

2부. 서비스

집이 케어 해주는 시대;
(DHC, Age-tech, AAL)

한태화연구부교수, 연세의료원
IEC SyC AAL vice-chair, WG5 컨비너

2026.05.21

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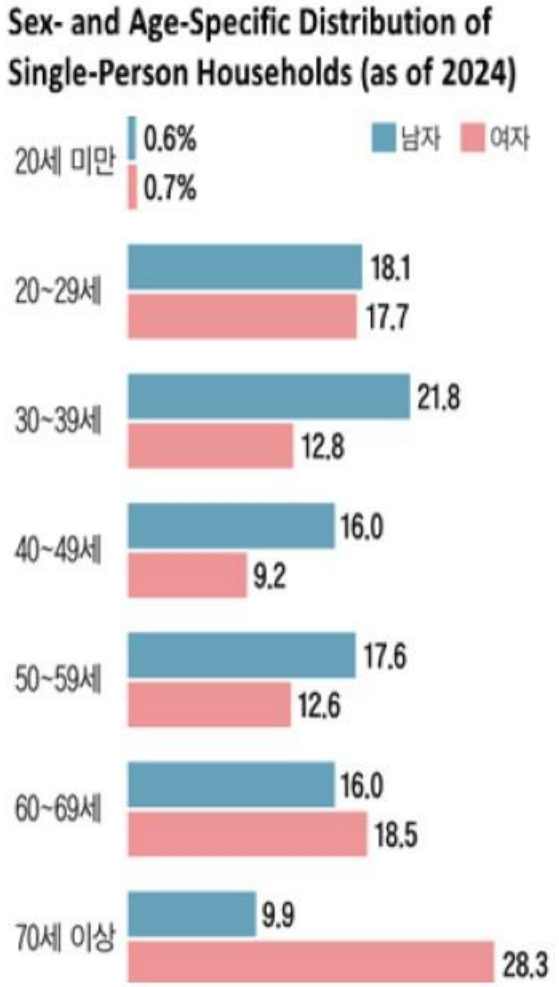
Rise of Single-Person Households in Korea: Beyond Ageing Trends

November 30、 2025

According to **Social Security in Statistics 2024,** released by **the Ministry of Health and Welfare**

"single-person households in Korea reached 8.045 million in 2024, accounting for a record-high 36.1% of all households. While *ageing-related single households continue to rise*, a **notable trend is that the increase is not limited to older adults**—Korea is also seeing substantial growth in single-person households among people in their 20s and 30s.",

