



TOWARD A SUSTAINABLE HEALTH ECOSYSTEM FIXED ON THE DEEPEST PROFESSIONAL VALUES



BY
GABRIËLLE SPEIJER



&
PETER WALGEMOED

Respectively, Radiation-Oncologist, Haga Teaching Hospital; and MBA, Founder CatalyzIT, NL and Founder Careliance, NL. Thought leaders in health and Information Technology & Communication, sharing the ambition to make the necessary change for an inclusive and democratic society with heart and soul.

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Patients and healthcare professional need to take the lead in technology as digital starts with human values and human needs. It's crucial that they organize together and don't leave it to the other stakeholders, like tech industry or government. All these stakeholders contributing to health and care should follow the same value: the Hippocratic Oath. Nowadays it's getting harder to uphold this oath lacking the orchestration principles for our human values in IT&C design globally. A mindset focused on return on data instead of return on investment is needed to exploit the anti-rival nature of data and their value for society. Concretizing the vision of Nobel prize winner Elinor Ostrom by organizing cooperatives in specific roles with a shared long-term mission, applying all IT&C principles described in our article lays the foundation for a sustainable health ecosystem that's yielding curated data and embeds the anti-trust law and legislation. It brings in the maximum potential of everyone's qualities and insights, continuously. Performing on top of licence realizing breakthroughs. For many more people and our future generations to learn and create wisdom on it, exponentially.

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01

NEW TECHNOLOGY: DRIVEN BY HUMAN VALUES

Patients and healthcare professionals need to take the lead in technology as digital innovation starts to interfere with human values and needs. It is crucial that they organize together and not leave crucial decisions to other stakeholders, such as the tech industry or governments. All of these stakeholders should adhere to the same values, namely to contribute to health and care, in particular the Hippocratic Oath. It is getting harder to follow the Hippocratic Oath in the absence of orchestration principles to place human values at the center of information technology and communications (“IT&C”) design globally.

02

THE HIPPOCRATIC OATH

The deepest professional value for a doctor is the Hippocratic Oath.² In short, it comes down to the promise to entrust the patient and society to the best care and health in confidentiality. Given the technological developments and possibilities in contemporary society, the Hippocratic Oath could look like this:

As a Data Driven Doctor, I will:

- Make health information valuable
- Make health information available for my patient and the knowledge network of colleagues.
- Treat health information confidentially
- Define and Lead Technology & its development

Aiming at the best care and health for my patient and society.

03

CONTEMPORARY CHALLENGES IN HEALTHCARE

In clinical practice globally, the shift from paper was done quite literally: patient records, processes, and workflows suitable for the traditional organizational structures were simply digitized. In retrospect, rethinking the organizational structure in terms of what technology and its advances could offer us as a community seemed not to be a priority. Since technology influences processes, interactions and behavior, it can also freeze them with far-reaching consequences. Problem solving in the day-to-day treadmill of existence instead of back casting and imagining what we really want technology and its expected development to bring us in future has a high cost. As a matter of fact, we have lost sight of the translation of our societal values (including the Hippocratic Oath) into principles for IT&C design. This fundamental aspect of IT&C design is still lacking today, leading to significant challenges in healthcare.

A. Digitiz-ed: Increasing Risk for Health Safety

1. Digitized Paper

In clinical practice it takes the healthcare professional a lot of administrative time and effort to get insight into the health situation of their patient, as clinical information is stored in legacy documentation systems in files, folders, subfolders containing letters, PDFs, notes, workflows, to-do lists, etc. Moreover, the average professional must go through various documentation systems in different clinical practices, hospitals, or other care organizations to gather all the necessary information. To maintain an overview, all of these documents are copied manually into the systema of each healthcare professional and organization. This is an unnecessary, error-prone process leading to potential harms to patient safety, the reliability of healthcare professionals, and energy inefficiency,³ as well as the need to put in place protection and governance measures to maintain robust resilience concerning cybersecurity.⁴

2 World Medical Association. *The Modern Hippocratic Oath*. (2022). <https://www.wma.net/what-we-do/medical-ethics/declaration-of-ge-neva/>.

3 Robie McKie et. al., *Chaos after heat crashes computers at leading london hospitals*, THE GUARDIAN (Aug 7, 2022), <https://amp.theguardian.com.cdn.ampproject.org/c/s/amp.theguardian.com/environment/2022/aug/07/chaos-after-heat-crashes-computers-at-leading-london-hospitals>.

