Bio-digital convergence
- the hidden plan, yet in plain sight.
Top-down decision.
Why? How? With whom?

Dr. Geanina Hagimă

publications.gc.ca/site/eng/9.881083/publication.html

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Exploring biodigital convergence : what happens when biology and digital technology merge?

https://publications.gc.ca/site/eng/9.881083/publication.html

What is biodigital convergence?

Biodigital convergence is the interactive combination, sometimes to the point of merging, of digital and biological technologies and systems. Policy Horizons is examining three ways in which this convergence is happening.

1 Full physical integration of biological and digital entities

Digital technology can be embedded in organisms, and biological components can exist as parts of digital technologies. The physical meshing, manipulating, and merging of the biological and digital are creating new hybrid forms of life and technology, each functioning in the tangible world, often with heightened capabilities.

2 Coevolution of biological and digital technologies

This type of biodigital convergence emerges when advances in one domain generate major advances in the other. The coevolution of biological and digital sciences and technologies enables progress in each domain that would be impossible otherwise. This could lead to biological and digital technologies that are developed as integrated or complementary systems.

https://publications.gc.ca/collections/collection_2021/hpc-phc/PH4-185-2019-eng.pdf

UNIUNEA EUROPEANA
Fondul Social European

GUVERNUL ROMÂNIEI
Ministerul Dezvoltării Regionale
și Administrației Publice

PODCA
INOVAȚIE ÎN ADMINISTRAȚIE

Instrumente Structurale
2007-2013

PORTAL LEGISLATIV

ACASĂ | DESPRE PROIECT | FACILITĂȚI OFERITE | LEGĂTURI UTILE | GDPR

CUPRINS

Forme act
Forma consolidata
+ istoric consolidări

LEGE nr. 293 din 3 noiembrie 2022

pentru prevenirea și combaterea cancerului

EMITENT PARLAMENTUL ROMÂNIEI

Publicat în MONITORUL OFICIAL nr. 1077 din 8 noiembrie 2022

https://legislatie.just.ro/Public/DetaliiDocumentAfis/261246

Noul Parteneriat pentru medicina personalizată, care urmează să fie înființat în 2023 și finanțat în cadrul programului Orizont Europa, va identifica prioritățile pentru cercetare și educație în medicina personalizată, va sprijini proiectele de cercetare privind prevenirea, diagnosticul și tratamentul cancerului și va face recomandări pentru lansarea abordărilor medicale personalizate în practica medicală zilnică. Ca acțiune pregătitoare pentru parteneriat, Comisia Europeană va stabili o foaie de parcurs către prevenția personalizată, identificând lacunele din cercetare și inovare, și va sprijini o abordare pentru cartografierea tuturor anomaliilor biologice cunoscute care duc la susceptibilitatea la cancer, inclusiv a cancerelor ereditare.

Medicina personalizată va beneficia, de asemenea, de High-Performance Computing. Combinarea datelor de sănătate ale unei persoane cu monitorizarea în timp real prin dispozitive inteligente și farmacocinetică va constitui baza pentru crearea unui geamăn digital (digital twin) al fiecărei persoane. Acest lucru va valorifica potențialul abordărilor medicale personalizate și va spori strategiile de screening și prevenire, diagnosticele rapide și conceptele terapeutice individualizate.

Pe de altă parte, acest plan are în vedere o inițiativă prin care să se asigure accesul rapid la servicii de depistare, diagnosticare și tratament în cazul cancerelor pediatrice.

Personalised medicine will also benefit from **High-Performance Computing**. Combining an individual's health data with real-time monitoring through smart devices and pharmacokinetic will form the basis to create a digital twin (i.e. virtual representation) of each person. This will leverage the potential of personalised medicine approaches, and enhance targeted screening and prevention strategies, rapid diagnoses and individualised therapeutic concepts.

https://health.ec.europa.eu/document/download/26fc415a-1f28-4f5b-9bfa-54ea8bc32a3a_en

Standardization institutions

- **IEC International Electrotechnical Commission -** is an international standards organization that prepares and publishes **international standards for all electrical, electronic and related technologies** – collectively known as "electrotechnology". The **IEC cooperates closely with the International Organization for Standardization (ISO)** and the **International Telecommunication Union (ITU**). In addition, it works with several major standards development organizations, including the **IEEE** with which it signed a cooperation agreement in 2002, which was amended in 2008 to include joint development work.
- **IEEE Institute of Electrical and Electronics Engineers** - an American 501(c)(3) professional association for electrical engineering, electronics engineering, and other related disciplines.
- **ITU -International Telecommunication Union –**is a specialized agency of the United Nations responsible for many matters related to information and communication technologies. **The ITU promotes the shared global use of the radio spectrum, facilitates international cooperation in assigning satellite orbits, assists in developing and coordinating worldwide technical standards, and works to improve telecommunication infrastructure in the developing world.** It is also **active** in the areas of broadband Internet, optical communications (including optical fiber technologies), wireless technologies, aeronautical and maritime navigation, radio astronomy, satellite-based meteorology, TV broadcasting, amateur radio, and **next-generation networks**.

Standardul IEEE 1906.1: Nanocomunicațiile ca o nouă sursă de date

Editura: IEEE

Sebastian Canovas-Carrasco ; Antonio-Javier Garcia-Sanchez ; Joan Garcia-Haro Toți autorii

Abstract:
Comunicațiile la scară nanometrică reprezintă o nouă paradigmă care cuprinde toate acele preocupări legate de schimbul de informații între dispozitive la scară nanometrică. Este avută în vedere o infrastructură de rețea constând dintr-o cantitate imensă de nano-dispozitive pentru a asigura o transmisie de date robustă, fiabilă și coordonată. Acest lucru va permite o multitudine de aplicații și servicii viitoare în multe domenii de cercetare diferite, cum ar fi medicina personalizată, biologia sintetică, știința mediului sau industria, ceea ce va duce la progrese remarcabile și fără precedent. Standardul IEEE P1906.1 oferă un cadru conceptual și general pentru a stabili punctul de plecare pentru dezvoltările viitoare în rețelele de comunicații la scară nanometrică. Această lucrare trece în revistă cele mai recente recomandări IEEE P1906.1, observându-le principalele caracteristici atunci când sunt aplicate în zona de nanocomunicații electromagnetice (EM). Contribuim prin identificarea și discutarea principalelor deficiențe ale standardului, cărora trebuie să se dedice eforturi de cercetare ulterioare. De asemenea, oferim linii directoare interesante pentru focalizarea obiectului investigațiilor viitoare.

Publicat în: 2017 ITU Kaleidoscope: Challenges for a Data-Driven Society (ITU K)

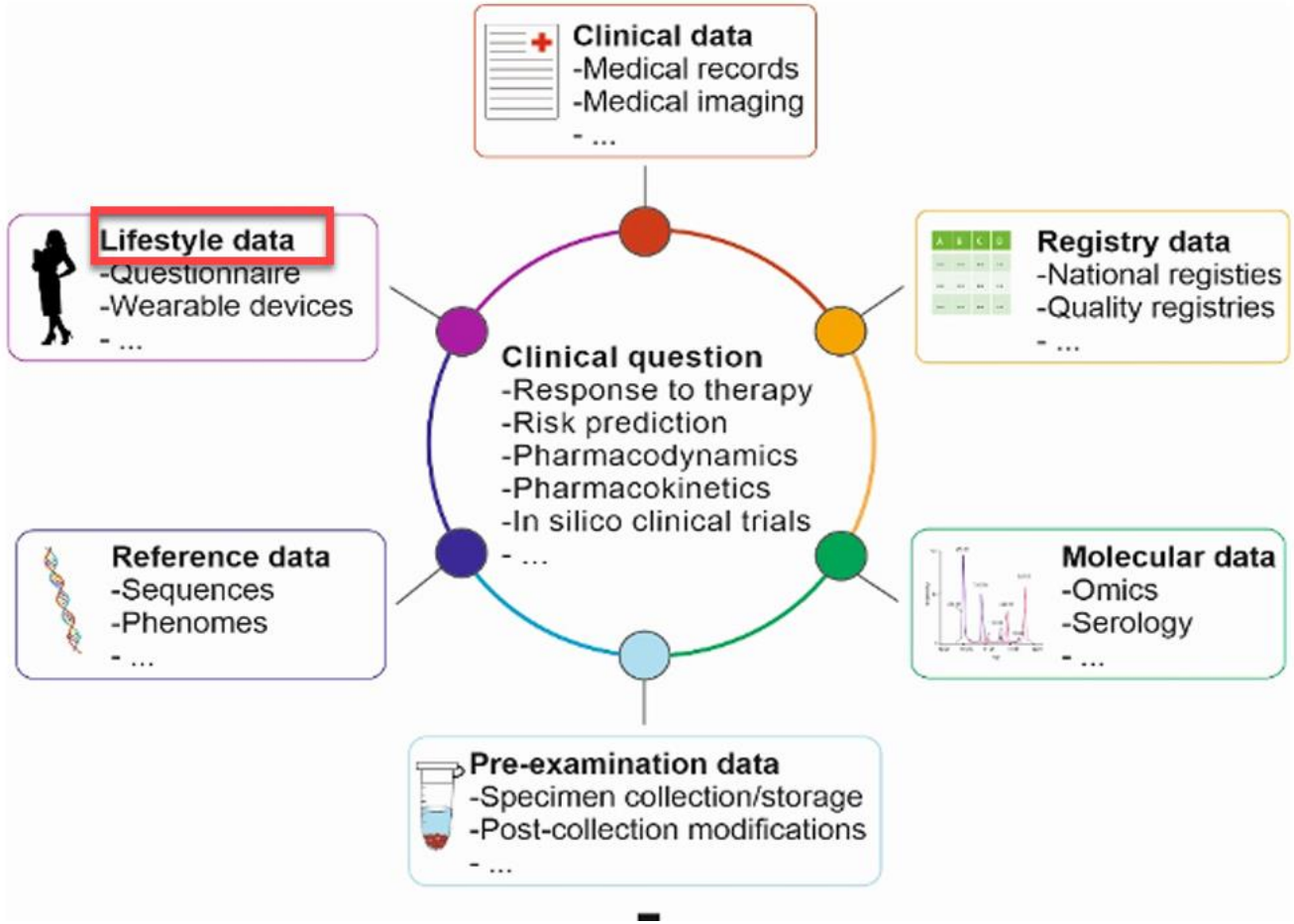
https://ieeexplore.ieee.org/document/8247001

Bio-digital convergence standardization opportunities IEC (2024-04-29)

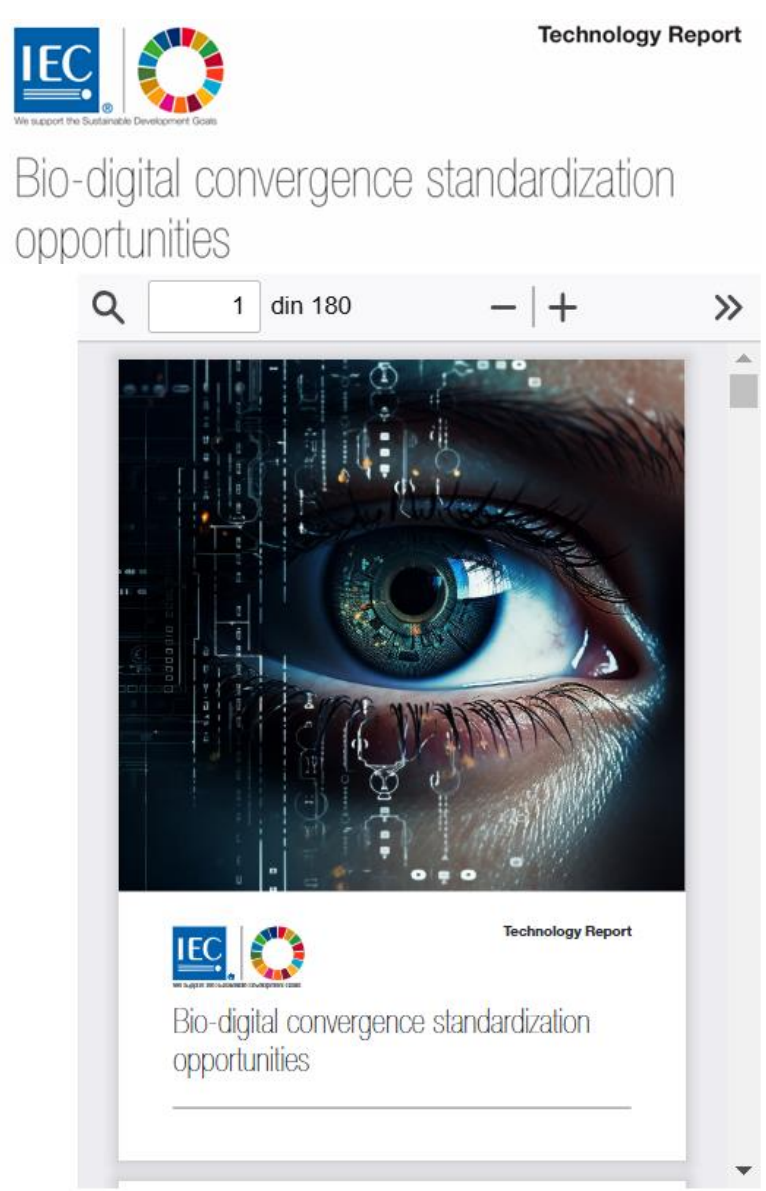
3.3 Human digital twins/virtual human twins

3.3.1 Description

The human digital twin or virtual human twin (VHT) is an integrated multiscale, multi-time, and multi-discipline digital representation of quantitative human physiology and pathology that plays an important role for personalized medicine approaches. Its realization through



https://www.iec.ch/basecamp/bio-digital-convergence-standardization-opportunities



Bio-digital convergence standardization opportunities

2024-04-29

Available for download: English

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The term bio-digital convergence denotes the convergence of engineering, nanotechnology, biotechnology, information technology and cognitive science. While the concept is at least 20 years old, developments in the area have been turbocharged by the fast-paced changes and evolution of information and digital technologies.

Such multi-disciplinary solutions are key to tackling global environmental, governmental and societal challenges. Breakthroughs in biomedical devices, artificial organs and stem cell research have been vital to modern healthcare solutions. Agricultural bioengineering or genetic engineering of food helps address global challenges around hunger and economic welfare. Strides in environmental monitoring are crucial to managing clean air, water or soil. With a rapidly evolving technology landscape, it becomes imperative for standards around the area to co-evolve to ensure efficient progress.

https://www.iec.ch/basecamp/bio-digital-convergence-standardization-opportunities

Technology Report

Bio-digital convergence standardization opportunities

https://www.iec.ch/basecamp/bio-digital-convergence-standardization-opportunities

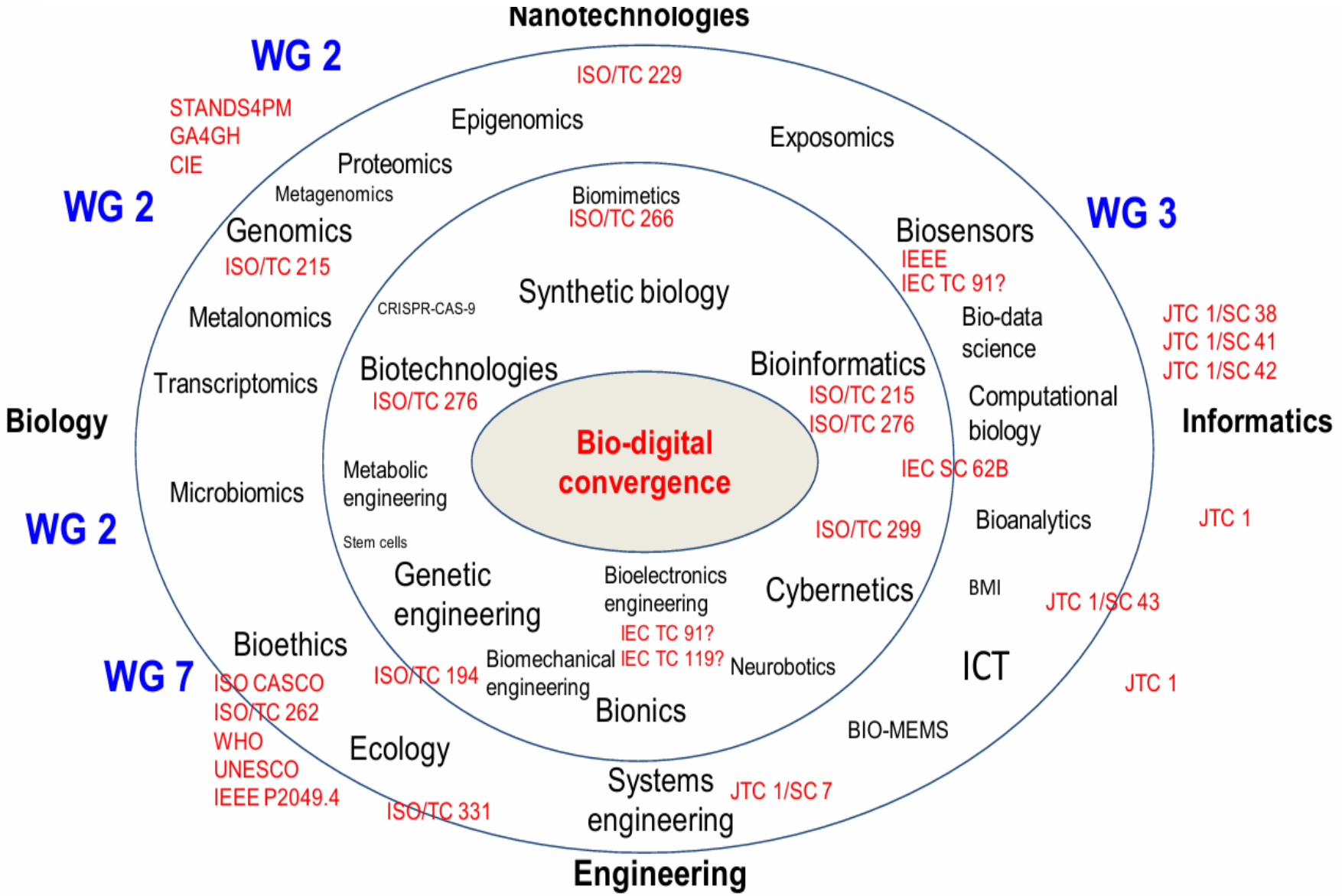


Figure 1 | Bio-digital convergence components

Bio-digital convergence standardization opportunities

https://www.iec.ch/basecamp/bio-digital-convergence-standardization-opportunities