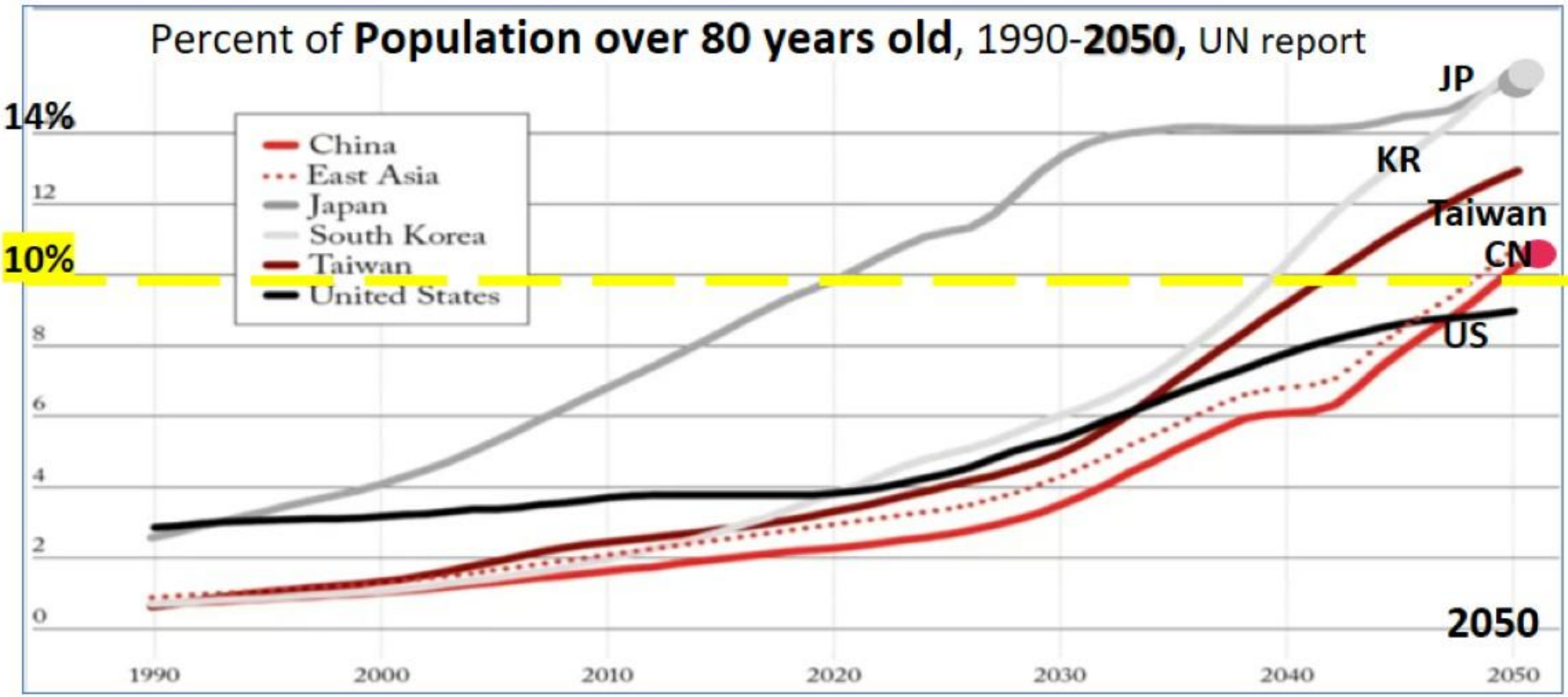


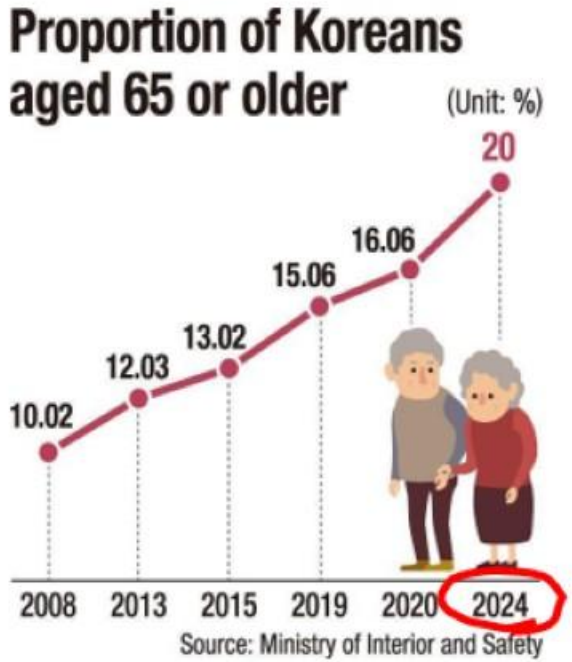


Ageing Challenges in Korea, Asia and Global

"Ensuring healthy lives and promoting well-being for all at all ages", in **UN SDG 3**

➔ Korea, China, and Japan all face **common challenges around 2050**





Status of Ageing in Korea ;
Super-aged society (2024 Dec.), South Korea

Ageing Challenges and Age-tech

As an essential infrastructure for ageing societies—
supporting wellbeing, preventing risks, enabling independence, and reducing care burden.

