

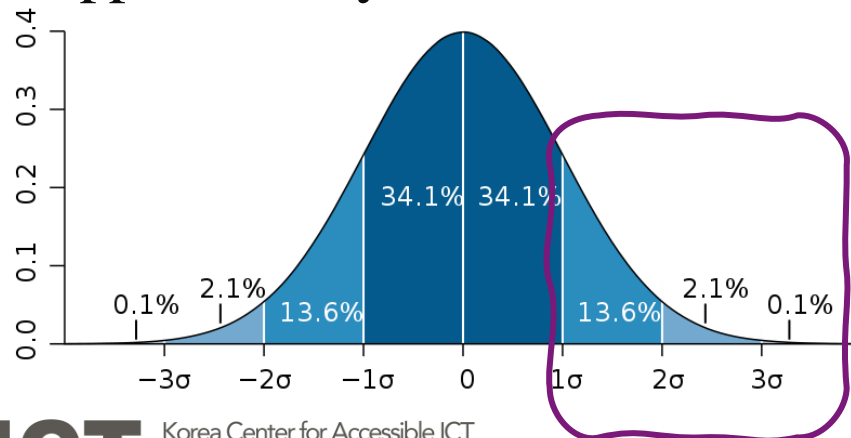


Accessible emerging technology and the role of standards

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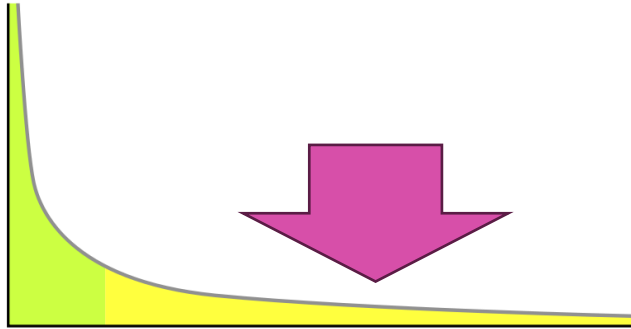
"Accessibility" and Normal distribution

- **Accessibility** – The notion of **accessibility** is to ensure that information and communication technology (ICT) is available to all people including persons with disabilities, those with age-related disabilities, and those with specific needs.
- According to the Central Limit Theorem, if the needs of all ICT users worldwide are expressed as a distribution, they follow a normal distribution.
- In mathematics, the standard deviation σ (sigma) is used as a unit to measure how far from the center. The figure below shows what this standard deviation means. In other words, considering the needs from the center to the person 1σ away, it is designed to satisfy approximately 68.2% of users.



- According to the WHO's World Health Survey, 15.6 percent of the world's population is those with disabilities. That is, in the normal distribution, the area **outside the right 1σ (sigma)** becomes persons with **disabilities**.

The tail of distribution – Persons with disabilities



Theoretically, this tail is a **right-downward curve**.

▪ Characteristics

1. The **density is smaller** compared to the center. (Area = number)
2. It is an **endless, long tail**.
3. There is not much difference in the number of frequencies. (though it does decrease)

▪ Perspective of accessibility

1. The number of customers in this area is smaller (compared to the central area).
2. There are various needs, and **there is no single solution** that can solve everything.
3. It is not easy to prioritize accessibility technologies.



Pitfalls of Developers in Accessibility Considerations

- The answer to the question of "**How far should we develop?**" is "**As far as technology allows.**" For developers, the answer is nothing short of a "**project that never ends.**"
- Another difficulty would be that as these people who need access deviate to the end of the tail, **their level of "fault tolerance" becomes lower.** Persons with disabilities have a lot more difficulties avoiding problems when they occur due to their already low level of accessibility (= having fewer alternative means).
- From the perspective of developers, **accessible services should be developed in consideration of the possibility of exceeding their knowledge or capabilities, and the developed results should be perfect considering all possible errors.**
- Securing ICT accessibility is a matter of considering somewhere behind **one sigma.** The manufacturing industry already began challenging the defect rate at the level of **six sigma (3 out of 1 million) in the 1980s.**
- **We need to look back on whether our "standard" may be too low.**



Promising Characteristics of Emerging Technology

- **Through these emerging technologies, ICT is becoming smart enough to consider persons with disabilities!**
- **Metaverse** – Virtual spaces created by metaverse with the aid of eXtended Reality (XR) technologies such as Virtual Reality(VR), Augmented Reality (AR), and Mixed Reality (MR), will open new opportunities for many users with disabilities, breaking away from fixed user interfaces such as a keyboard and mouse.
- **Artificial Intelligence (AI)** - AI's self-evolving and environmental-adaptive nature will allow the system to learn the various needs of users who need access and will continue to find ways to communicate with them.
- **Internet of Things (IoT)** - The scalability and interoperability features of IoT can be used as a platform for integrating various accessibility services and utilizing multiple alternative means for persons with disabilities.



Emerging Technologies and Accessibility

- Emerging technologies represented by metaverse, AI, IoT, etc. may be new opportunities for persons with disabilities. At the same time, it may cause another crisis.
- Persons with disabilities are **potential early adopters!**

(early adopter) : (price paid) < (expected benefit)

- **When persons with disabilities gain access to information systems through emerging technologies that they could not through legacy technologies, the expected benefits will be very high for them.**
- Of course, this requires a major premise. – **"If it's made properly!"**
- If emerging technology does not have sufficient accessibility, persons with disabilities will be the last users to introduce emerging technology. If access is not secured, **emerging technology service providers will miss the potential early adopter**, which accounts for more than 15% of the world's population, **making it difficult to secure rapid business feasibility, and the digital divide widens socially.**



Accessibility Standards

- Shareholders evaluate efforts to improve corporate accessibility through annual shareholders' meetings. It is important to improve accessibility as part of corporate social responsibility, but there are some problems with this method.
- First of all, in most cases, "**shareholders do not represent persons with disabilities.**" In other words, there is a possibility of pursuing the introduction of “**impactful**” or “**fancy**” technology to satisfy shareholders, **rather than improving accessibility in the form of accommodating the needs of persons with disabilities.**
- Another way to expand corporate accessibility is through legal obligations and regulations. **It is necessary to present practical and specific ways to improve accessibility.**
- Therefore, the **role of accessibility standards** are:
 - 1) To understand the characteristics of persons with disabilities and specifically list their needs
 - 3) To present a roadmap of accessibility improvement and prioritize development plans
 - 4) To integrate various accessibility improvement technologies to ensure consistency



What should we do?

- In summary, emerging technology has various technical characteristics for expanding accessibility and has the potential to secure more persons with disabilities that existing technologies have not accepted. However, if this is developed by following the existing method through the central limit theorem, the digital divide will eventually intensify.
- In order to guide the introduction of emerging technology in a socially desirable direction,
 - 1) **Policymakers must induce service providers to have appropriate accessibility,**
 - 2) **Service providers should develop technologies to provide substantial access to persons with disabilities,**
 - 3) **Standard developers should present a big picture and deliver proper accessibility guidelines that standardize concrete development methods to ensure interoperability and scalability.**
- **"no one left behind"** is a short four-word expression, but the path is not so easy.



Thank You