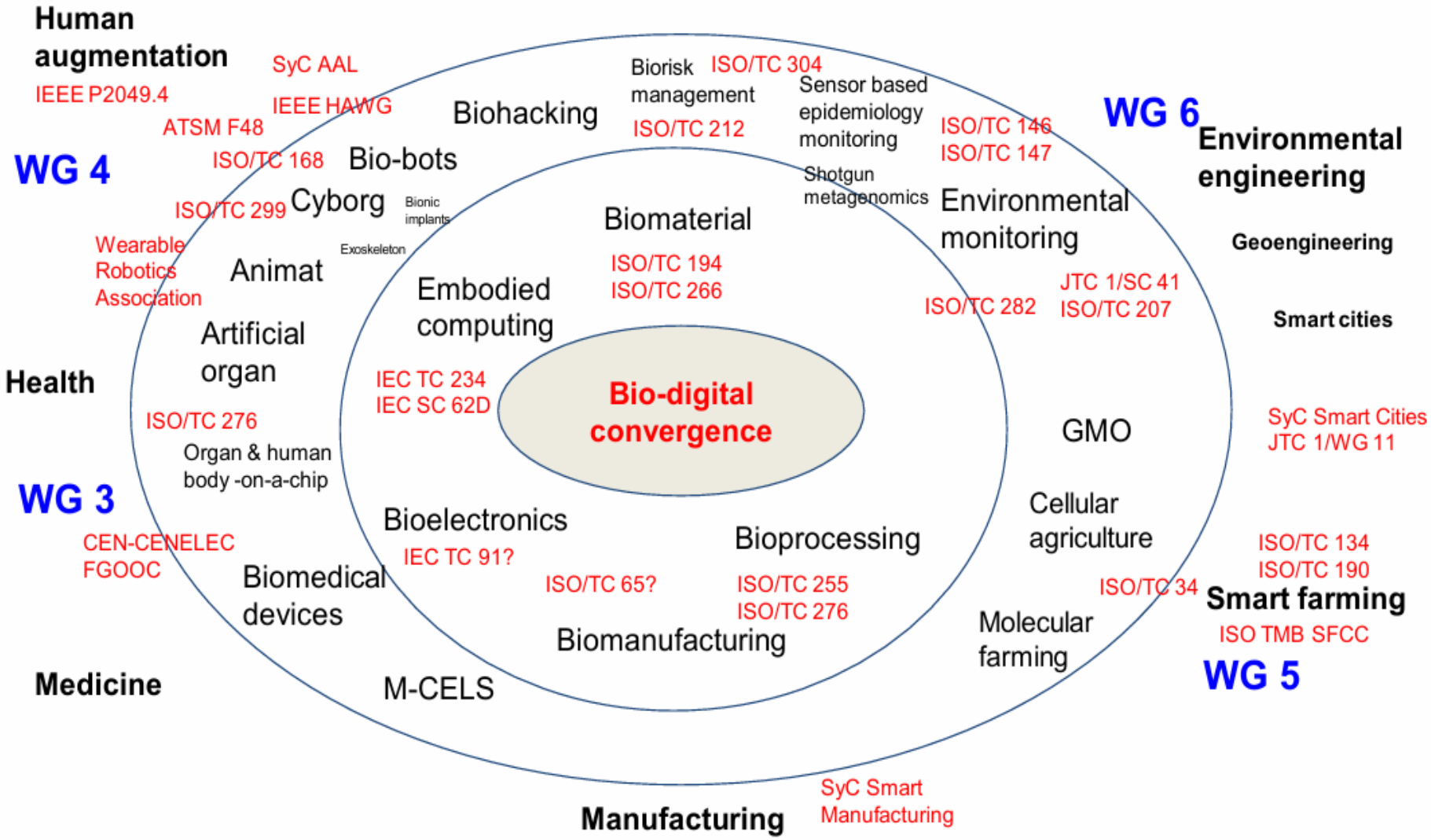


Figure 4 | Bio-digital convergence applications

Future Standards for Bio-digital – Convergence

UCL - University College London

IEC SEG 12 established six Working Groups, each tasked with exploring critical issues related to bio-digital convergence in the current standardization landscape and identifying potential standardization opportunities. These Working Groups focus on the following areas:

- Working Group 1: Reverse Engineering of Living Systems (“WG1”)
- Working group 2: Life Systems and Bioengineering (“WG2”)
- Working group 3: Human Augmentation Technologies (“WG3”)
- Working group 4: Agricultural Bioengineering (“WG4”)
- Working group 5: Environmental Bioengineering (“WG5”)
- Ad-hoc Working Group: Bio-digital convergence ethical and societal considerations (“ahG7”)

https://www.ucl.ac.uk/steapp/sites/steapp/files/1_final_report_-_future_standards_for_bio-digital_convergence.pdf

https://www.itu.int/en/journal/j-fet/2021/003/Pages/default.aspx

- The **Terahertz (THz) band from 0.1 THz to 10 THz will be of paramount importance for wireless communications in the next decade**.
- In particular, **due to its abundant frequency resources,** the THz band will be a key to overcome the spectrum scarcity and capacity limitations inherent to current wireless systems.
- It is anticipated that THz band communications **will enable unprecedented applications both at the macro-scale and at the nano-scale**, ranging from high-speed satellite communications, ultra-high-capacity wireless fronthaul/backhaul in cellular networks, ultra-high-speed short-distance data transfer between devices, to inter/intra-chip communications and **instantaneous data exchange between nano-scale devices.**

https://www.itu.int/dms_pub/itu-s/opb/jnl/S-JNL-VOL2.ISSUE3-2021-PDF-E.pdf

National Science and Technology Council
Committee on Technology
Interagency Working Group on Nanoscience, Engineering and Technology (IWGN)

Nanotechnology Research Directions: IWGN Workshop Report

Vision for Nanotechnology R&D in the Next Decade

SEPTEMBER 1999

About the National Science and Technology Council

President Clinton established the National Science and Technology Council (NSTC) by Executive Order on November 23, 1993.

https://www.nano.gov/sites/default/files/IWGN_rd.pdf

There are numerous other potential applications of nanoscience to biology:

- Rapid, efficient **genome sequencing**, revolutionizing diagnostics and therapeutics
- **Effective and less expensive healthcare using remote and in-vivo devices**
- **New formulations and routes for drug delivery** that enormously broaden their therapeutic potential by effecting **delivery of new types of medicine to previously inaccessible sites in the body**
- More durable, **rejection-resistant artificial tissues and organs**
- **Sensor systems** that detect emerging disease in the body, which will shift the focus of patient care from **disease treatment to early detection and prevention**

Interagency Working Group on Nanoscience, Engineering and Technology (IWGN)

Chair: M.C. Roco, NSF
White House IWGN Co-chair: T.A. Kalil, Special Assistant to the President, W.H. Economic Council
Vice-chair: R. Trew, DOD
Executive Secretary: J.S. Murday, NRL
Members:

White House:	T.A. Kalil
OSTP:	K. Kirkpatrick
NSTC:	J. Porter
OMB:	D. Radzanowski
DOC:	P. Genther-Yoshida, M.P. Casassa (NIST), R.D. Shull (NIST)
DOD:	R. Trew, J.S. Murday (NRL), G.S. Pomrenke (AFOSR)
DOE:	I.L. Thomas, R. Price, B.G. Volintine
DOT:	R.R. John, A. Lacombe (Volpe Center)
DoTREAS:	E. Murphy
NASA:	S. Venneri, G.H. Mucklow, M. Meyyappan (NASA Ames), T. Krabach (JPL)
NIH:	J.A. Schloss, E. Kousvelari
NSF:	M.C. Roco, T.A. Weber, M.P. Henkart

Public Affairs Consultant: J. Canton

https://www.nano.gov/sites/default/files/IWGN_rd.pdf

WORLD ECONOMIC FORUM

COMMITTED TO IMPROVING THE STATE OF THE WORLD

The Fourth Industrial Revolution

During the summer of 2015, Professor Schwab proposed that the theme of Annual Meeting 2016 focus on the incredible speed and scale with which technology is disrupting all industries and economies around the world. Reflecting on the wealth of work by a wide range of experts on the impacts of digitisation and emerging technologies, including in depth work by the Forum itself, Schwab realised that these changes were of such a fundamental nature that they constitute nothing less than a new industrial revolution. This led to the World Economic Forum Annual meeting 2016 theme becoming "Mastering the Fourth Industrial Revolution", to a series of expert consultations in Abu Dhabi in November 2015 and to Professor Schwab writing in under three months a best-selling book on the dramatic ways in which technology, business and society are co-evolving.

The fourth industrial revolution describes a global transformation characterized by the convergence of digital, physical, and biological technologies. These technologies are influencing societies, economies and individuals in ways that are changing not just the world around us but the very idea of what it means to be human. The resulting transformation is historic in terms of its size, speed, and scope. This transformation is

https://www3.weforum.org/docs/Media/AM17/AM17_4IR.pdf

As powerful technologies such as artificial intelligence, advanced materials, augmented reality, 3D printing and new computing technologies become increasingly affordable and ultimately ubiquitous, they are altering the way we produce, consume, communicate, move, generate energy, and interact with one another. And given the new powers in genetic engineering and neurotechnologies, they may directly impact who we are and how we think and behave. The fundamental and global nature of this revolution also poses new threats related to the disruptions it may cause—affecting labor markets and the future of work, income inequality, and geopolitical security as well as social value systems and ethical frameworks.

Over the course of 2016, the Forum has deepened and extended its work on technology and society, and in October 2016 announced a new office, to open in San Francisco in February 2017: the World Economic Center for the Fourth Industrial Revolution. The Center will accelerate global cooperation for effectively and efficiently governing of the fourth industrial revolution, helping corporations, governments, civil society leaders, researchers and other stakeholders to realize the greatest positive societal impact from new technologies and scientific developments.

Unless we govern the fourth industrial revolution properly then its full economic and social potential will not be realised. As Gillian Hadfield, Professor of law and economics at the University of Southern California, argues, this means that rethinking how we make new rules is as important as deciding what rules we need. Governance is a sine qua non of economic and social progress: to be responsive and responsible in the fourth industrial revolution, during the course of 2017 leaders across all sectors need to work together to create agile governance models for an inclusive, prosperous, human-centred future.

https://www3.weforum.org/docs/Media/AM17/AM17_4IR.pdf

- A proof that the fourth industrial revolution **was not the demand of the people but the decision of organizations like the World Economic Forum**, and that Human Rights were violated.
- “And if we look at other **implications of the fourth industrial revolution**, I just want to mention the impact this revolution has on us. **It changes not only what we do, it changes us**. We create algorithms but algorithms can change us and our behavior. And we haven't really thoughts what it means. **But this again amplifies the fear of people who feel they are losing control,** and then of course they try to find protection in believing in, let's say, more populist approaches.”

2019 World Economic Forum Founder Klaus Schwab on the Fourth Industrial Revolution - https://www.youtube.com/live/CVIy3rjuKGY between minutes 21.16 - 23.06

WORLD ECONOMIC FORUM

COMMITTED TO IMPROVING THE STAT OF THE WORLD

Global Agenda

Top 10 Emerging Technologies of 2016

By the World Economic Forum's Meta-Council on Emerging Technologies

June 2016

https://www3.weforum.org/docs/GAC16_Top10_Emerging_Technologies_2016_report.pdf

Contents

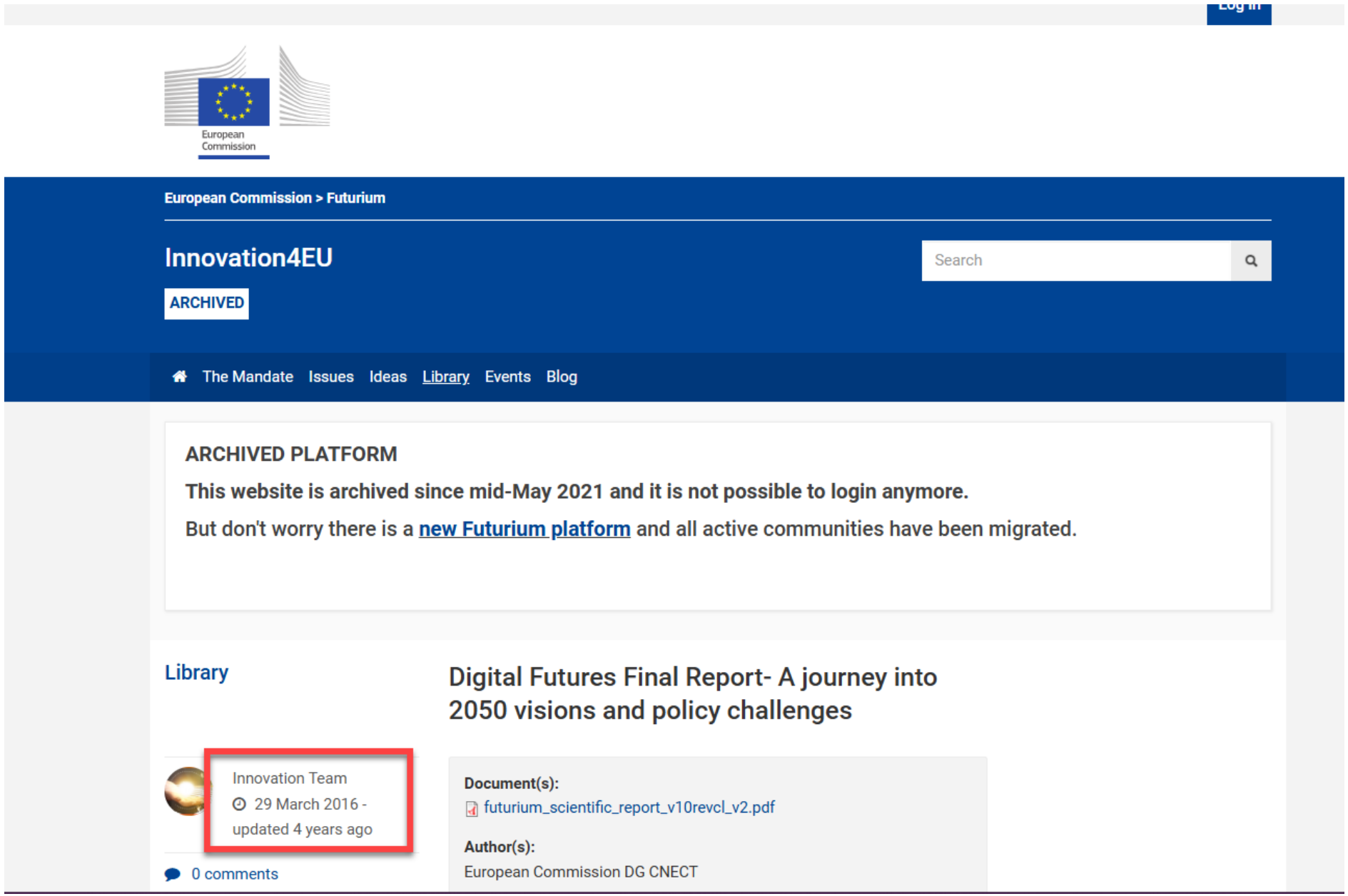
HEALTH AND HEALTHCARE SYSTEMS

Tracking how our bodies work could change our lives

Jun 4, 2020

https://www.weforum.org/stories/2020/06/internet-of-bodies-covid19-recovery-governance-health-data/

- We're entering the era of the "Internet of Bodies": collecting our physical data via a range of devices that can be implanted, swallowed or worn.
- The result is a huge amount of health-related data that could improve human wellbeing around the world, and prove crucial in fighting the COVID-19 pandemic.
- But a number of risks and challenges must be addressed to realize the potential of this technology, from privacy issues to practical hurdles.



https://ec.europa.eu/futurium/en/content/digital-futures-final-report-journey-2050-visions-and-policy-challenges.html

Directia generală Rețele de comunicații, conținut și tehnologie

Shape the Future

A trans-humanistic era

By 2050, a new form of human (a trans-human) will emerge, where ICTs and bio-medicine will fundamentally improve the human condition and greatly enhance human intellectual, physical, and psychological capacities.