1) Definition of AgeTech

AgeTech refers **to technologies, products, and digital services designed to support older adults' health, independence, safety, and social participation.** Its aim is to help **people *age in place*—living safely and autonomously at home and in the community.**

2) Related Terms

- **Gerontechnology** – academic term linking **technology & aging**
- **Digital Care / Connected Care** – health care–home integration services
- **AAL (Active Assisted Living) – systems-level framework** for ageing support

3) Key Trends in AgeTech

① **Multi-sensor + AI Integration** Wearables, home IoT, ambient sensing → early risk detection, personalized care
② **Shift from Devices to Ecosystems** Hospital–home–community data flow, interoperability, FHIR adoption
③ **Robotics & Social Companionship** Care robots, social robots (e.g., Hyodol) expanding for emotional support
④ **Digital Inclusion & Usability for Seniors** Human factors, cognitive accessibility, intuitive UI/UX
⑤ **Policy & Standardization Acceleration** AAL architectures, AI trustworthiness, safety & interoperability standards

AgeTech Market Map(2022~2025)







AgeTech Market Map(2022~2025)





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DHT integration maturity

Digital Health
and Digital Health Technologies

Digital Health

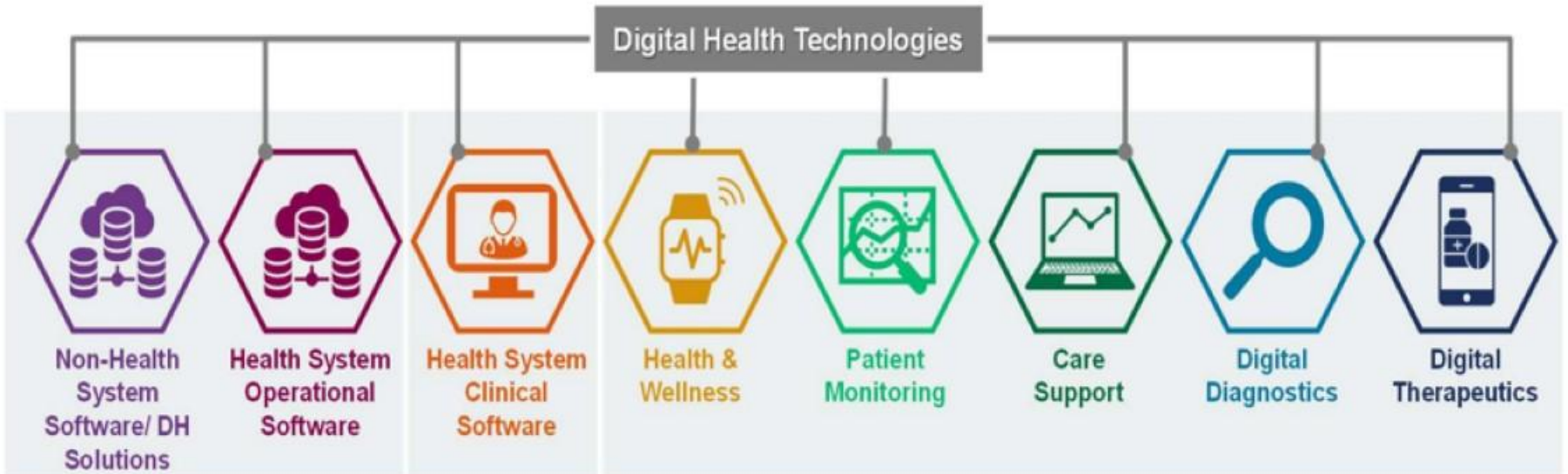
The use of digital technologies in healthcare

- mobile health (mHealth
- health IT
- wearable devices
- telehealth/tel medicine
- personalized medicine
- AI/ML

Digital Health Technologies

Tools that use computing platforms, connectivity, software, and sensors

- general wellness aplications
- medical device applications
- companion or adjunct use



DHT: 의료 및 관련 용도로 사용되는 컴퓨팅 플랫폼, 연결된 기기, 소프트웨어 및 센서 (FDA, 2020)