4 R. Quinn, *Potential dangers of using technology in healthcare*, SOCIETY OF HOSPITAL MANAGEMENT. (Mar 17, 2016), <https://www.the-hospitalist.org/hospitalist/article/121825/potential-dangers-using-technology-healthcare>.

“We’re building virtual healthcare without foundation, solving today’s problems technically, locking healthcare in the past.”

2. Digitized Bricks and Mortar

A complete timeline of all records including the essential metadata (e.g. information about the place, the type of diagnostic or treatment machine or tool, the responsible care team members) of a patient’s health path is not recorded since when digitizing some decades ago the ‘old organization’ was simple enough. With growing mobility, patients are visiting more and more clinical practices and with big advances in healthcare like expanding diagnostic applications, treatment modalities and superspecialization of healthcare professionals, the complexity of healthcare has increased a lot. The need for a complete timeline of all records will rise further with demand for telehealthcare. Strangely enough, it seems there is a widely held belief ‘the healthcare system’ is taking care of this complete timeline, while in reality there is no governance over this process. As a result, healthcare professionals struggle daily to get the right information on a timely basis. Also, information is difficult to track or may even be hidden away, despite best efforts.

3. Digitized Consent Concerning Access to Information

Considering the approach of how consent on access to information has been managed it simply became a e-translation from paper in recent times. As the world wide web facilitated the spread of information to anyone anywhere, it became a business model for companies. Besides the primary model based on development of services; advertising is still a big part of the revenue. In the meantime, privacy legislations like “HIPAA” (Health Insurance Portability and Accountability Act),⁵ “CCPA” (California Consumer Privacy Act),⁶ “GDPR” (General Data Protection Regulation)⁷ and “PIPL” (Personal Information Protection Law)⁸ have been introduced in the U.S., Europe, and China.

As a result, in the consumer market, we see “EULA” (End User License Agreements) of unreasonable sizes and understandability. Applying this to the field of healthcare one

might discuss whether ethical to make people sign such agreements in a vulnerable (mental) state. In the healthcare sector we see a twofold reaction. Ignorance of the potential consequences of the importance of personal data protection especially for our professional relationship with the patient. On the other side of the spectrum, we see a reluctance giving access to data when crucial for continuity or advancement of care.

“*Considering the approach of how consent on access to information has been managed it simply became a e-translation from paper in recent times*”

Lacking a seamless integration of consent concerning access to data, all sorts of data breaches that can currently be identified: from failure to deliver (on time), loss, unauthorized inspection, to use or misuse for purposes other than primarily providing care without consent, including technology, pharma or market research companies getting access to these sensitive data. Services, drugs, or marketing tools, with or without consent can now be developed in return for services or payment to the healthcare organization or healthcare professional. For Data Protection Authorities (“DPAs”) like the Dutch AP — the independent public authorities applying the GDPR — it is practically impossible to oversee the fundamental right to the protection of personal data.⁹ In conclusion, the GDPR is not currently construed according to its intent, which leads to an increasing risk for health safety.

B. No State-of-the-art Technology: No Insight into Overall Health Situation

In healthcare, mainly financial administrative processes are supported digitally, much less the patient characteristics, which determine healthcare professionals’ actions and

5 Health Insurance Portability and Accountability Act of 1996. <https://www.govinfo.gov/content/pkg/FR-2013-01-25/pdf/2013-01073.pdf>.

6 California Consumer Privacy Act, Cal. Civ. Codes § 1798.199.10, § 1798.199.10(a), § 1798.185(d), § 1798.199.10(a), § 1798.199.15(a), § 1798.155(a), § 1798.199.45(a). <https://privacyrights.org/resources/california-privacy-rights-act-overview>.

7 General Data Protection Regulation (EU) 2016/679 of the European Parliament and of the Council. *The protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC*, (Apr 26, 2016), <https://gdpr.eu/>.

8 Personal Information Protection law. Nov 2020. <https://www.reuters.com/world/china/china-passes-new-personal-data-privacy-law-take-effect-nov-1-2021-08-20/>.