The augmentation of human beings' cognitive and intellectual abilities through technological implants, such as memory and energy storage, will be possible.

Information and Communication Technology (ICT)

Long Term

Brain-to-Brain communication via implants

- Inter-personal communication will be mediated through technology capable of reading information from the brain (for instance through brain waves interpretation) and exchanging this information with other humans according to "trust" profiles.
- Data and information can be shared with other humans or machines through quantum communication links.
- Data will be received by brain implants and actuated instantaneously, i.e. the rational and emotional states of the originating human will be perceived by the receiving human(s) as if they are actually experienced. This will allow achieving the myth of telepathy.
- With increasingly reliable communication between multiple brains and bodies at the speed of quantum networks, thoughts will be instantaneously captured and shared between humans at a global level.

Genetically Enhanced Humans (GEH) will be the majority in the world

- With improved implant techniques and the creation of direct nerve connectors, body and sense enhancing implants are a common practice in 2050.
- They enhance the capabilities in normal functioning humans and provide normal or enhanced capabilities for impaired people. The visual implants make the blind see and the hearing implants make the deaf hear. Muscle implants make the weak stronger. Neural implants make the lame walk.
- GEH will be characterised by better senses and biological capabilities that are in so far prerogative of other species (e.g. speed, resistance, adaptation to extreme conditions, etc.).
- Following the philosophical path of trans-humanism, the augmentation of human's cognitive and intellectual abilities through technological implants, such as memory and energy storage, will be possible.

Enhancement option available that ensures effective treatment & management of chronic disease

- Nano devices and bio-computers provide life extending treatment.
- Nano-robots will help diagnosis and treatment of diseases at any age, including pre-birth surgery. They will be able to read from and write into our biology. They can also detect and destroy neoplasms, thus defeating cancer forever.
- Similar to nano-robots, bio-computers will be inoculated into the human body to perform complex tasks, for instance sensing and monitoring the status of organs or repairing tissues and organs in real-time, in-situ, at a micro and nano scale.

NBIC-convergence

- NBIC-convergence is the ongoing unification of nanotechnology, biotechnology, information technology and cognitive science.
- NBIC-convergence could allow us to enhance our intelligence, mobility, cognitive qualities or increase industrial productivity.

We are in the era of the Fourth Industrial Revolution (4IR), which is characterized by the convergence and complementarity of emerging technology domains, including nanotechnology, biotechnology, new materials and advanced digital production technologies. Despite the challenges posed by the disruptive nature of these innovations—which are increasingly connecting objects, machines, people and the environment—the digital transformation presents opportunities for inclusive and sustainable development.

https://www.unido.org/sites/default/files/files/2021-11/Standards%20and%20Digital%20Transformation_Complete_2021.pdf

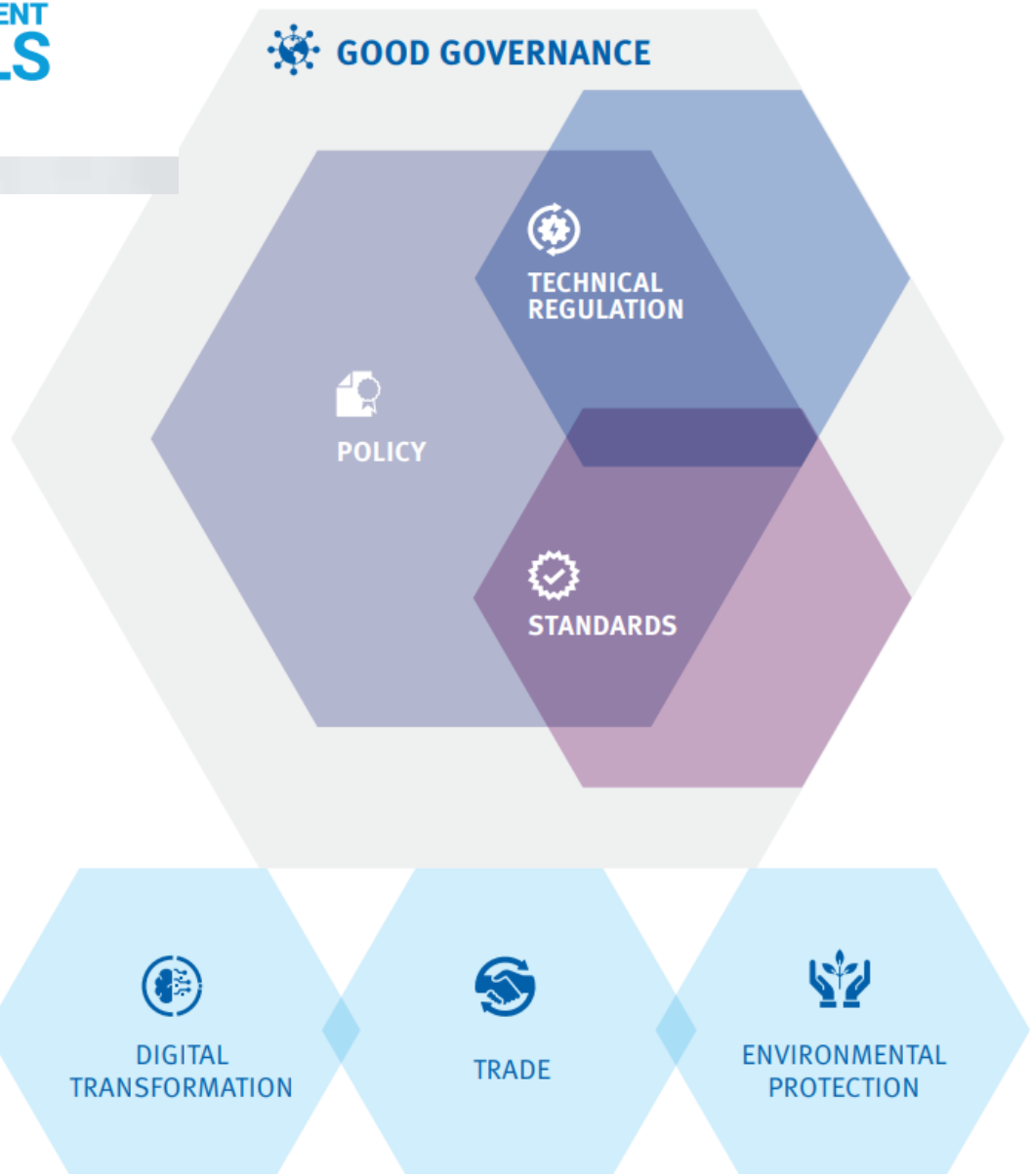
While revolutions and change have marked human development, what distinguishes the 4IR from previous industrial revolutions is the parallel technological breakthroughs within and across the digital, biological and physical spheres. The complexity and rapid pace of change of the 4IR also make the revolution distinctive. Moreover, the COVID-19 pandemic has been an unanticipated accelerator to the pace of change and structural shift towards the 4IR and the adoption of new technologies.

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

SUSTAINABLE DEVELOPMENT GOALS

STANDARDS & DIGITAL TRANSFORMATION

GOOD GOVERNANCE IN A DIGITAL AGE



https://www.unido.org/sites/default/files/files/2021-11/Standards%20and%20Digital%20Transformation_Complete_2021.pdf

November 22, 2023

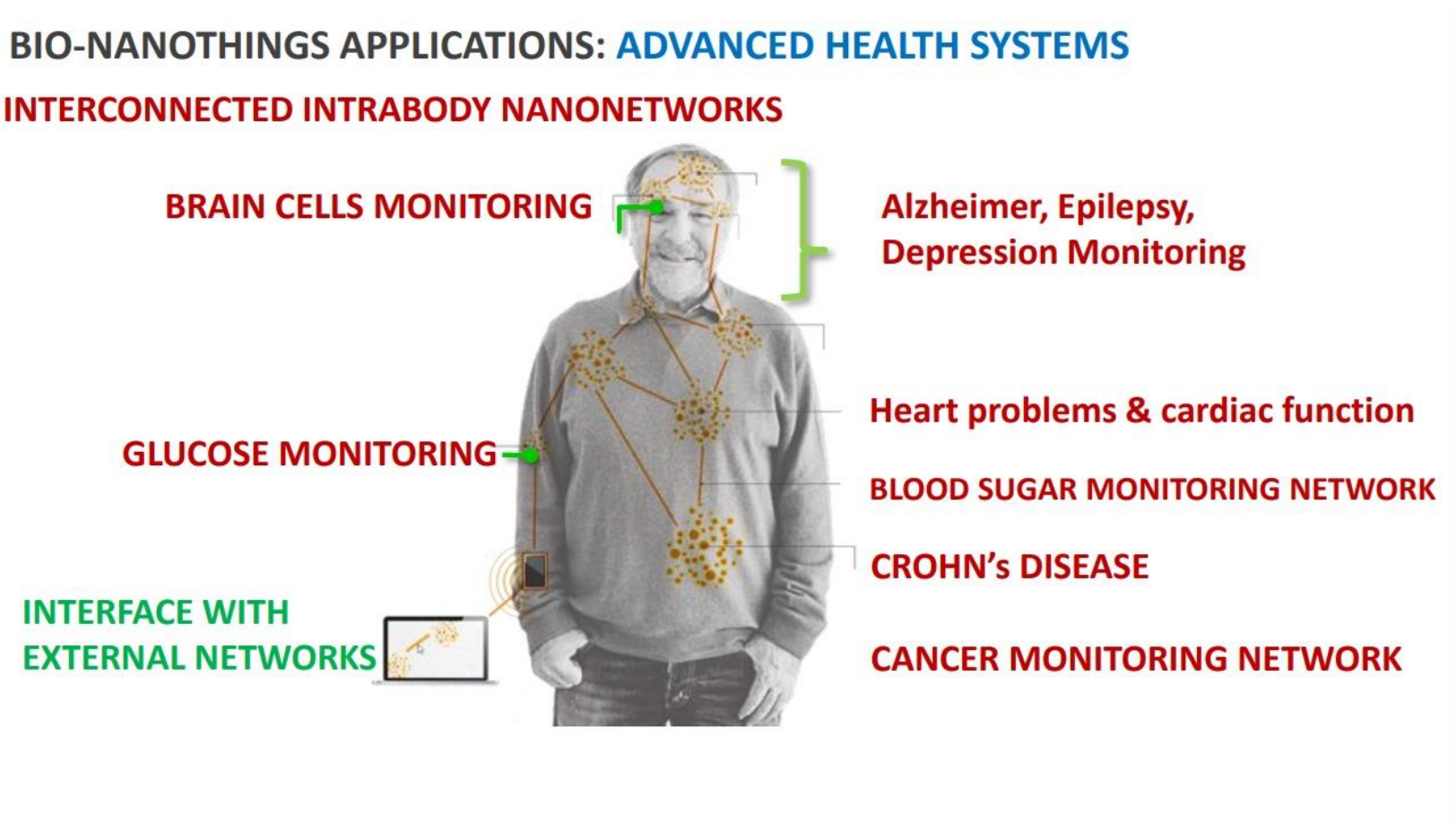
Nanotechnology \ Bio & Medicine

Networking nano-biosensors for wireless communication in the blood

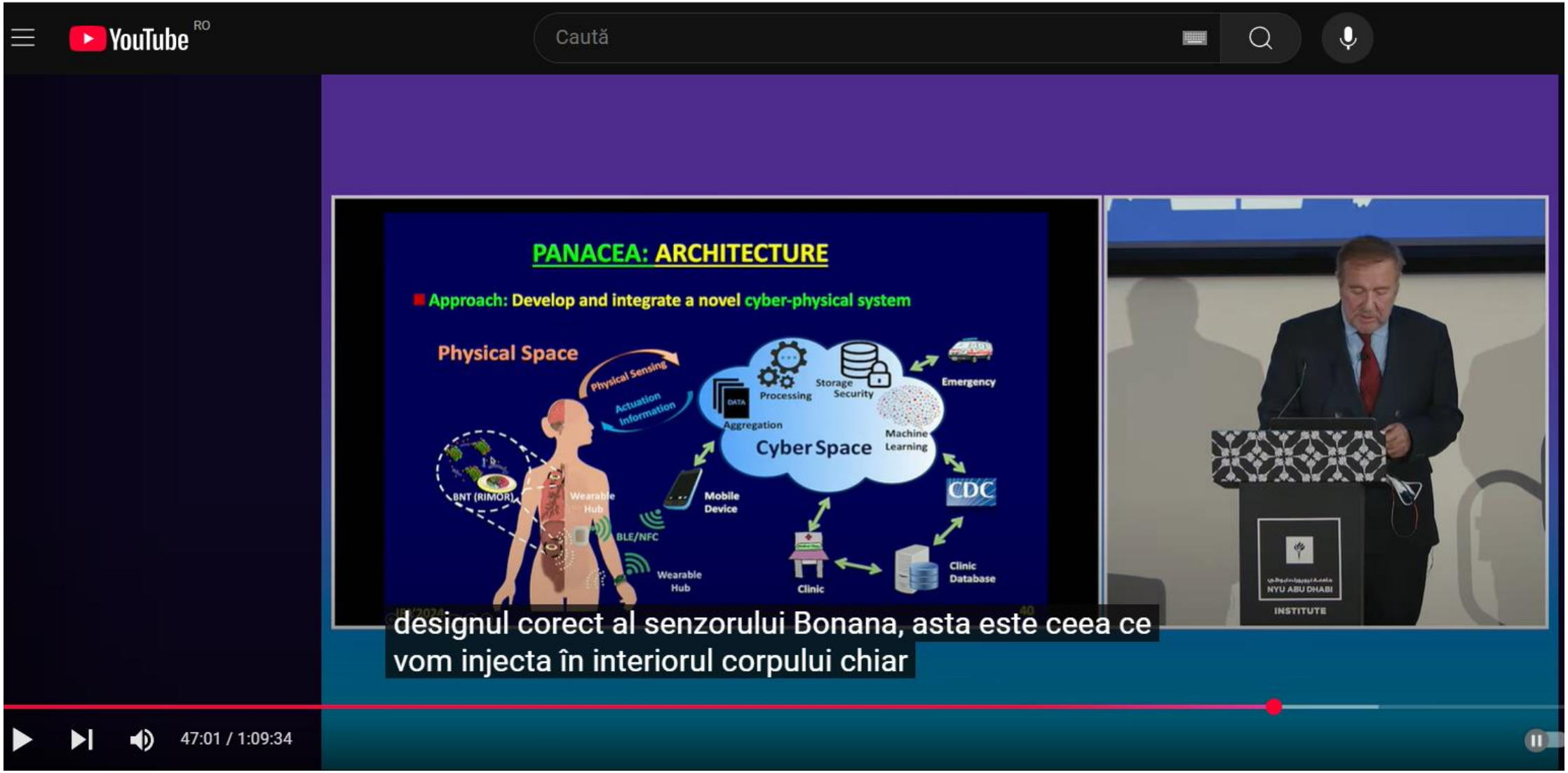
by Tanya Petersen , Ecole Polytechnique Federale de Lausanne

https://phys.org/news/2023-11-networking-nano-biosensors-wireless-communication-blood.amp

PANACEA: A Cyber-Physical System for Early Detection and Mitigation of Infections



https://www.itu.int/en/ITU-T/academia/kaleidoscope/2019/Documents/Presentations/Keynote%20speech_Ian_Akyildiz.pdf



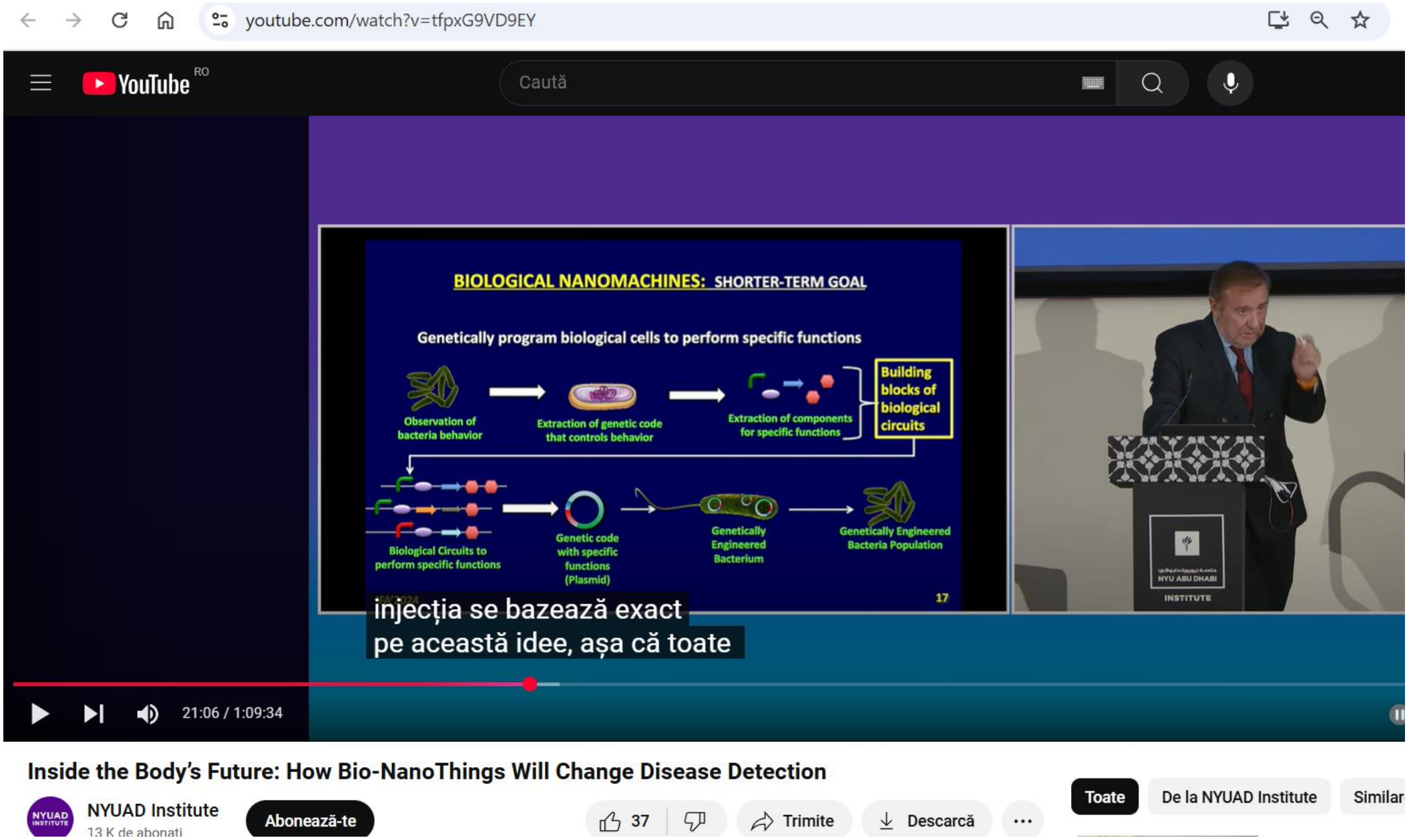
Inside the Body's Future: How Bio-NanoThings Will Change Disease Detection

NYUAD Institute
12,9 K de abonați
Abonează-te

24 | Trimite | Descarcă | ...