3. contents

구분	디지털 헬스 데이터				
	디지털 바이오마커	개인생성건강데이터 (PGDH)	사회적 건강 결정 요인 (SDOH)	디지털 표현형	보건정보기술 기반 데이터
정의	디지털 헬스 기술을 통해 측정된 생리적·행동적 개입에 대한 반응 지표 (FDA)	개인이 일상에서 수집한 건강 관련 생활 데이터 (ONC-Health IT)	건강에 영향을 미치는 사회·경제·환경적 데이터 (WHO)	디지털 행태로 추정되는 행동·심리 표현 (John Torous, 2016)	EHR, 청구, 레지스트리 등 임상·행정 기반의 의료정보
데이터 예시	심박변이도, 수면 효율, 타이핑 속도, 걸음 수 등	운동량, 식사기록, 수면 시간 등 앱 기반 자가 기록	소득, 교육수준, 거주환경, 고립도, 교통 접근성 등	위치 패턴, 통화 빈도, 스마트폰 센서 로그, 텍스트 사용 패턴 등	진단명, 검사결과, 약물 처방, 입원기록, 청구코드 등
생성 주체/장소	웨어러블, 센서, 모바일 앱 (자동)	개인 사용자, 웨어러블, 자가입력 (수동)	커뮤니티, 정부 통계, 설문, 주거환경 기기 및 센서	스마트폰, 앱, 통신기록 등 (무의식적 생성)	의료기관, 보험자, 정부 등

Ageing in Place ; 지역사회 연속거주

"요양원 시설과 같은 대체 거주시설보다는 노인들이 나이, 수입, 혹은 신체적 능력을 포함한 능력의 수준(Ability Level)에 상관없이 자신의 집과 자신이 속한 커뮤니티에서 안전하고 독립적이며, 안락하게 살아가는 것"、 **CDC**



ＡＩＰ촉진방안 :
-Home Modification 등
-40년 이상 거주 65세 이상 부동산 세금 감면

실제로 65세 이상 노인의 90%는 그들이 현재 머무르는 거처에서 살아가는 것을 선호

한국, 통합돌봄법 시행, 26년 3월 37 일



지역사회에서의 연속적 거주를 위한 거주 공간의 개선 방안

"What data is actually required for care?"

"Care를 위한 초기 signal은 생활 속에서 먼저 나타난다"

Clinical Data	← →	Life Data
EMR	진단보단 활동감소 먼저	Activity
Lab	생체수치 수면변화	Sleep
Imaging	기능저하는 이동성으로	Mobility
Diagnosis	생활패턴변화로 위험신호 감지	Routine
Episodic	병원은 순간관찰, 집은 지속적 관찰	Continuous

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What is AAL ?



- **concepts, products, services and systems**
  - **combining technologies and social environment**
  - **with the aim of improving the people's QoL**

- **"people"** include everyone but puts emphasis on **"older citizens"** taking account of the ageing of our global society

AAL, Active Assissted Living(IEC SyC AAL)

❖IEC SyC AAL 구성

SyC AAL Active Assisted Living

Scope | Structure | Projects / Publications | Documents | Votes | Meeting

Membership | Officers | Liaisons | Working Groups

SyC AAL Officers

Chair	**Mr Dejun Ma** (CN) Term of office : 2029-11
Vice-Chair	**Ms Pamela D Gwynn** (US) Term of office : 2025-12
Vice-Chair	**Ms Tae Hwa Han** (KR) Term of office : 2027-07
Secretary	**Mr Hajime Yamada** (JP)
Assistant Secretary	**Mr Atsushi MIYOSHI** (JP)

IEC Secretariat Contacts

Technical Officer	**Mr Miroslav Siket**
Standards Project Administrator	**Mrs Sandrine Gosselin**
Editor	**Mrs Lucy Sonner**

구 분	제 목
SyC AAL/WG 1	User Focus
SyC AAL/WG 2	Architecture and Interoperability
SyC AAL/WG 3	General specifications, Quality and Conformity assessment
SyC AAL/WG 4	Regulatory Affairs
SyC AAL/WG 5	AAL in the connected home environment
SyC AAL/WG 7	Cooperative multiple systems in connected home environments - Functional safety of electrical/electronic safety-related systems - AAL aspects
SyC AAL/MT 6	International Electrotechnical Vocabulary - Part 871: Active Assisted Living
SyC AAL/JWG 9	Ageing-inclusive living in smart home
SyC AAL/AG 1	Chair's Advisory Group - Strategy and Coordination

Aging committee 설립의 배경 상이

- FP7 (2007-2013) – Horizon 2020 (2014-2020) – (현) Horizon Europe (2021-2027)까지
  - 디지털 헬스, Active and Healthy Ageing(AHA), 스마트홈(Connected Home, smart home), AAL(Active Assisted Living)

·범유럽 공동 연구 프로젝트 (다국가 컨소시엄 중심), **기술개발 + 사회혁신** 동시 추진 (예: eHealth, AgeTech, Gerontechnology).
·**고령자**의 **삶의 질 향상**과 **헬스케어 지속가능성**에 중점, **표준화(Standards)**·**상호운용성(Interoperability)**을 프로젝트의 중요한 산출물로 명시.