9 Dutch Data Protection Authority, *necessary AP growth to protect citizens in digitizing Netherlands*, P356 (Nov 11,2020), <https://www.privacy365.eu/en/by-the-dutch-data-protection-authority-necessary-ap-growth-to-protect-citizens-in-digitising-netherlands/>.

outcomes with their patients. Purchasing of technology in clinical setting is often done after long-term trajectories of (public) procurement processes. These involve risks and uncertainties for suppliers of whom a limited number can survive and finally sign long-term contracts with hospital management, receiving a privileged status.¹⁰ As regulatory requirements become more intense, such as "MDR" (Medical Device Regulation), CE / FDA certification, and the EU AI Act,¹¹ they tend to slow down innovation even further when applied within these existing and cumbersome organizations.

"Today technology imposes thresholds, it's about putting the thresholds on the right places in the system so that we can live up to our values and work together in this."

Since fundamental decisions on the functionality of the technology already have been made in the very beginning of its development, the people who deliver and receive care through it will face the resulting limitations and their clinical consequences. Even with deep knowledge in the field of medical informatics it turns out to be very hard to see through beautiful promises, let alone to foresee the implications of what has been offered and its clinical consequences over time as insight in the deeper layers is lacking before signing agreements.

In healthcare, mainly financial administrative processes are supported digitally, much less the patient characteristics, which determine healthcare professionals' actions and outcomes with their patients

For example, an EHR vendor can claim integrated international standards for semantic interoperability like SNOMED International. Taking a deeper look this can turn out to be a low-value implementation of a limited list of codes for diagnoses and some treatments while eliminating the rich hierarchical structures representing its added value. On the other hand, this co-creative process with continuous input

from the clinical side, discussion on what's possible and appropriate from a technical standpoint is crucial to support care safely over time. Standards, certifications, and other regulations are extremely important to deliver safe care, but they can't live up to clinical guidance and continuous validation!

As technology in the consumer market is developing exponentially, the domain of health and leisure applications is growing alongside it. While delivering care with legacy technology in the clinical setting as it shapes up to increasing regulations, these applications are mainly developed outside clinical practices. This means healthcare professionals generally lack information on most of their patients' health characteristics. Consultations still take a central role in healthcare today because it is impossible to harness the power of technology considering all variables like exposome, social graph, genome, microbiome, transcriptome, and metabolome. In short, we are unable to create a continuous insight into the overall health situation of a patient.¹²

"In the design of the health ecosystem, the patient, who is of course central, is left all alone if we don't orchestrate the doctor with its Hippocratic Oath."

Even more concerning is the emergence of a parallel landscape able to expand driven by advertising and profit, and *not* necessarily following the core value of the Hippocratic Oath or other values like inclusion, justice, equality, solidarity, non-discrimination, or democracy. This holds a potential risk of harm to entire populations. For example, social media platforms can say that they support people with mental problems but may make profit on insights shared by their users. Seriously ill and vulnerable people may miss out on routine care, making them tempting prey for sinister treatments outside the scope of regular licensed and heavily regulated practices. This is a paradoxical situation.

"The Hippocratic Oath should be deployed across the entire health ecosystem, why should it only apply to doctors, when we share the same purpose?"

10 KPMG, authority consumer markets (ACM), *The market for EHR systems has been further concentrated in the past ten years; there is little movement due to a limited offer in combination with high transition costs*, (2021), <https://www.acm.nl/sites/default/files/documents/market-survey-into-information-systems-and-digital-data-exchange-in-the-hospital-sector.pdf>.

11 Regulation of the European Parliament and of the Council, *Harmonised rules on artificial intelligence (Artificial Intelligence Act) and amending certain union legislative acts*, SEC (2021) 167 final, SWD (2021) 84 final, SWD (2021) 85 final, (Apr 21, 2021), <https://artificialintelligenceact.eu/>.

12 Eric J. Topol, *Individualized medicine from prewomb to tomb*, Cell Vol 157, Issue 1, p241-253, 2014, <https://www.cell.com/cell/fulltext/S0092-8674%2814%2900204-9>.

