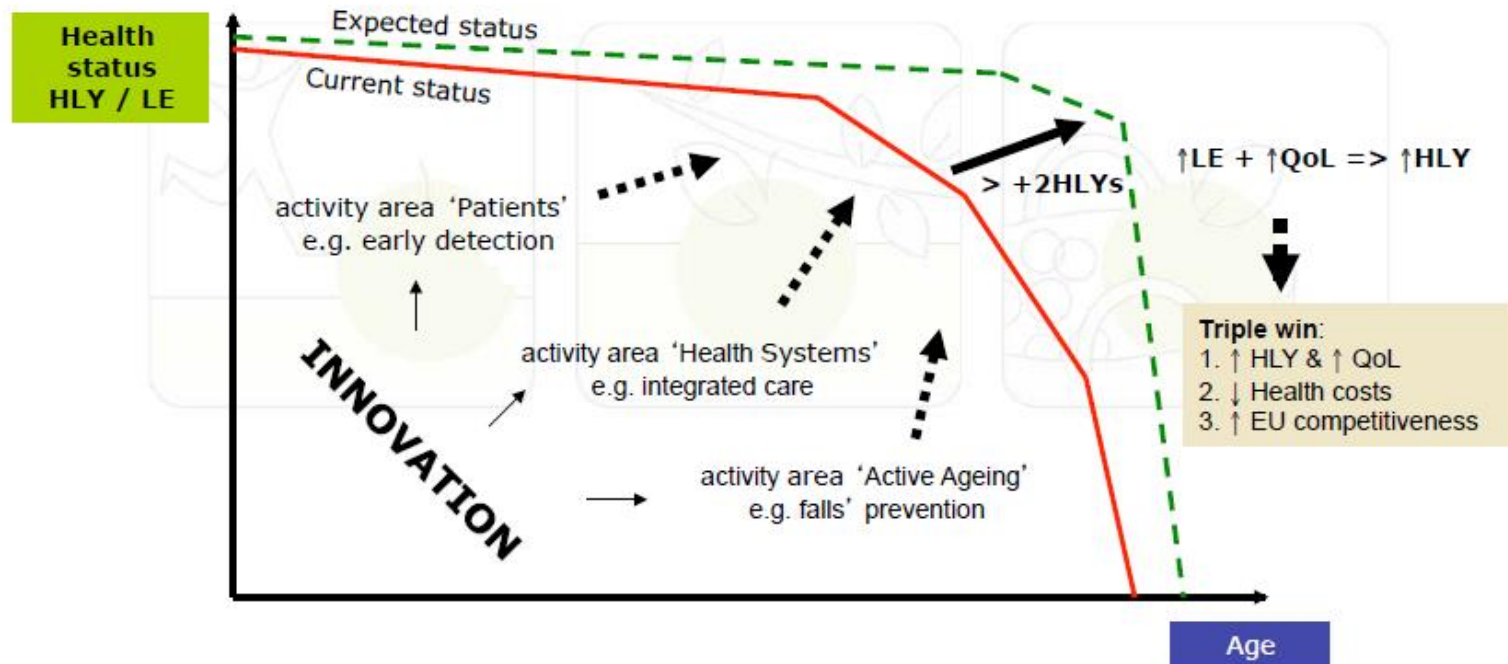
=> **falls**: 1/3rd of +65 fall at least 1/yr => economic burden >€15bio/y

=> **fractures**: 24% women and 33% men die within 1 year after fracture incidence