·**영국 정부** 차원 **국내 인구 고령화 대응 전략**에 중점.
  – 고령화를 국가적 도전이자 경제적 기회(Silver Economy) 정의.
·**국내 정책 중심** (연금, 의료, 사회복지 개혁 등).
·**산업 전략**의 일환으로 "Grand Challenges"에 포함 (UK Industrial Strategy, 2017).
·Focusing on: **생산성 유지, 고령자 고용, 연금 개혁, NHS 지속가능성, 주거·지역사회 돌봄.**
·EU FP처럼 연구개발 중심이 아니라, **정책·제도 개혁**과 **사회·경제 시스템 재편**에 집중.

Low Fertility & Ageing Response Roadmap

The Lense of Gov. Roadmap, "Basic Plans on Low Birth Rates and Ageing Society"

- National strategies supporting ageing society and AAL related services

;Implemented through five consecutive **"Basic Plans on Low Birth Rates and Ageing Society"** (2006–2030), which progressively strengthened ageing policy frameworks

Plan(Years)	Core Policy Direction	Key Supporting Policies
1st plan (2006- 2010)	Laying the foundation for an ageing society	• Expansion of the National Pension coverage and discussion on Basic Pension introduction • Launch of Long-Term Care Insurance (2008) • **Expansion of elderly welfare facilities (nursing homes, senior community centers)**
2nd plan (2010 - 2015)	Building an age-friendly society and expanding services	• Expansion of long-term care services and home/community care • **Strengthening community-based elderly welfare service delivery** • Expansion of senior employment and social participation programs • Initial promotion of the age-friendly industry
3rd plan (2015 - 2020)	Transition to community-based care and structural response to super-ageing	• Pilot projects on Community Care for the Elderly (from 2018) • Restructuring of elderly care services (home-visit, day/night care focus) • **Introduction of ICT-based remote health management pilots** • Support for continued employment of older adults
4th plan (2021 - 2025)	**Responding to *the super-ageing transition* and fostering *digital inclusion***	• **Promotion of smart care technologies and age-tech industries** • **Deployment of digital care devices (wearables, sensors, robots) and AAL-based service pilots** • Advancement of the **National Dementia Responsibility Policy (cognitive health + community care)** • **Digital transformation of senior community centers**
5th plan (2026 - 2030)	Structural response to ageing and regional depopulation, **integration of AAL & robotics**	• **Policy integration of Community Care + Connected Home Environment + Smart City** • **Development of ageing-related quality of life indicators and evaluation frameworks** • **Institutionalization and standardization of AAL and robotics-based care services**

The Computer for the 21st Century

Specialized elements of hardware and software, connected by wires, radio waves and infrared, will be so ubiquitous that no one will notice their presence

by Mark Weiser

The most profound technologies are those that disappear. They weave themselves into the fabric of everyday life until they are indistinguishable from it.

Consider writing, perhaps the first information technology. The ability to represent spoken language symbolically for long-term storage freed information from the limits of individual memory. Today this technology is ubiquitous in industrialized countries. Not only do books, magazines and newspapers convey written information, but so do street signs, billboards, shop signs and even graffiti. Candy wrappers are covered in writing. The constant background presence of these products of "literacy technology" does not require active attention, but the information to be transmitted is ready for use at a glance. It is difficult to imagine modern life otherwise.

Silicon-based information technology, in contrast, is far from having become part of the environment. More than 50 million personal computers have been sold, and the computer nonetheless remains largely in a world of its own. It is approachable only through complex jargon that has nothing to do with the tasks for which people use computers. The state of the art is perhaps analogous to the period when scribes had to know as much about making ink or baking clay as they did about writing.