C. No Support from Connective Technology: No Learning Health System

Making information available is not digitally supported in the current systems, either among colleagues from the same discipline or across medical disciplines, let alone at the institutional level. Consequently, healthcare professionals are using workarounds to get the information to the right place on time. This is done by phone calls, additional meetings, emails, direct messaging etc. To keep oversight in clinical settings, correspondence is still used (like when working on paper) and archived in all these systems. This leads to unnecessary risks for patient safety, and creates extra administrative work for the physician who would rather spend time with the patient.¹³ Moreover, the ability to learn from data is lacking because information can become blocked in certain systems.¹⁴

D. No Proper Archiving: No Value Creation and Undesired Bias

Every organization and clinical practice have its own processes in place to store patient health information (irrespective of its value) for a period subject to statutory data retention periods until simply deleting it. Data curation, the process in the clinical setting where communication, clinical evaluation, and decision-making take place, determines the value of data. This includes data for its primary use (i.e. its clinical purpose) and for its secondary use (scientific research, the development of services, or pharma, quality, financial or safety analysis).

Efforts made separately from clinical processes, like data cleaning, checks by clinicians on non-current data in individual platforms, and systems or standard data entry forms and boxes for clinicians and patients, can lead to the following issues. First, loss of context over time leads to lower data quality. Second, standardization of data entry forms can lead to selection for information already known, therefore enlarging potential biases in clinical decision making, research, service-, product development and missing potential crucial factors to improve quality, finance, safety, security, energy efficiency, and much more.

E. No Joint Focus on (Cyber)security: Potential Profound Implications for Societal Health

The cybercriminal also seemed to plunge into healthcare recently. Healthcare had the highest number of data breaches

of all sectors in 2020. Based on the 2021 Identity Breach Report, the healthcare sector experienced a 51 percent increase in the total volume of records exposed when compared with 2019.¹⁵ Healthcare is threatened by the cybercriminal who operates in a purely financially driven way. The most important areas appeared to be ransomware and disinformation in the era of digital everything, which puts healthcare at great risk. Joint efforts throughout the entire sector to protect from this (new) type of global health threat has never been more urgent. A crucial step in this is collaboration among healthcare professionals making it part of their work ethic.

04

SOLUTION TO SUSTAINABLE HEALTH ECOSYSTEM: A NEW ROADMAP

As described above, big challenges are threatening safe and sustainable health(care) globally while tackling problems in the workspace by fitting in technology seems to even get us further away from what health(care) should and could be. In the early days of the world wide web there was a shared vision of a huge potential to connect everyone's computer anywhere in the world, a democratic model to build up knowledge globally. In the following years, it escaped the attention of the broader public what digital development would imply when you leave it to some parties. From the start of the world wide web (Web 1.0), platforms (Web 2.0) developed. Web 2.0 brought so many conveniences (either for free or in exchange for a subscription fee) that we as a society got used to. We seem not to make a big deal out of the way data should be handled. Data about ourselves, our activities and what we consider as valuable to keep regardless the range of technological applications over time. During the COVID-19 pandemic, we have seen healthcare professionals working longer hours, risking their own health to help patients, while in society there has been a growing trend towards healthcare consumerism and lack of trust. Insight into the expectations and experiences of society and healthcare professionals toward and with each other will be required in order to bridge this gap in the near future.

¹³ Atul Gawande. *Why doctors hate their computers*, Annals of Medicine Nov 12, 2018, <https://www.newyorker.com/magazine/2018/11/12/why-doctors-hate-their-computers>.

¹⁴ Keneth D Mandell, *Scalable Collaborative Infrastructure for a Learning Healthcare System (SCILHS): Architecture*, J Am Med Inform Assoc. 2014 Jul; 21(4): 615-620, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4078286/>.

¹⁵ Constella, 2020 Identity Breach Report, *Weaponized Data Breaches Fueling Identity-based Attacks Across the Globe*, (May 2020), <https://info.constellaintelligence.com/2020-identity-breach-report?hsLang=en>.

“The virtual space for healthcare: fixed on the deepest professional value, the Hippocratic oath and super flexible in all other dimensions.”¹⁶

A. Mindset

Globally, there is a growing awareness of the fact that technological development has such a societal impact.¹⁷ Recently, the European Parliament discussed defending European values, democracy, and fundamental rights in terms of how the Digital Services Act could set the global benchmark for regulating online platforms in the future.^{18 19} European frameworks and legislation are important, and the GDPR provides crucial rights supporting confidentiality in the doctor-patient relationship.