Cost to the EU of Aging: 2 HLY is little

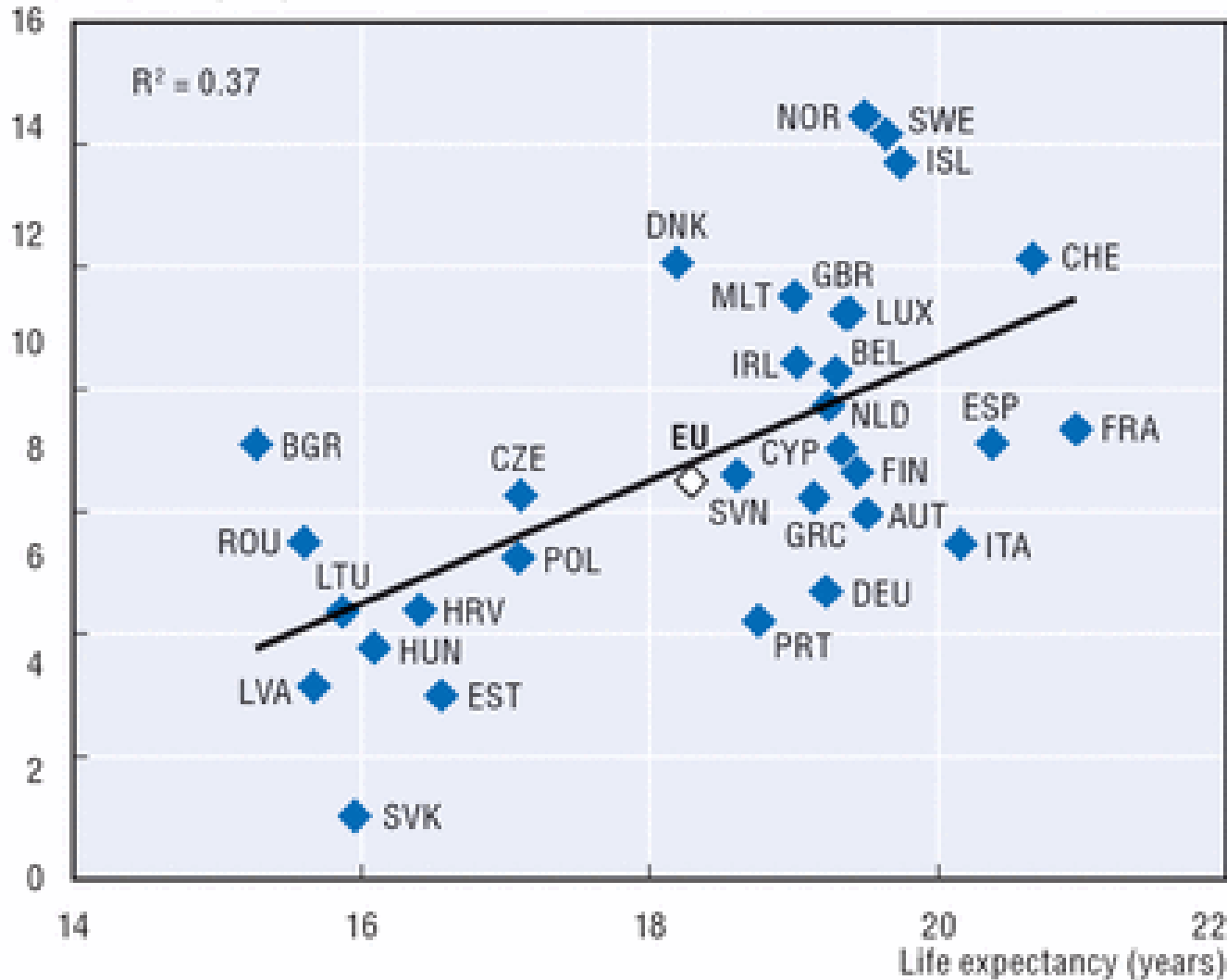


Innovation for HLY+2 and 'triple win for Europe'