The arcane aura that surrounds personal computers is not just a "user interface" problem. My colleagues and I at the Xerox Palo Alto Research Center think that the idea of a "personal" computer itself is misplaced and that the vision of laptop machines, dynabooks and "knowledge navigators" is only a transitional step toward achieving the real potential of information technology. Such machines cannot truly make computing an integral, invisible part of people's lives. We are therefore trying to conceive a new way of thinking about computers, one that takes into account the human world and allows the computers themselves to vanish into the background.

Such a disappearance is a fundamental consequence not of technology but of human psychology. Whenever people learn something sufficiently well, they cease to be aware of it. When you look at a street sign, for example, you absorb its information without consciously performing the act of reading. Computer scientist, economist and Nobelist Herbert A. Simon calls this phenomenon "computing"; philosopher Michael Polanyi calls it the "tacit dimension"; psychologist J. J. Gibson calls it "visual invariants"; philosophers Hans Georg Gadamer and Martin Heidegger call it the "horizon" and the "ready-to-hand"; John Seely Brown of PARC calls it the "periphery." All say, in essence, that only when things disappear in this way are we freed to use them without thinking and so to focus beyond them on new goals.

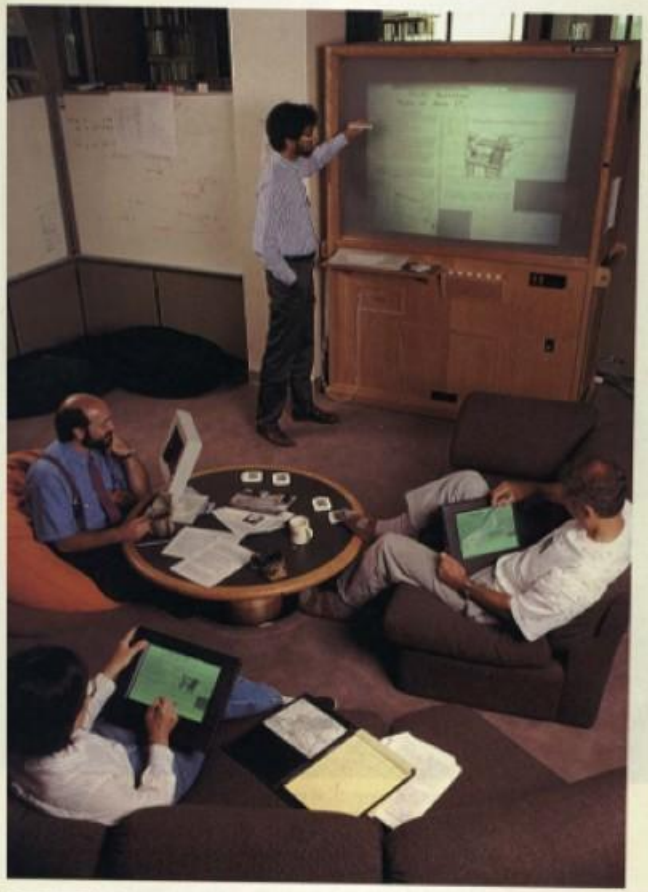
The idea of integrating computers seamlessly into the world at large runs counter to a number of present-day trends. "Ubiquitous computing" in this context does not mean just computers that can be carried to the beach, jungle or airport. Even the most powerful notebook computer, with access to a worldwide information network, still focuses attention on a single box. By analogy with writing, carrying a superlaptop is like owning just one very important book. Customizing this book, even writing millions of other books, does not begin to capture the real power of literacy.

Furthermore, although ubiquitous computers may use sound and video in addition to text and graphics, that does not make them "multimedia computers." Today's multimedia machine makes the computer screen into a demanding focus of attention rather than allowing it to fade into the background.

Perhaps most diametrically opposed to our vision is the notion of virtual reality, which attempts to make a world inside the computer. Users don special goggles that project an artificial scene onto their eyes; they wear gloves or even bodysuits that sense their motions and gestures so that they can move about and manipulate virtual objects. Although it may have its purpose in allowing people to explore realms otherwise inaccessible—the insides of cells, the surfaces of distant planets, the information web of data bases—virtual reality is only a map, not a territory. It excludes desks, offices, other people not wearing goggles and bodysuits, weather, trees, walks, chance encounters and, in general, the infinite richness of the universe. Virtual reality focuses an enormous apparatus on simulating the world rather than on invisibly enhancing the world that already exists.