Toate | De la NYUAD Institute | Pentru tin

https://www.youtube.com/watch?v=tfpxG9VD9EY



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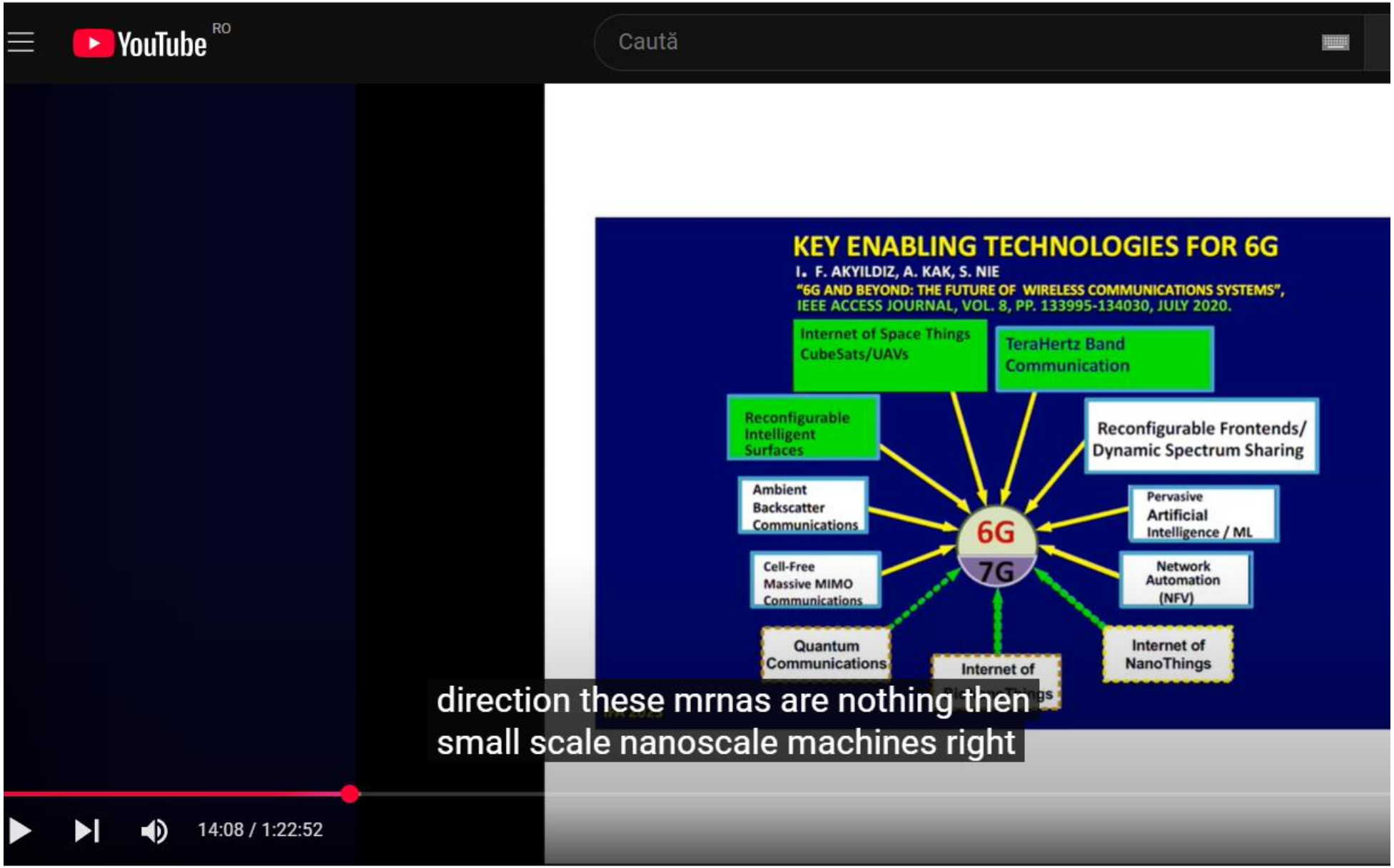


ARRC Seminar Series - Prof. Ian F. Akyildiz

https://www.youtube.com/watch?v=YAtQFkEg5-w

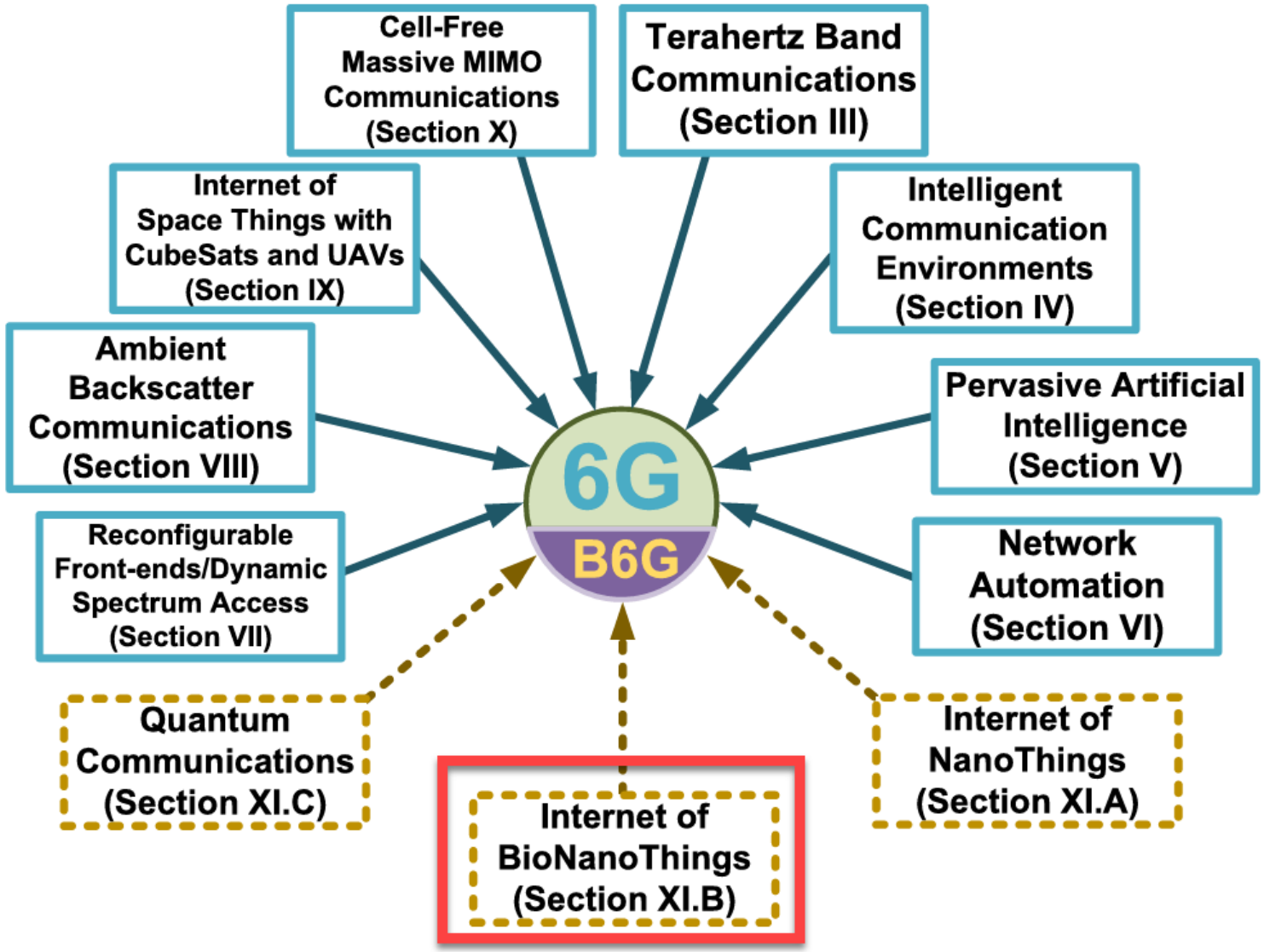


FIGURE 1. The envisioned key enabling technologies for 6G and beyond wireless communications systems.

https://ieeexplore.ieee.org/document/9145564

The internet of Bio-Nano things

Publisher: IEEE Cite This PDF

I. F. Akyildiz ; M. Pierobon ; S. Balasubramaniam ; Y. Koucheryavy **All Authors**

Abstract:

The Internet of Things (IoT) has become an important research topic in the last decade, where things refer to interconnected machines and objects with embedded computing capabilities employed to extend the Internet to many application domains. While research and development continue for general IoT devices, there are many application domains where very tiny, concealable, and non-intrusive Things are needed. The properties of recently studied nanomaterials, such as graphene, have inspired the concept of Internet of NanoThings (IoNT), based on the interconnection of nanoscale devices. Despite being an enabler for many applications, the artificial nature of IoNT devices can be detrimental where the deployment of NanoThings could result in unwanted effects on health or pollution. The novel paradigm of the Internet of Bio-Nano Things (IoBNT) is introduced in this paper by stemming from synthetic biology and nanotechnology tools that allow the engineering of biological embedded computing devices. Based on biological cells, and their functionalities in the biochemical domain, Bio-NanoThings promise to enable applications such as intra-body sensing and actuation networks, and environmental control of toxic agents and pollution. The IoBNT stands as a paradigm-shifting concept for communication and network engineering, where novel challenges are faced to develop efficient and safe techniques for the exchange of information, interaction, and networking within the biochemical domain, while enabling an interface to the electrical domain of the Internet.

Published in: IEEE Communications Magazine (Volume: 53 , Issue: 3, March 2015)

https://ieeexplore.ieee.org/document/7060516

MAC Protocol Selection and Performance Analysis in Wireless Body Area Networks

Publisher: IEEE Cite This PDF

Bhavana Alte ; Amarsinh Vidhate **All Authors**

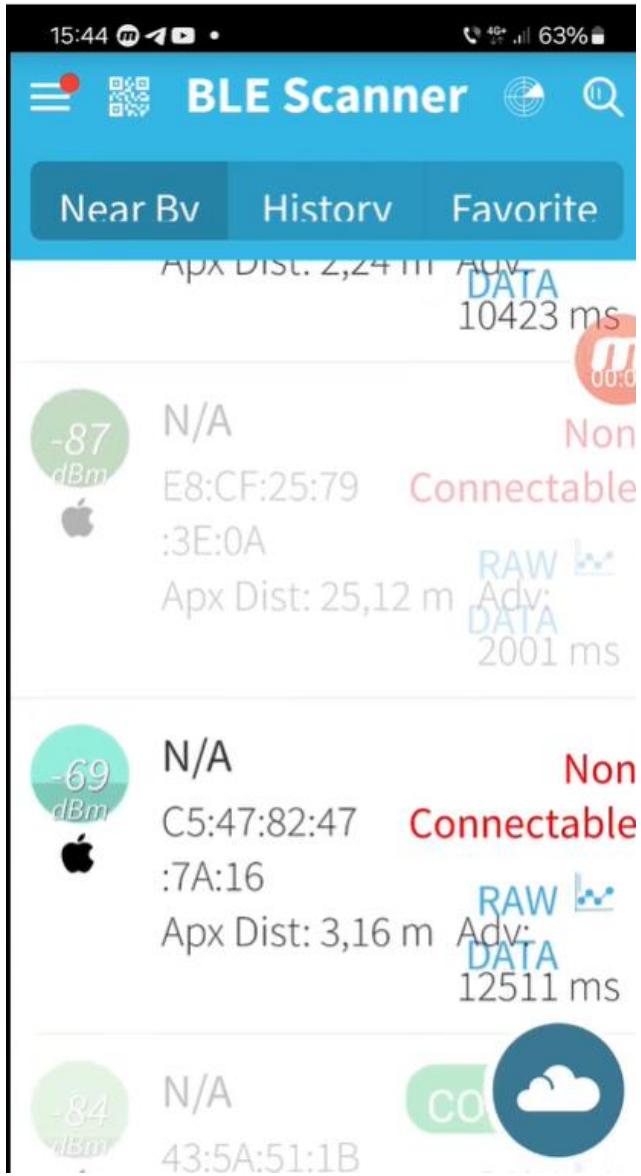
Abstract:

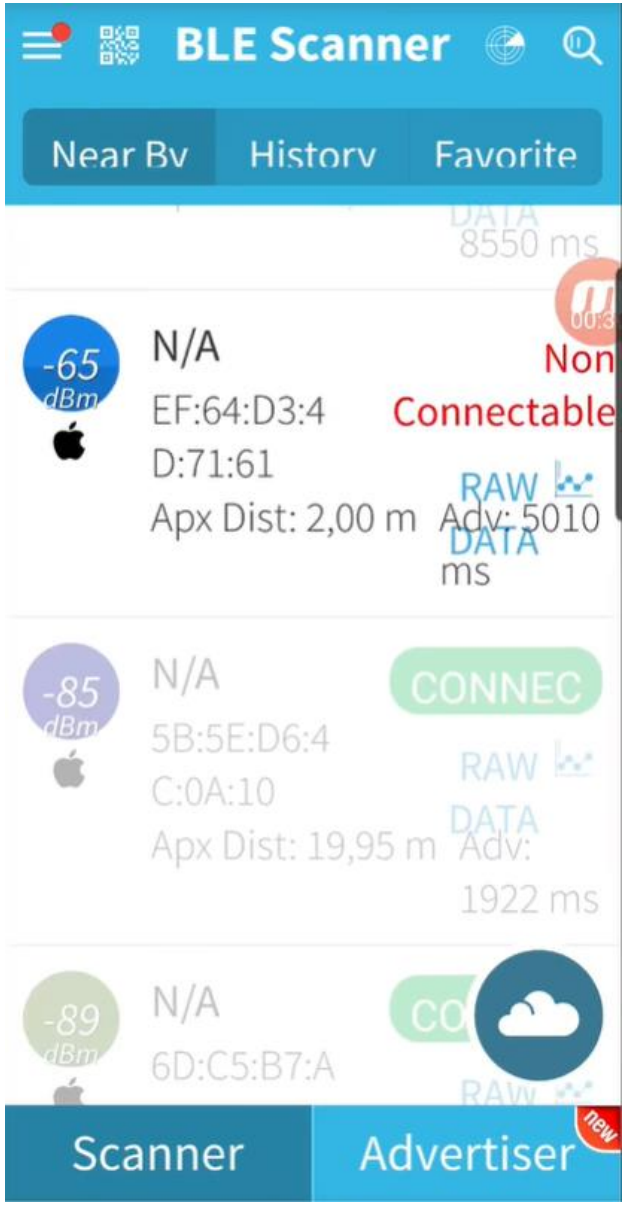
Over the last few decades, health monitoring systems based on wireless sensor networks have seen an exceptional surge in popularity. Wireless body area networks (WBANs) play a crucial role in enhancing the efficiency of medical services via a remote monitoring environment. Several small battery-operated implanted or wearable sensors in WBAN have many challenges in improving energy, quality, and operational performance. Prioritizing sensor nodes, selecting a sink node, and reducing control packet overheads are all ways to save energy while still handling emergency data, which has always been a significant problem for Wireless Body Area Networks (WBAN). Various researchers proposed a modified super-frame architecture of the MAC layer for efficient energy utilization, emergency traffic management, reliability, etc. In this paper, we have discussed significant observations of different MAC layers along modified super-frame architectures proposed by numerous researchers. Later, we provided comparative simulation observations of IEEE 802.15.4 and IEEE 802.15.6. By utilizing Guaranteed Time Slot (GTS) and polling mechanism, these results focus on providing decisive factors for selecting the acceptable MAC protocol in the medical context. Finally, we have provided a conclusion of our analysis for selecting the appropriate MAC protocol in WBAN.