Cost to the EU of Aging: Chronic Disease Burden at 65 years old

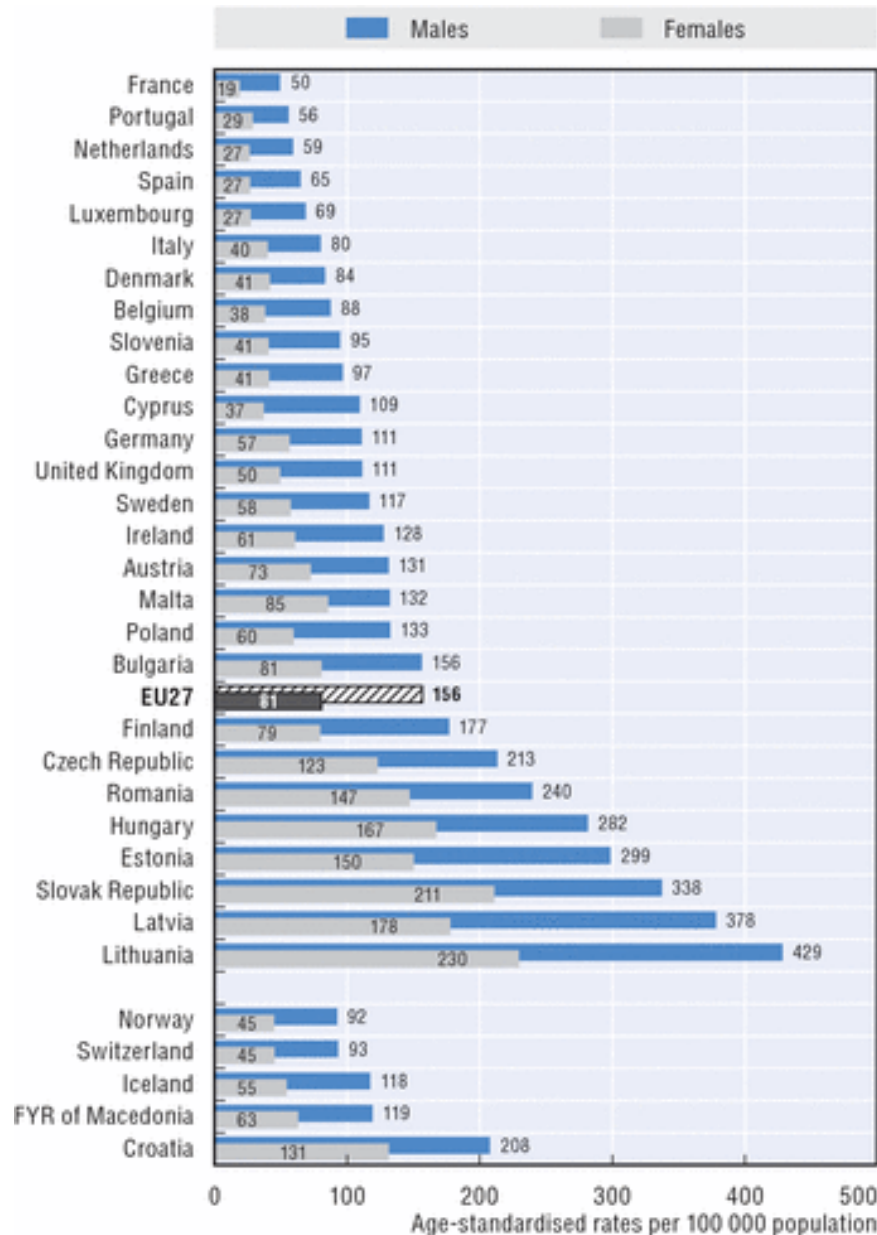
Healthy life years (HLY)