Indeed, the opposition between the

MARK WEISER is head of the Computer Science Laboratory at the Xerox Palo Alto Research Center. He is working on the next revolution of computing after workstations, variously known as ubiquitous computing or embodied virtuality. Before working at PARC, he was a professor of computer science at the University of Maryland; he received his Ph.D. from the University of Michigan in 1979. Weiser also helped found an electronic publishing company and a video arts company and claims to enjoy computer programming "for the fun of it." His most recent technical work involved the implementation of new theories of automatic computer memory reclamation, known in the field as garbage collection.



US COMPUTING begins to emerge in the form of five or six different scale tabs that will eventually replace chalkboards as well as in other devices at the Xerox Palo Alto Research Center. Computer scientists using the boards can write and erase notes and sketches as if they were using a live board for discussion. Building boards and integrating them with other tools has helped researchers understand better the eventual shape of ubiquitous computing. In conjunction with active badges, live boards can customize the information they display.

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bly into people's lives, this scenario points up some of the social issues that embodied virtuality will engender. Perhaps key among them is privacy: hundreds of computers in every room, all capable of sensing people near them and linked by high-speed networks, have the potential to make totalitarianism up to now seem like sheerest anarchy. Just as a workstation on a local-area network can be programmed to intercept messages meant for others, a single rogue tab in a room could potentially record everything that happened there.

Even today the active badges and self-writing appointment diaries that offer all kinds of convenience could be a source of real harm in the wrong hands. Not only corporate superiors or underlings but also overzealous government officials and even marketing firms could make unpleasant use of the same information that makes invisible computers so convenient.

Fortunately, cryptographic techniques already exist to secure messages from one ubiquitous computer to another and to safeguard private information stored in networked systems. If designed into systems from the outset, these techniques can ensure that private data do not become public. A well-implemented version of ubiquitous computing could even afford better privacy protection than exists today.

By pushing computers into the background, embodied virtuality will make individuals more aware of the people on the other ends of their computer links. This development may reverse the unhealthy centripetal forces that conventional personal computers have introduced into life and the workplace.

Even today, people holed up in windowless offices before glowing computer screens may not see their fellows for the better part of each day. And in virtual reality, the outside world and all its inhabitants effectively cease to exist. Ubiquitous computers, in contrast, reside in the human world and pose no barrier to personal interactions. If anything, the transparent connections that they offer between different locations and times may tend to bring communities closer together.

My colleagues and I at PARC believe that what we call ubiquitous computing will gradually emerge as the dominant mode of computer access over the next 20 years. Like the personal computer, ubiquitous computing will produce nothing fundamentally new, but by making everything faster and easier to do, with less strain and fewer mental gymnastics, it will transform what is apparently possible. Desktop publishing, for example, is essentially no different from computer typesetting, which dates back to the mid-1960s. But ease of use makes an enormous difference.

When almost every object either contains a computer or can have a tab attached to it, obtaining information will be trivial: "Who made that dress? Are there any more in the store? What was the name of the designer of that suit I liked last week?" The computing environment knows the suit you looked at for a long time last week because it knows both of your locations, and it can retroactively find the designer's name even though that information did not interest you at the time.

Sociologically, ubiquitous computing may mean the decline of the computer addict. In the 1910s and 1920s many people "hacked" on crystal sets to take advantage of the new high-tech world of radio. Now crystal-and-cat's-whisker receivers are rare because high-quality radios are ubiquitous. In addition, embodied virtuality will bring computers to the presidents of industries and countries for nearly the first time. Computer access will penetrate all groups in society.

Most important, ubiquitous computers will help overcome the problem of information overload. There is more information available at our fingertips during a walk in the woods than in any computer system, yet people find a walk among trees relaxing and computers frustrating. Machines that fit the human environment instead of forcing humans to enter theirs will make using a computer as refreshing as taking a walk in the woods.

FURTHER READING

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감사합니다.



연세대학교
YONSEI UNIVERSITY