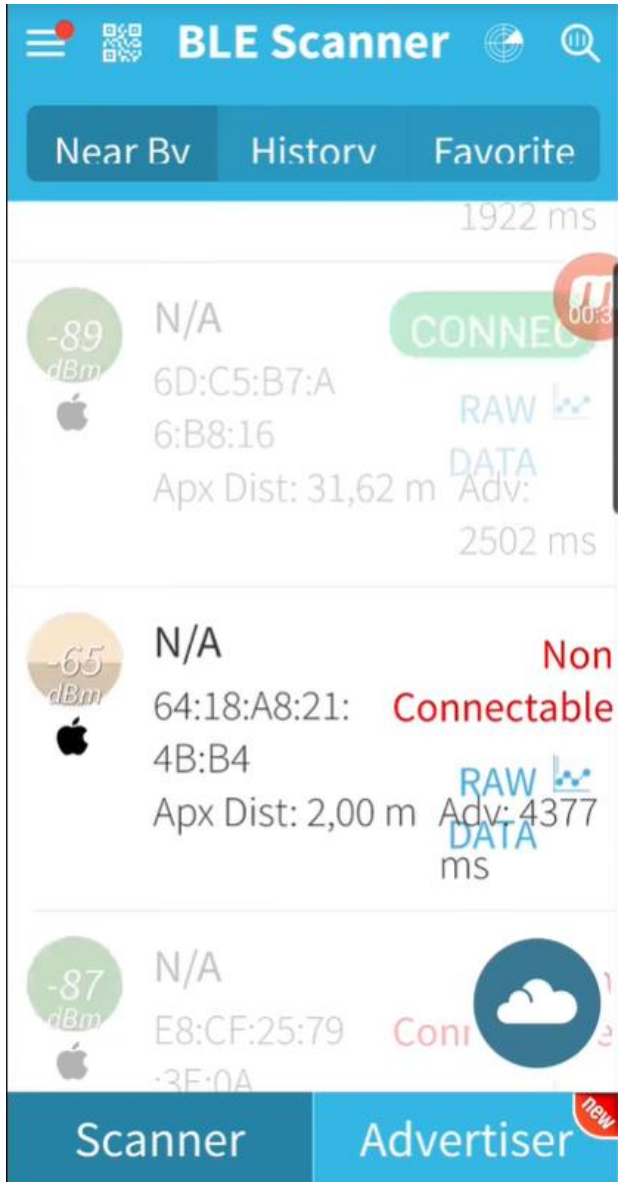
Published in: 2022 IEEE 2nd Mysore Sub Section International Conference (MysuruCon)

https://ieeexplore.ieee.org/document/9972349

Adrese MAC emise de persoanele de la saună





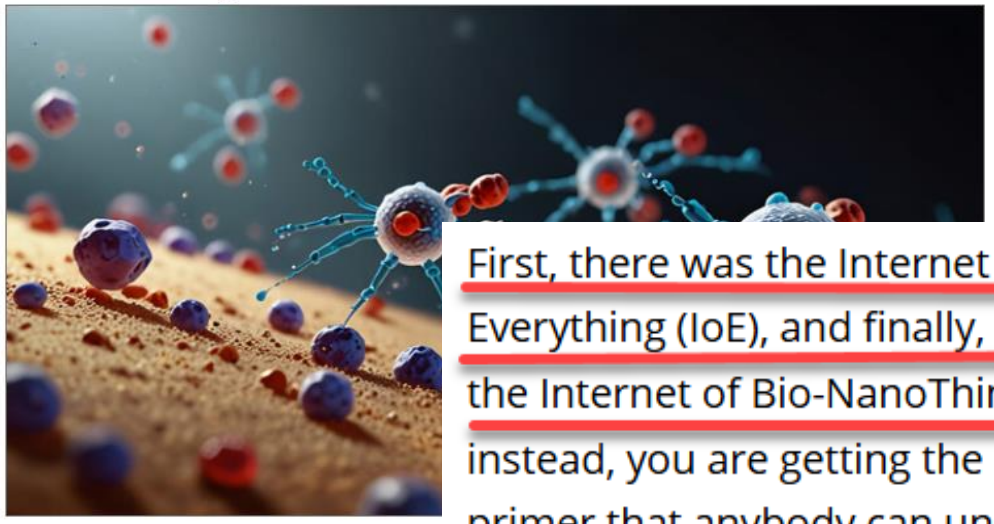


Children's Health Defense

CHD HOME DEFENDER NEWS CHD.TV RESOURCES COMMUNITY SCIE

ELECTROMAGNETIC RADIATION & WIRELESS • NEWS FROM AROUND THE WORLD
AUGUST 22, 2024

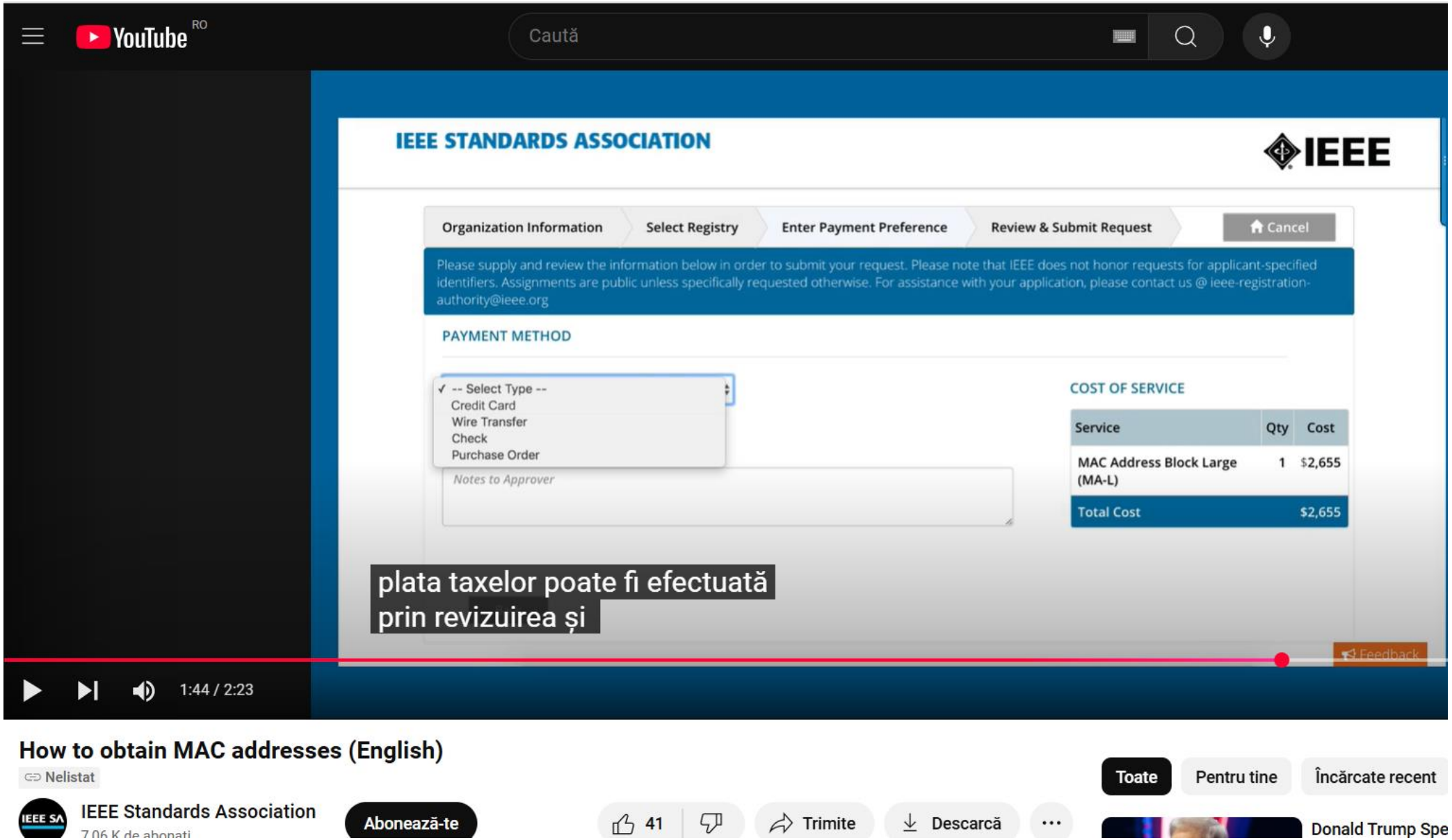
Under The Skin: The Internet Of Bio-NanoThings



First, there was the Internet of Things (IoT), then the Internet of Bodies (IoB), the Internet of Everything (IoE), and finally, Big Pharma and the military are going into your blood to construct the Internet of Bio-NanoThings (IoBNT). You might have hoped for the Internet of Nothing, but instead, you are getting the Internet Of Universal Skynet (IoUS). This paper from March 2015 is a primer that anybody can understand, including you. The IoBNT is the final building block of the surveillance network, bridging all living things from the biochemical domain into the electrical domain of the Internet.

There was no warning that nanotechnology of this sort was being pumped into your veins when you received a mRNA injectable from Pfizer or Moderna. Not a word from the government, Big Pharma, or the Military. There was no Informed Consent offered. The non-stop propaganda blared "Safe and Effective."

https://childrenshealthdefense.org/emr/under-the-skin-the-internet-of-bio-nanothings/



https://www.youtube.com/watch?v=0nlkxVfyxL4&t=86s
https://standards.ieee.org/products-programs/regauth/mac/

IEEE Access
Multidisciplinary | Rapid Review | Open Access Journal

Received September 2, 2018, accepted September 19, 2018, date of publication October 4, 2018, date of current version October 29, 2018.

Digital Object Identifier 10.1109/ACCESS.2018.2873825

Security in Wireless Body Area Networks: From In-Body to Off-Body Communications

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[2]Department of Computer Science, The University of Auckland, Auckland 1142, New Zealand
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The publication of this article was funded by the Qatar National Library.

https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8481660

ABSTRACT Wireless body area networks (WBANs) play a vital role in shaping today's healthcare systems. Given the critical nature of a WBAN in one's health to automatically monitor and diagnose health issues, security and privacy of these healthcare systems need a special attention. In this paper, we first propose a novel four-tier architecture of remote health monitoring system and then identify the security requirements and challenges at each tier. We provide a concise survey of the literature aimed at improving the security and privacy of WBANs and then present a comprehensive overview of the problem. In particular, we stress that the inclusion of *in vivo* nano-networks in a remote healthcare monitoring system is imperative for its completeness. To this end, we elaborate on security threats and concerns in nano-networks and medical implants as well as we emphasize on presenting a holistic framework of an overall ecosystem for WBANs, which is essential to ensure end-to-end security. Lastly, we discuss some limitations of current WBANs.

- A. WBAN ARCHITECTURE
- In-body communications involve implants and nano-devices placed inside a human body. On-body communications involve the devices placed on the body such as wearables and other sensors for ECG, EEG, blood glucose, and blood pressure monitoring.
- Nano-devices: Nano-devices are one of the smallest entities in the healthcare ecosystem able to perform very basic functions at nano-scale, such as computing, data storage, sensing, actuation, and communications
- Nano-links: These are communication links between nano-devices and nano-micro interfaces.
- Nano-micro Interface: This interface connects nanodevices inside human body to a sink node, which finally connects them to off-body devices.
- Implant: This represents a medical device implanted inside human body for monitoring certain diseases, vital signs, or even biometric identification.
- Sink Node: Sink node acts like a data hub in WBANs that collects data from different in-body devices to relay it to the medical server and vice versa.

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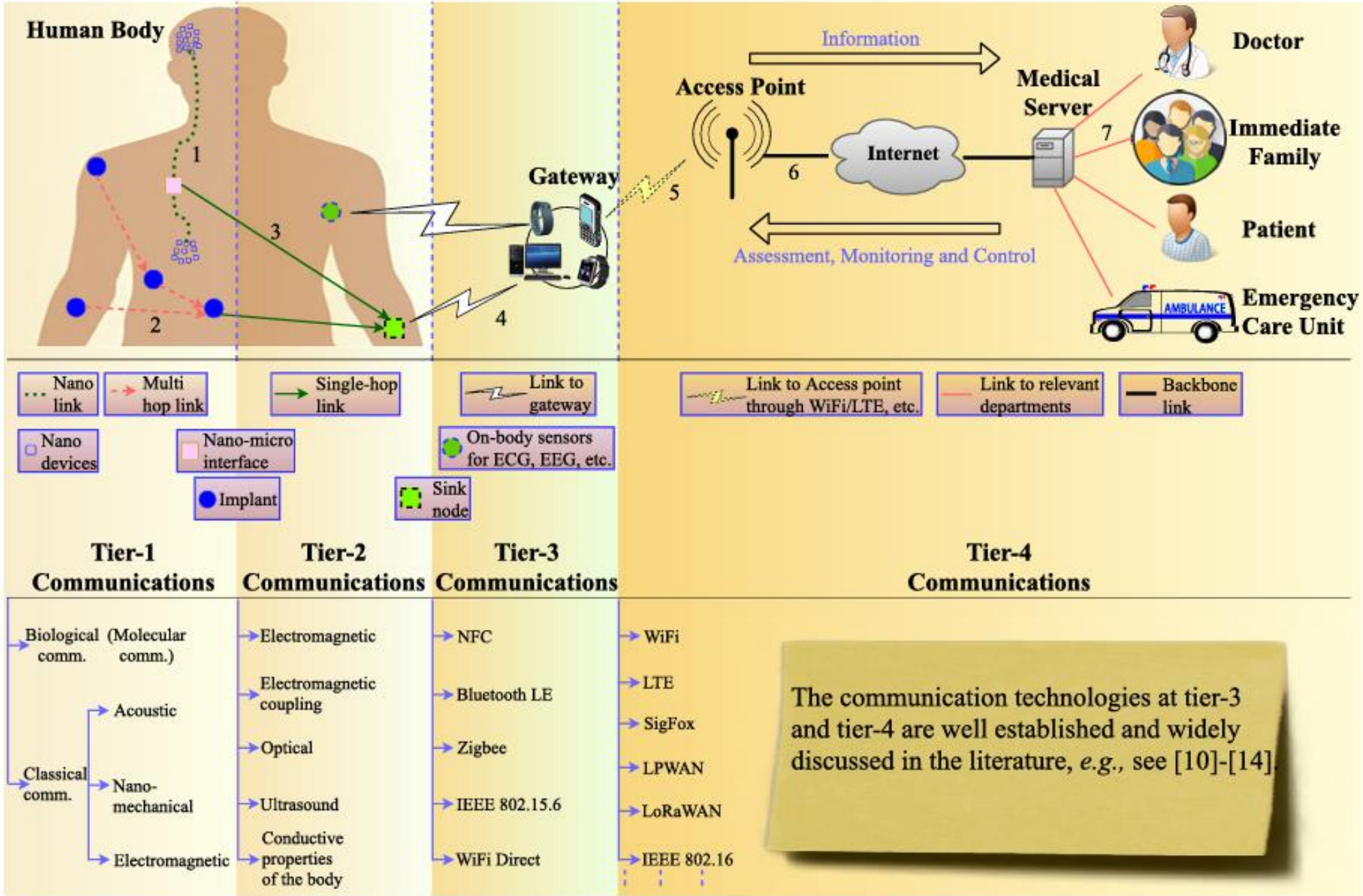
- On-body Sensors: This includes different sensors placed on the skin or inside clothes of a human body to measure and monitor different vital signs such as ECG, EEG, blood pressure, blood glucose, and blood oxygen level.
- Gateway: This represents a gateway device employed to connect the WBAN with the medical server. It can be a smartphone or any other device such as a computer or an Internet-of-Things (IoT) device that is directly connected to a base station using, e.g., 3G/4G.
- Access Point: This represents a cellular base station or a WiFi access point to route sensor's traffic to the medical server.
- Medical Server: This is a database, which stores all information of sensors for further actions and analysis of the data. It can include real-time monitoring of vital signs and virtual clinics wherein patients and physicians

https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8481660



https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8481660

> Comput Biol Med. 2021 Sep:136:104707. doi: 10.1016/j.compbiomed.2021.104707. Epub 2021 Jul 31.