Cost to the EU of Aging: Chronic Disease Burden

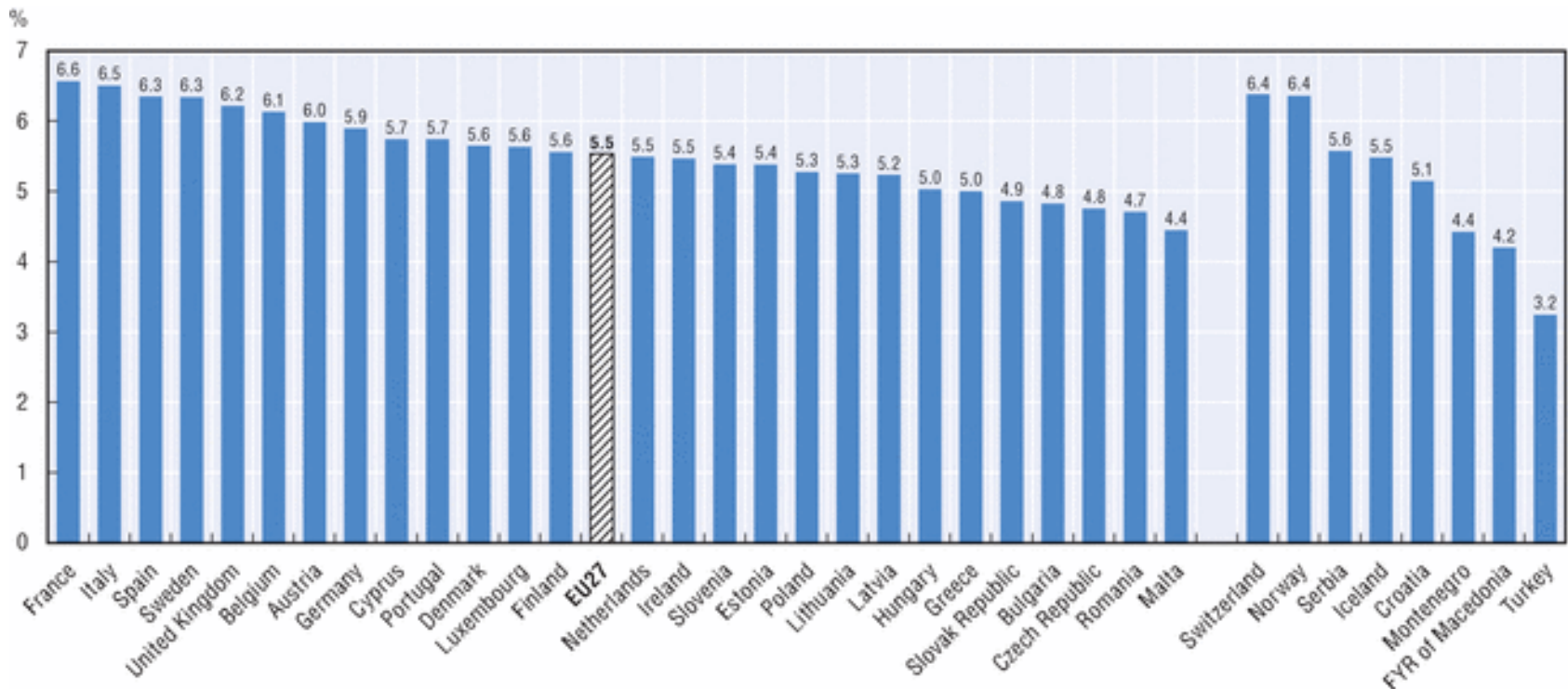
- Heart Disease mortality Rates OECD 2010

French Paradox:
What is it?



Cost to the EU of Aging: Chronic Disease Burden

- Prevalence of dementia, population aged 60 years and over, OECD 2009



Biology of Chronic Disease

- For most of history humans died of infection: Our defenses are ready for that task
- Human now die from effects of low level systemic inflammation over lifetime leading to chronic disease in age. genetics and epigenetics: CVD, AZ, DBII,...
- Dementia: early onset form of Alzheimer's as a gene, susceptibility to late onset Alzheimer's due to lifestyle effects.
- Dominate problem is APOE4: closely related to diet and exercise
- Many animal studies of APOE4 disease in humans, genes, i.e. but the epigenetics have to come from human lifestyle: diet, exercise, smoking, alcohol, stress, sleep, oral care, etc.
- The leverage of smart systems on health is in the influence on Lifestyle

Human Condition: Adapt to Survive

- Through out history: Humans died of Infection: Immune systems are tuned to that process of survival in a much different environment.
- Less violence to body yet more bacteria
- Food and diets changed
- Eye are the windows to soul, mouth is door to the body
 - Caring for teeth became essential: Philips product
 - sharing the insight on product and services innovation

Aging Well: Transition from Good Life to Elderly

- Diet: sugar, salt, trans-fats, tends to get to very personal issues
 - Combination of hard regulation of sources for whole population
 - Smoking and trans fats are good examples
 - Education and enlightenment for the specific issues
 - Hypertension control is a more personal issue in diet
 - How to promote interest in diet: Biomaker conditioning
 - Diet much more complex: Costly in terms of sustainability of the economy
- Exercise: Education and promotion: Sport industry love this...
- Oral care
 - Not new; part of lifestyle for over 1.6 million years
 - But ready for innovation
- Body care in general: Skin and pain management

Smart Systems for Lifestyle Improvement

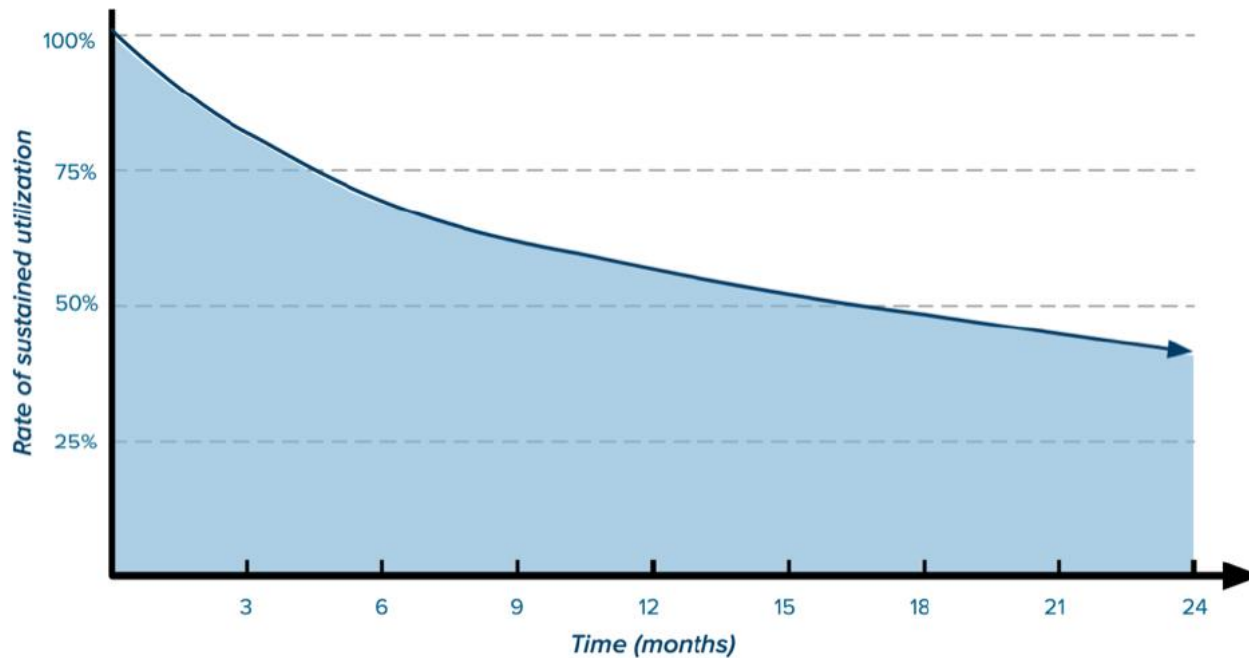


Technologies

- Wearables
- Smart Handhelds: Bath room and Bed room
- **Presence** in the home/office: Move from Apps to Avatars or Presence
- Projection of the Internet Everywhere: **Presence**
 - IoT
 - Cyber Physical Systems: Beyond Industry4.0 must be Lifestyle6.0

Smart Systems alone are not enough

- Services from the Society or Internet ; Direct Life is part of Weight Watchers
- Lifestyle improvement via the devices needs support



*Declining Rate of Sustained Activity Tracker Use Over Ownership
(Endeavour Partners, September 2013)*

Smart Systems and Biology needs coupling

- Oral care: Who is developing the new devices: Oral disease is the most common co-morbidity in old age.
- Pain relief and hypertension dominated by medication: 40 and 66 Billion euro markets:
- Do we have the institution research programme to impact lifestyle as we can health
- What is the biological basis of Lifestyle 6.0?

Conclusions

- Biology insight for devices : Population insight for services
- Data analytics of Lifestyle will be vital to services
- CPS will move from Industry 4.0 to Lifestyle 6.0
 - Diet, exercise, stress, sleep, medication issues
- Regulation need to ensure equality of education for a healthy lifestyle across Europe. Employ the scalability of the Internet
- Ray Kurzweil (Google) say ***we can live for ever***,
are our horizons too limited in Europe