Securing Bio-Cyber Interface for the Internet of Bio-Nano Things using Particle Swarm Optimization and Artificial Neural Networks based parameter profiling

Sidra Zafar [1], Mohsin Nazir [2], Aneeqa Sabah [3], Anca Delia Jurcut [4]

PMID: 34375900 DOI: 10.1016/j.compbiomed.2021.104707

Abstract

Internet of bio-nano things (IoBNT) is a novel communication paradigm where tiny, biocompatible and non-intrusive devices collect and sense biological signals from the environment and send them to data centers for processing through the internet. The concept of the IoBNT has stemmed from the combination of synthetic biology and nanotechnology tools which enable the fabrication of biological computing devices called Bio-nano things. Bio-nano things are nanoscale (1-100 nm) devices that are ideal for in vivo applications, where non-intrusive devices can reach hard-to-access areas of the human body (such as deep inside the tissue) to collect biological information. Bio-nano things work collaboratively in the form of a network called nanonetwork. The interconnection of the biological world and the cyber world of the Internet is made possible by a powerful hybrid device called Bio Cyber Interface. Bio Cyber Interface translates biochemical signals from in-body nanonetworks into electromagnetic signals and vice versa. Bio Cyber Interface can be designed using several technologies. In this paper, we have selected bio field-effect transistor (BioFET) technology, due to its characteristics of being fast, low-cost, and simple The main concern in this work is the security of IoBNT, which must be the preliminary requirement, especially for healthcare applications of IoBNT.

https://www.sciencedirect.com/science/article/abs/pii/S0010482521005011?via%3Dihub

Security of Wireless Body Area Networks for Healthcare Applications: Comparison between ETSI and IEEE Approaches

Publisher: IEEE Cite This PDF

Giacomo Borghini ; Stefano Caputo ; Lorenzo Mucchi ; Adnan Rashid ; Sara Jayousi ; Matti Hämäläinen **All Authors**

Abstract:

Wireless Body Area Network (WBAN) is vulnerable to various security threats including both active and passive attacks. It is important to implement effective security measures to mitigate these threats and ensure the security requirements of medical information transmitted over WBANs. In this paper, a comparison of the security features of different standards suitable for WBANs are presented. The various security protocols, made by different global standard organizations, such as the Institute of Electrical and Electronic Engineers (IEEE) and European Telecommunications Standards Institute (ETSI), for WBAN, are analyzed. Moreover, it also presented their current work in the context of WBAN security and what their future directions are.

Published in: 2023 IEEE 17th International Symposium on Medical Information and Communication Technology (ISMICT)

Date of Conference: 10-12 May 2023

DOI: 10.1109/ISMICT58261.2023.10152140

Date Added to IEEE *Xplore*: 20 June 2023

Publisher: IEEE

https://ieeexplore.ieee.org/document/10152140

1. NAME OF THE MEDICINAL PRODUCT

ENGERIX B 10 micrograms/0.5 ml
Suspension for injection
Hepatitis B recombinant vaccine, adsorbed

SUMMARY OF PRODUCT CHARACTERISTICS

5. PHARMACOLOGICAL PROPERTIES

5.1. Pharmacodynamic properties

ENGERIX B, hepatitis B vaccine is a sterile suspension containing the purified major surface antigen of the virus manufactured by recombinant DNA technology, adsorbed onto aluminium hydroxide.

The antigen is produced by culture of genetically-engineered yeast cells (Saccharomyces cerevisiae) which carry the gene which codes for the major surface antigen of the hepatitis B virus (HBV). This hepatitis B surface antigen (HBsAg) expressed in yeast cells is purified by several physico-chemical steps.

The HBsAg assembles spontaneously, in the absence of chemical treatment, into spherical particles of 20 nm in average diameter containing non-glycosylated HBsAg polypeptides and a lipid matrix consisting mainly of phospholipids. Extensive tests have demonstrated that these particles display the characteristic properties of natural HBsAg.

https://www.ema.europa.eu/en/documents/referral/engerix-b-article-30-referral-summary-product-characteristics_en.pdf

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The Free Encyclopedia

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Fractal antenna

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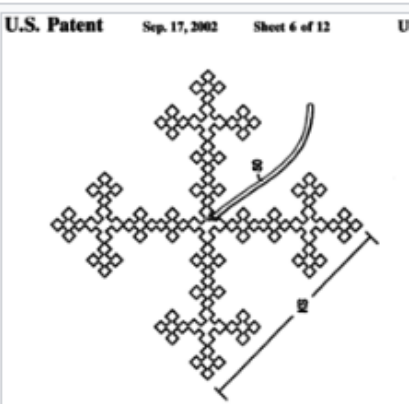
From Wikipedia, the free encyclopedia

A **fractal antenna** is an antenna that uses a fractal, self-similar design to maximize the effective length, or increase the perimeter (on inside sections or the outer structure), of material that can receive or transmit electromagnetic radiation within a given total surface area or volume.

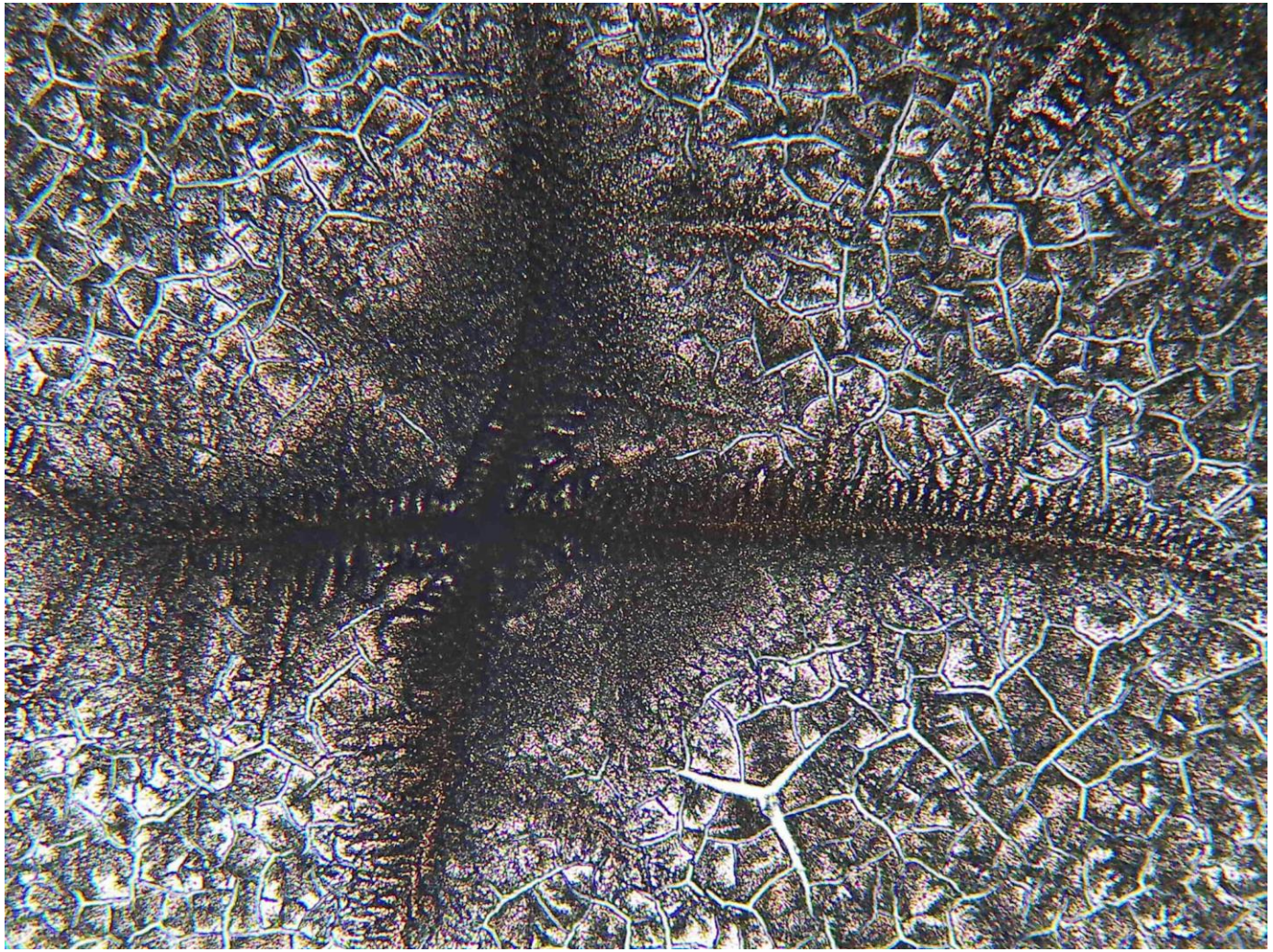
Such fractal antennas are also referred to as multilevel and space filling curves, but the key aspect lies in their repetition of a motif over two or more scale sizes,[3] or "iterations". For this reason, fractal antennas are very compact, multiband or wideband, and have useful applications in cellular telephone and microwave communications. A fractal antenna's response differs markedly from traditional antenna designs, in that it is capable of operating with good-to-excellent performance at many different frequencies simultaneously. Normally, standard antennas have to be "cut" for the frequency for which they are to be used—and thus the standard antennas only work well at that frequency.



An example of a fractal antenna: a space-filling curv called a "Minkowski Island"["Minkowski fractal"[2]

https://en.wikipedia.org/wiki/Fractal_antenna

Gardasil vaccine droplet crystallization pattern



1. NAME OF THE MEDICINAL PRODUCT

Gardasil 9 suspension for injection.
Gardasil 9 suspension for injection in a pre-filled syringe.
Human Papillomavirus 9-valent Vaccine (Recombinant, adsorbed)

2. QUALITATIVE AND QUANTITATIVE COMPOSITION

1 dose (0.5 ml) contains approximately:

Human Papillomavirus[1] Type 6 L1 protein[2,3]	30 micrograms
Human Papillomavirus[1] Type 11 L1 protein[2,3]	40 micrograms
Human Papillomavirus[1] Type 16 L1 protein[2,3]	60 micrograms
Human Papillomavirus[1] Type 18 L1 protein[2,3]	40 micrograms
Human Papillomavirus[1] Type 31 L1 protein[2,3]	20 micrograms
Human Papillomavirus[1] Type 33 L1 protein[2,3]	20 micrograms
Human Papillomavirus[1] Type 45 L1 protein[2,3]	20 micrograms
Human Papillomavirus[1] Type 52 L1 protein[2,3]	20 micrograms
Human Papillomavirus[1] Type 58 L1 protein[2,3]	20 micrograms

[1]Human Papillomavirus = HPV.
[2]L1 protein in the form of virus-like particles produced in yeast cells (*Saccharomyces cerevisiae* CANADE 3C-5 (Strain 1895)) by recombinant DNA technology.
[3]Adsorbed on amorphous aluminium hydroxyphosphate sulfate adjuvant (0.5 milligrams Al).

https://www.ema.europa.eu/en/documents/product-information/gardasil-9-epar-product-information_en.pdf

ITU Journal on Future and Evolving Technologies, Volume 5, Issue 2, June 2024

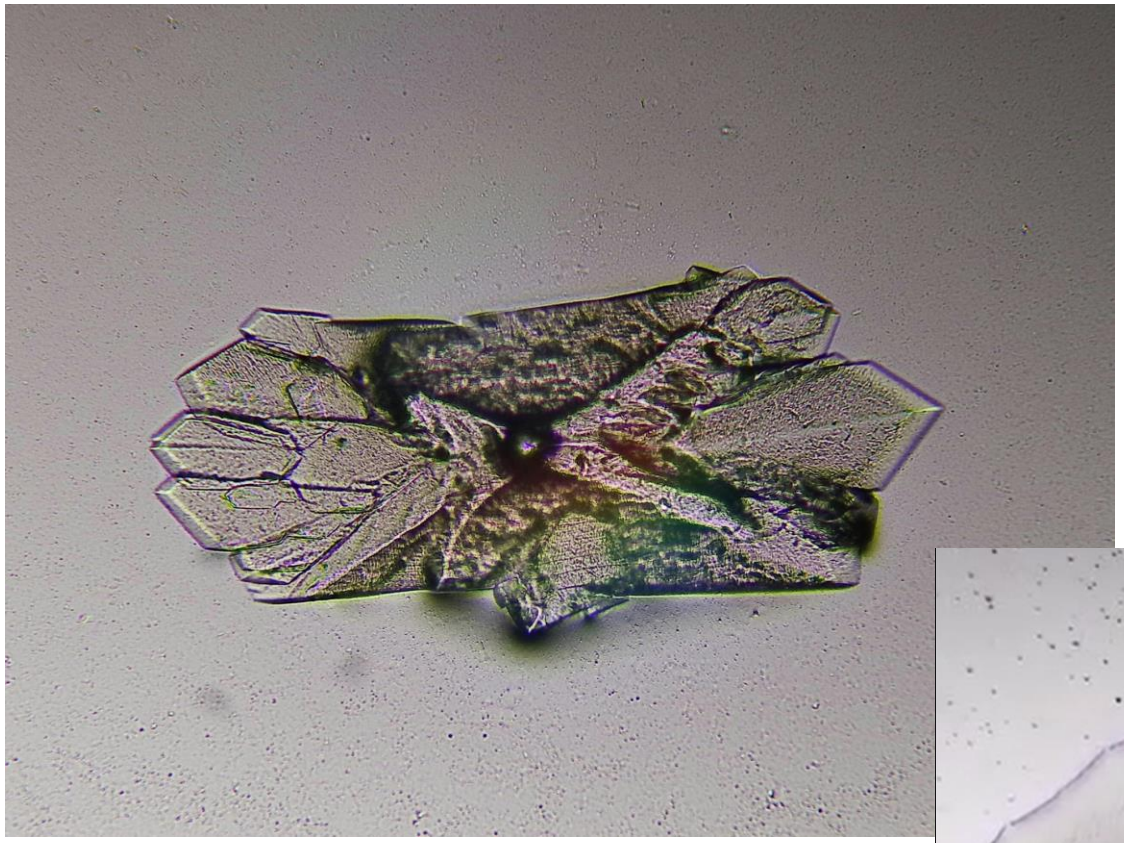
FUTURE SATELLITE COMMUNICATIONS: SATELLITE CONSTELLATIONS AND CONNECTIVITY FROM SPACE

Hazer Inaltekin[1], Mark Bowyer[2], Iain B. Collings[1], Gunes Karabulut Kurt[3], Walid Saad[4], Phil Whiting[1]
[1]Macquarie University, [2]Airbus UK, [3]Polytechnique Montreal, [4]Virginia Tech

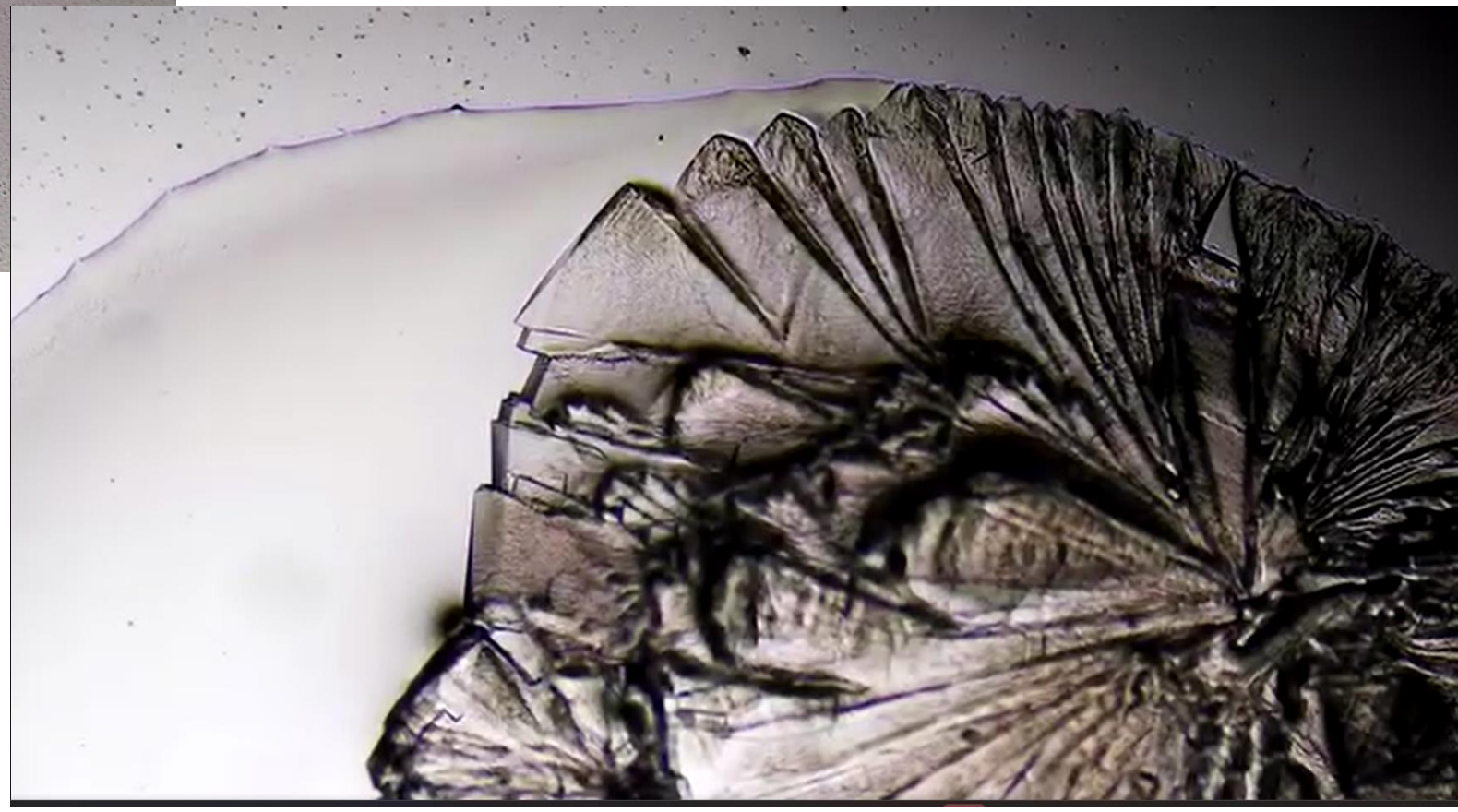
NOTE: Corresponding author: Hazer Inaltekin, hazer.inaltekin@mq.edu.au

Abstract – *Satellite communications is currently undergoing a massive growth, with a rapid expansion in Low Earth Orbit (LEO) networks, and a range of new satellite technologies. Until very recently, satellite communication systems and terrestrial 5/6G wireless networks have been complementary distinct entities. There is now the opportunity to bring these networks together and deliver an integrated global coverage multi-service network. Achieving this will require solving some key research challenges, and leveraging new technologies including high frequency phased-array antennas, onboard processing, dynamic beam hopping, physical layer signal processing algorithms, transmission waveforms, and adaptive inter-satellite links and routing. By integrating seamlessly with terrestrial 5/6G networks and low altitude flying access points, future satellite networks promise to deliver universal connectivity on a global scale, overcoming geographical limitations. In this special issue, we focus on the future of satellite communications, exploring topics ranging from beam hopping and design to space routing and THz satellite communications. Our aim is to shed light on the potential of these emerging technologies and their role in reshaping the landscape of global connectivity.*

https://www.itu.int/dms_pub/itu-s/opb/jnl/S-JNL-VOL5.ISSUE2-2024-A20-PDF-E.pdf



Crystallization model of Comirnaty Omicron and Moderna vaccine droplets



NEUROTECHNOLOGIES FOR BRAIN-MACHINE INTERFACING

https://standards.ieee.org/industry-connections/activities/neurotechnologies-for-brain-machine-interfacing/

About the Activity

The goal of this program is to bring together diverse stakeholders across neurotechnologies, research institutions, industry and government agencies to identify and address gaps in the existing standards for Brain-Machine Interfacing (BMI)/Brain Computer Interface (BCI) based solutions.

Next Steps

View the ICAID (PDF)

https://unesdoc.unesco.org/ark:/48223/pf0000383559

https://unesdoc.unesco.org/search/N-EXPLORE-90ec54c0-bf2d-4f15-a655-a71489709fa1

Roco, Mihail C. <mroco@nsf.gov> 8 ian. 2024, 18:08

către eu

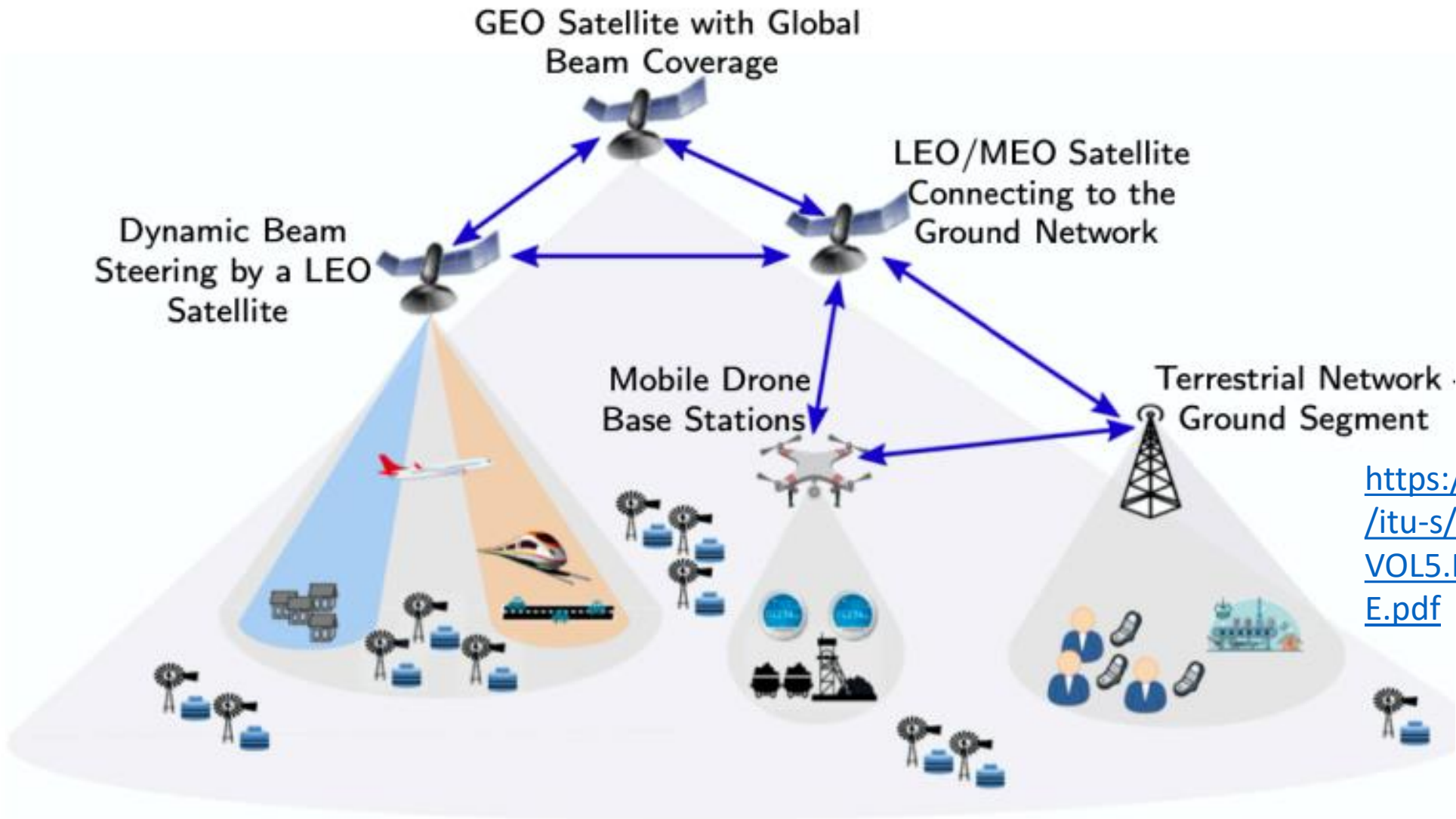
Dr. Geanina Hagimă,

I have received your e-mail with your comments and personal opinions on nanoscale science and engineering.

The National Nanotechnology Initiative is a science-based project and program where societal implications, including environmental and health effects, have been addressed from its beginning. All natural and man-made objects are built from atoms and molecules and have a nanostructure at the first level of organization of atoms. Nanostructure are encountered in every material object or organism, and by itself is not dangerous. Understanding and properly using nanoscale science and engineering makes the world better in a fundamental way. Combating possible misuses of nanotechnology must be addressed in each application. The general concerns must be addressed by researchers and manufacturers, and for specific product concerns it is the primarily responsibility of those making the new specific products to investigate. The regulatory framework is affected by political factors in each country and region. For example, the vaccine manufacturers must address the efficacy and safety of their products.

I am not involved directly in medical research applications and I am not able to address your suggestions. If there are concerns of governance of nanotechnology in Europe, please consider writing to the EU/EC or local industry.

Sincerely,
Mihail Roco
NSF



https://www.itu.int/dms_pub/itu-s/opb/jnl/S-JNL-VOL5.ISSUE2-2024-A20-PDF-E.pdf

Fig. 1 – A multi-layer space network integrated with terrestrial and low-altitude drone base stations.

ITU Journal on Future and Evolving Technologies, Volume 5, Issue 2, June 2024

A STUDY ON THz COMMUNICATIONS BETWEEN LOW EARTH ORBIT CONSTELLATIONS AND EARTH STATIONS

Estephania Flores Aguilar[1] and Gunes Karabulut-Kurt[1]
[1]Polytechnique Montréal, 2500 Chem. de Polytechnique, Montréal, QC H3T 1J4, Canada

NOTE: Corresponding author: Estephania Flores, estephania.flores-aguilar@polymtl.ca

Abstract – *A non-terrestrial system that uses Terahertz (THz) frequencies is a potential solution to achieving equal access to the Internet worldwide. This paper describes a non-terrestrial system that consists of a Low Earth Orbit (LEO) constellation, Earth Stations in Motion (ESIMs) and standard Earth stations. We examine the effects of rain, fog, clouds and atmospheric gases for this non-terrestrial system for frequencies between 100-300 GHz. The research findings suggest that the frequency bands between 102 - 109.5 GHz are rather suitable for communication between Earth stations and satellites, including ESIMs, reaching in a critical scenario uplink data rates of up to 2.6 Gbits/s with 0.5 GHz of bandwidth or up to 12 Gbits/s with 5 GHz of bandwidth in uplink. For the downlink, we can reach up to 6 Mbits/s with a transmitted power of 29 dBW, but if we increase the power transmitted by satellites, it is possible to reach up to 25 Gbits/s with 2.5GHz of bandwidth. Under clear, blue-sky conditions, we can achieve a maximum data rate of 17.3 Gbits/s for downlink and uplink. For inter-satellite links (communications between satellites in the same orbit or between different orbits), the frequency bands between 111.8 – 114.25 GHz, 116 – 123 GHz, 174.5 – 182 GHz, 185 – 190 GHz are viable, offering speeds from 1.5 to 2.51 Gbits/s when using a uniform rectangular array with 625 radiating elements. This research provides new findings from the amalgamation of existing literature, which is crucial for the future allocation of optimal frequencies between 100 - 300 GHz for satellite services.*

https://www.itu.int/dms_pub/itu-s/opb/jnl/S-JNL-VOL5.ISSUE2-2024-A19-PDF-E.pdf ,
https://www.itu.int/en/journal/j-fet/Pages/default.aspx

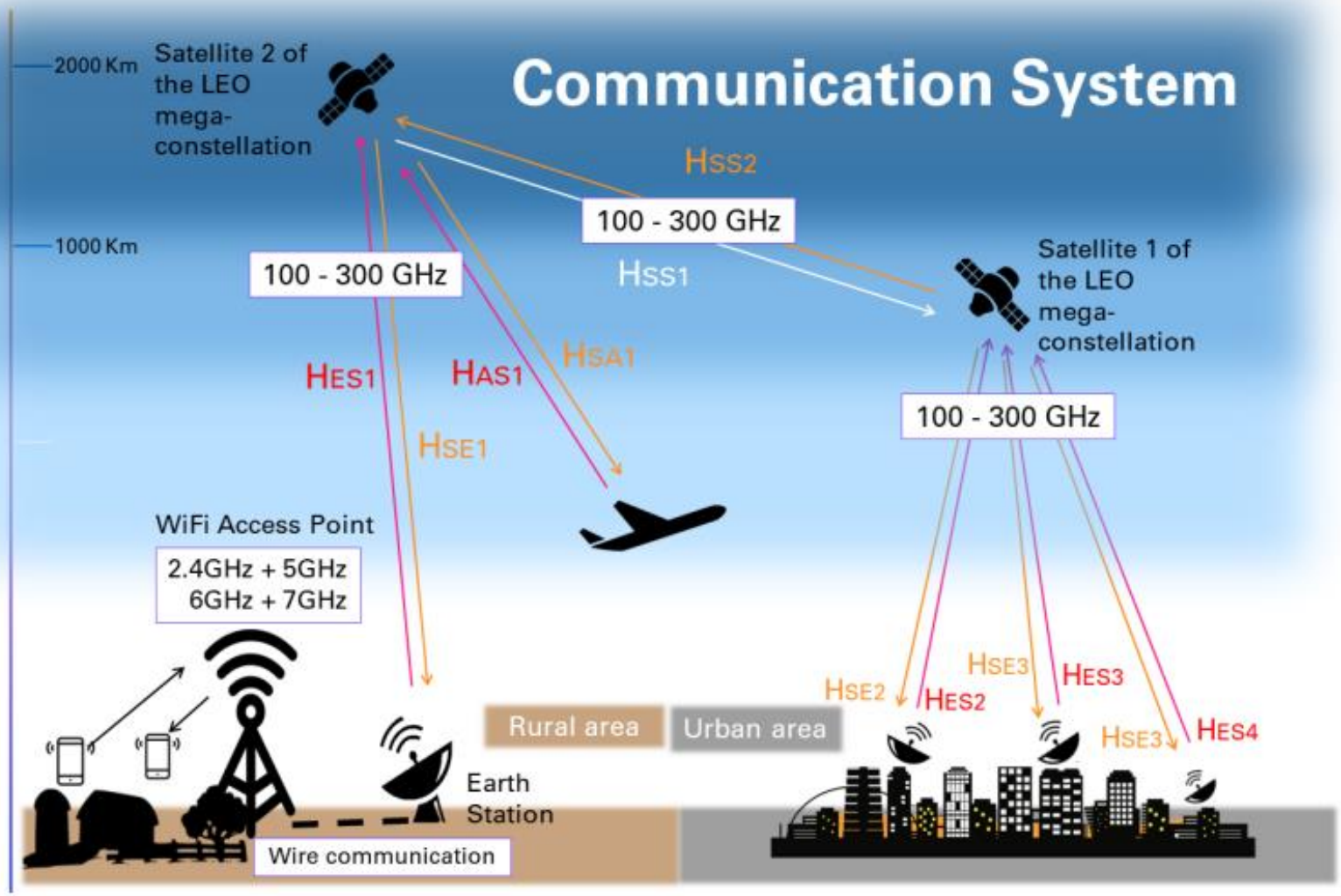


Fig. 1 – An overview of the considered communication system

A STUDY ON THz COMMUNICATIONS BETWEEN LOW EARTH ORBIT CONSTELLATIONS AND EARTH STATIONS

https://www.itu.int/dms_pub/itu-s/opb/jnl/S-JNL-VOL5.ISSUE2-2024-A19-PDF-E.pdf ,
https://www.itu.int/en/journal/j-fet/Pages/default.aspx

Our Common Agenda
Policy Brief 7

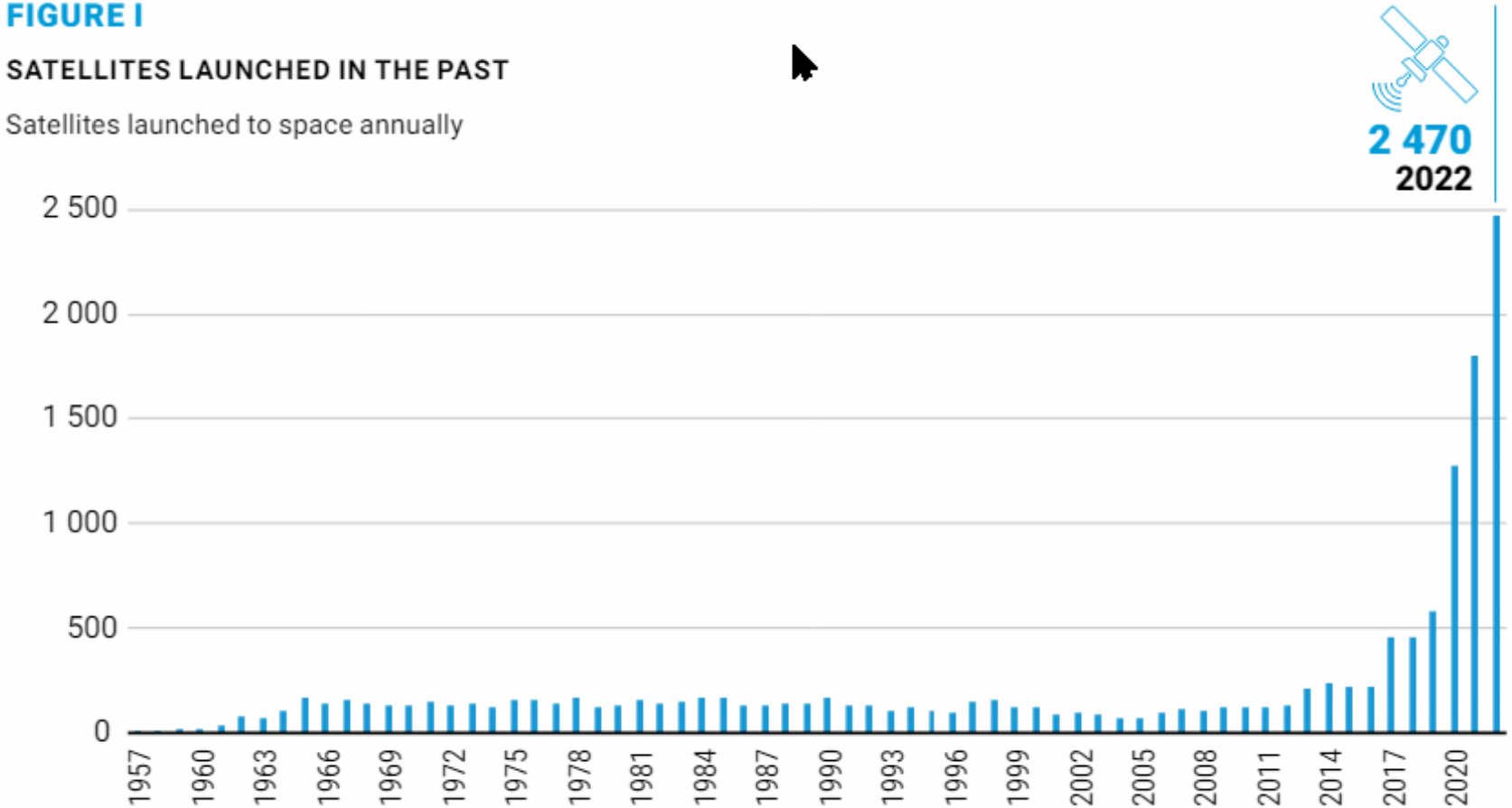
For All Humanity – the Future of Outer Space Governance

MAY 2023

FIGURE I

SATELLITES LAUNCHED IN THE PAST

Satellites launched to space annually



https://www.un.org/sites/un2.un.org/files/our-common-agenda-policy-brief-outer-space-en.pdf

Our Common Agenda
Policy Brief 7

For All Humanity – the Future of Outer Space Governance

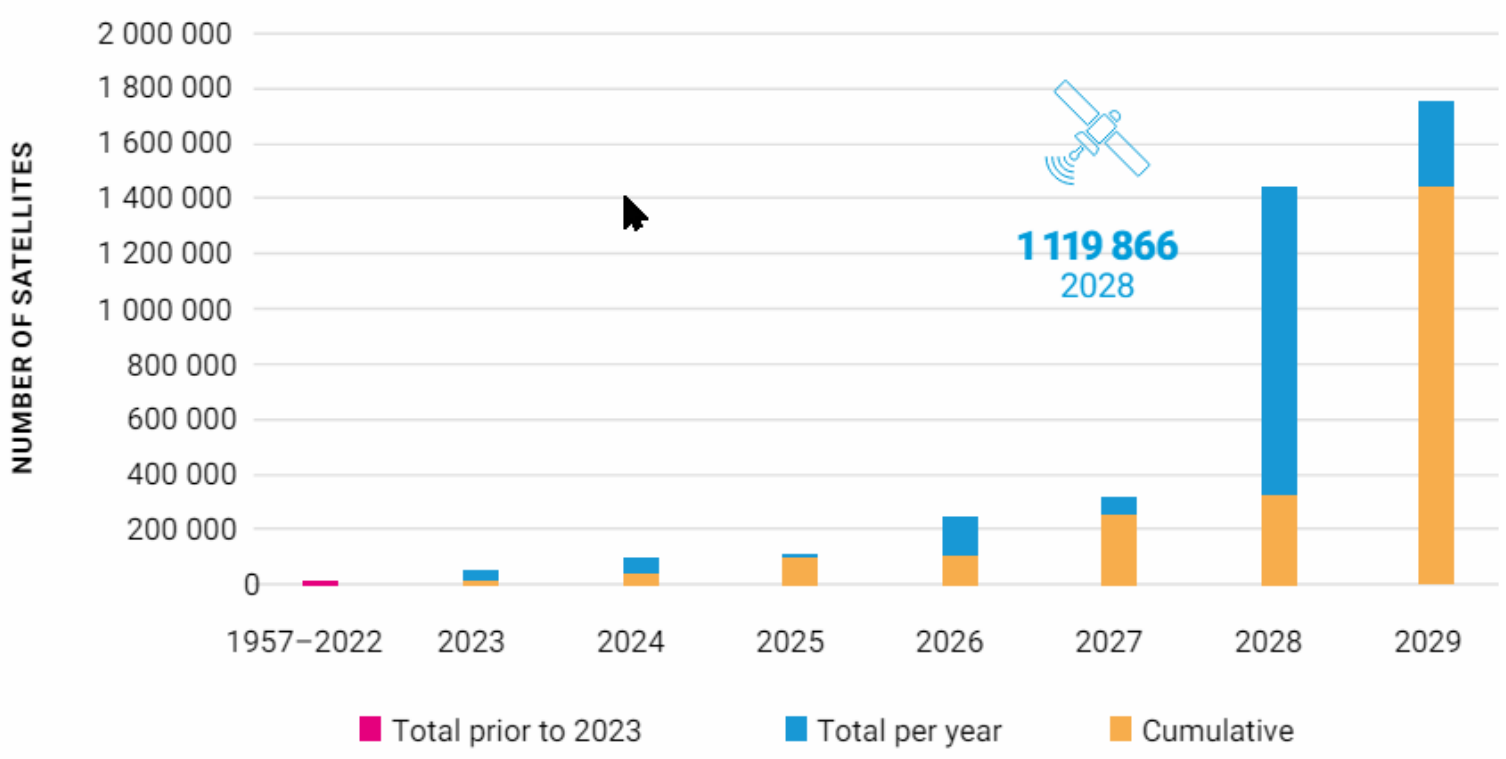
MAY 2023

https://www.un.org/sites/un2.un.org/files/our-common-agenda-policy-brief-outer-space-en.pdf

SATELLITES REGISTERED TO LAUNCH IN THE FUTURE

Number of non-geostationary satellites for which states have registered radio frequecies with the International Telecommunication Union (by year and cummulative)

For past launches, see figure I.



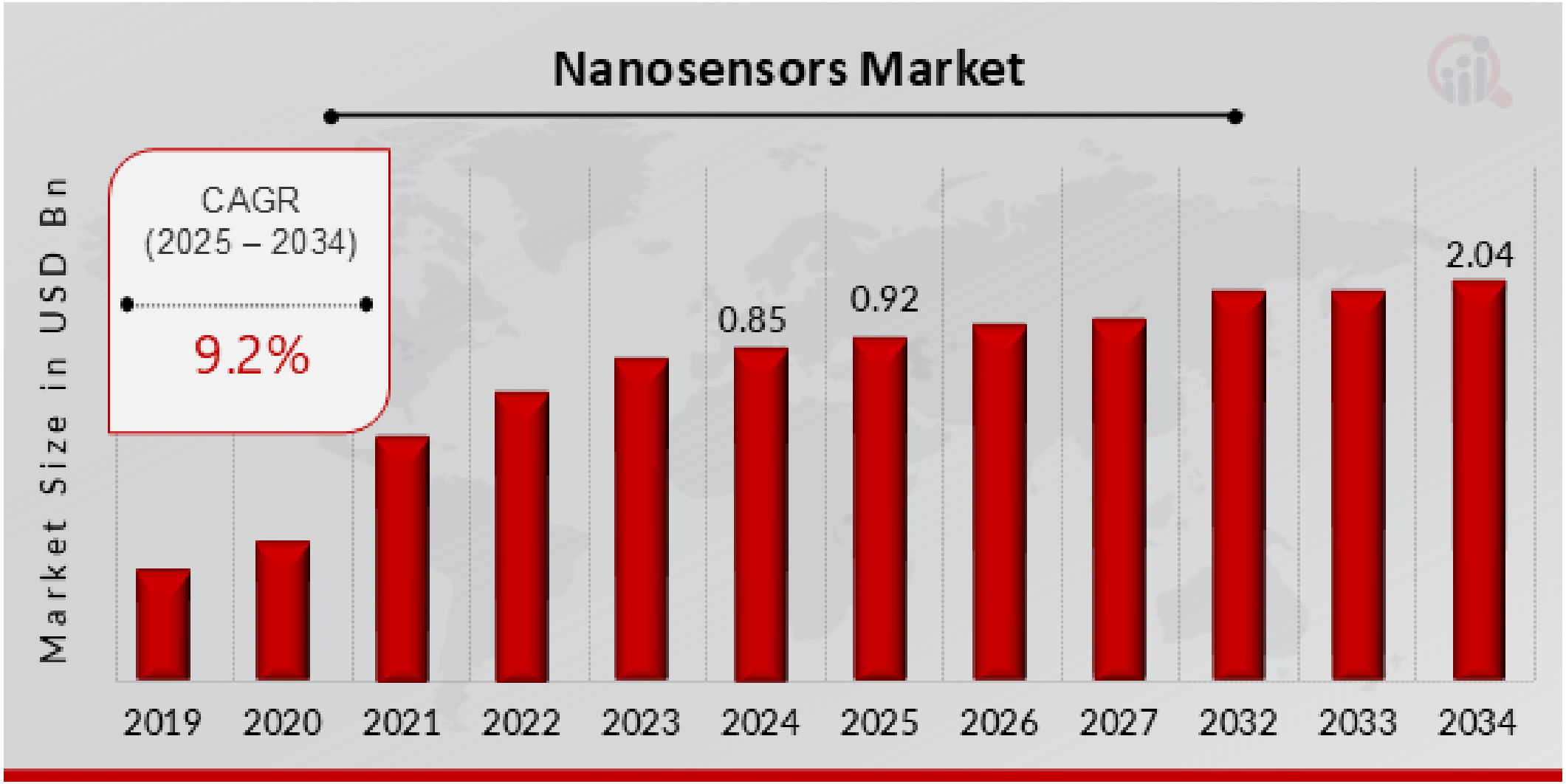
Global Body Area Network Market Outlook (2022 to 2032)

The **global body area network market** is predicted to grow at a robust **CAGR of 22.3%**. It is estimated to be valued at about **US$ 229.8 Bn** by 2032, going up from **US$ 24.6 Bn** in 2021.

Attributes	Details
Body Area Network Market Size (2021)	US$ 24.6 Bn
Body Area Network Market Value (2022)	US$ 30.8 Bn
Body Area Network Market Value (2032)	US$ 229.8 Bn
Body Area Network Market Growth Rate (2022 to 2032)	22.3%
Market Share of Top 5	68.6%

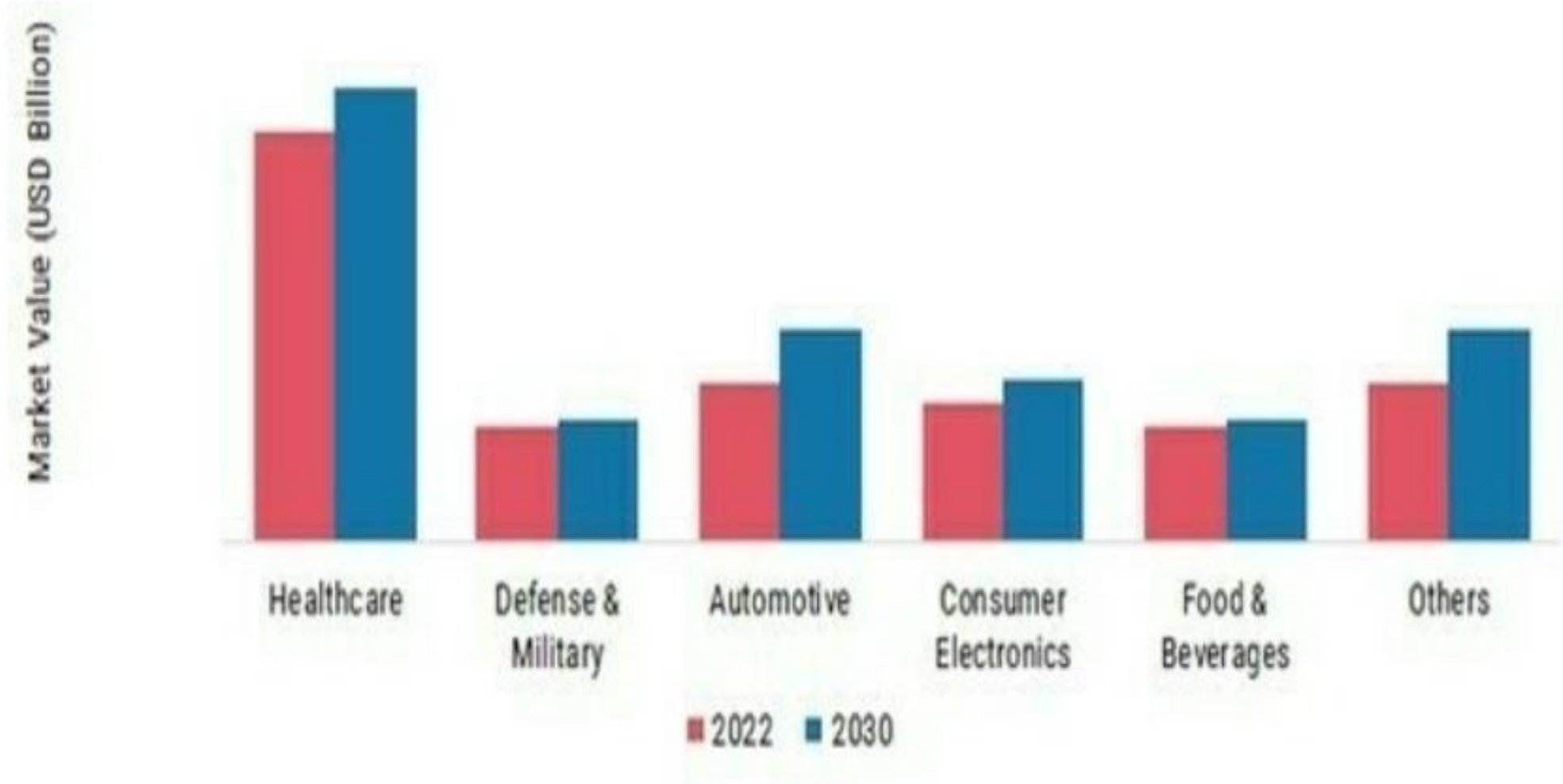
https://www.factmr.com/report/body-area-network-market

https://dataintelo.com/report/global-wireless-body-area-network-market



https://www.marketresearchfuture.com/reports/nanosensors-market-1117

Figura 2: Piața globală a senzorilor NANO, după aplicație, 2022 și 2030 (miliard USD)



https://www.marketresearchfuture.com/reports/nanosensors-market-1117

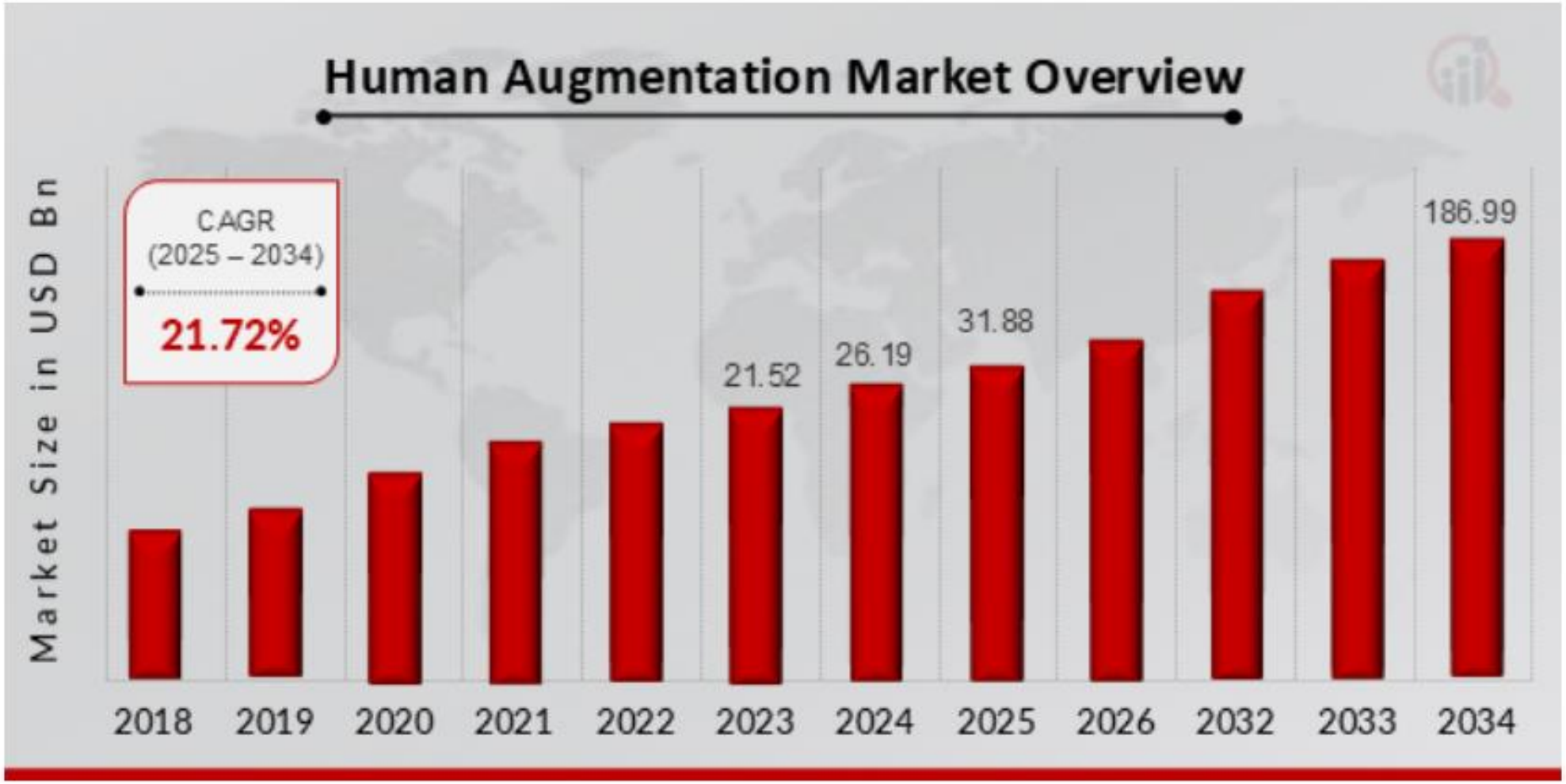
Human Augmentation Market Overview

Human Augmentation Market is projected to grow from **USD 31.88 billion** in 2025 to **USD 186.99 billion** by 2034, exhibiting a compound annual growth rate **(CAGR) of 21.72%** during the forecast period (2025 - 2034). Additionally, the market size for Human Augmentation Market was valued at USD 26.19 billion in 2024.

The increasing adoption of wearable devices in the fitness sector and the growing demand for human augmentation technologies are the key market drivers enhancing market growth.

https://www.marketresearchfuture.com/reports/human-augmentation-market-5043

Figure 1: Human Augmentation Market Size, 2025-2034 (USD Billion)



https://www.marketresearchfuture.com/reports/human-augmentation-market-5043