However, a broader sense and understanding of what is necessary and urgent to find a fundamental solution is ahead of us now. While releasing more legislation and regulation it is key to acknowledge there is a window of opportunity now as technology for Web 3.0 is reaching readiness levels allowing us to collectively translate our human values into the design principles for IT&C.²⁰ This will facilitate the process to keep up with the speed of technological developments and to create frameworks and laws around.²¹ In healthcare we must be aware of this crossroads in history as our health is at stake globally now.²²

Sustainable care is about orchestration of people, processes, and technology. The essence is to be able to provide the best care in confidentiality. This implies the freedom for

patients and healthcare professionals to match with each other flexibly, supported with the available insights in order to build upon that trusted connection by knowing about their expectations and experiences with each other. It also means the ability to stack knowledge and insights openly and transparently.

“**However, a broader sense and understanding of what is necessary and urgent to find a fundamental solution is ahead of us now**

This requires a shift in focus from *return on investment* to *return on data* aiming at *return on health*. A learning health system where we can learn from every single patient starts with the mindset of being aware of the societal value of data and the underlying value of the Hippocratic Oath when contributing to the health and care space.

B. Cooperation with Mission

By applying Ostrom’s principles for self-governance of communities,^{23 24} and common property, data can gain their genuine value when curated within communities with a shared goal (Commons Based Peer Production²⁵) or more solid mission driven communities sharing a long-term pur-

16 G. Speijer. *What will metaverse offer physicians and patients in the future?* ICT & health International, Jun 28,2022, <https://ictandhealth.com/what-will-metaverse-offer-physicians-and-patients-in-the-future/news/>.

17 World Economic Forum, *Responsible use of technology*, Aug 2019, https://www3.weforum.org/docs/WEF_Responsible_Use_of_Technology.pdf.

18 News European Parliament, *Facebook whistle blower testifies in European Parliament*, Nov 9, 2021, <https://www.europarl.europa.eu/news/en/headlines/society/20211028STO16120/facebook-whistleblower-testifies-in-european-parliament>.

19 News European Parliament, *Discussion with Frances Haugen on the global impact of digital services act*. May 16, 2022. <https://www.europarl.europa.eu/news/en/press-room/20220516IPR29638/discussion-with-frances-haugen-on-the-global-impact-of-the-digital-services-act>.

20 Digital Assembly, *Future of the Internet: The Metaverse and Web3*, (Jun 21-22, 2022) <https://digitalassembly2022.captag.events/J4RMT4/#/d/v5qgubZRA8zY3KyrtJqPXdDaEGvXBIMq6WEKb2UcKEM>.

21 Dirk Helbing et. al. *Will Democracy Survive Big Data and Artificial Intelligence?* Feb 25, 2017, <https://www.scientificamerican.com/article/will-democracy-survive-big-data-and-artificial-intelligence>.

22 G. Speijer, *Digital Preparedness of the healthcare sector*. Ch15 p122 Natascha van Duuren, Victor de Pous. Multidisciplinary aspects of COVID-19 apps. KNVI, 2021, 978-90-9034977-0. fhal-03547444

23 Beyond Markets and States: Polycentric Governance of Complex Economic Systems, *American Econ. Review* 100 (June 2010): 641-67 <https://web.augsburg.edu/sabo/BeyondMarketsandStatesPolycentricGovernanceofComplexEconomicSystems.pdf>.

24 David Rozas, *When Ostrom Meets Blockchain: Exploring the Potentials of Blockchain for Commons Governance*, Mar 26, 2021, <https://journals.sagepub.com/doi/full/10.1177/21582440211002526>.

25 Benkler, Y. (2006). *The wealth of networks: How social production transforms markets and freedom*. Yale University Press. Online at: https://cyber.harvard.edu/wealth_of_networks/Download_PDFs_of_the_book.

pose (data-driven health lab co-operative)²⁶ demonstrating that approach equating data to oil is a false, deceptive assumption.²⁷ If data would be treated as oil, it becomes a rival product in a highly profitable and under-regulated data economy, without equal health and fair wealth distribution. It won't automatically match the shared values of our society and specifically the Hippocratic Oath. Similarly to the provisions we have made socially for pure drinking water for all, we will have to orchestrate analogous to how our society takes control when it comes to data and technology in the current technological revolution.²⁸

“This requires a shift in focus from return on investment to return on data aiming at return on health

Therefore, a more appropriate definition in healthcare might see data equivalent to blood.²⁹ This would be proper from a moral perspective. However, from a value perspective the definition is incorrect. Because like oil, blood is a finite resource, whereas data are characteristic for their *anti-rivalrous* property, which means opposed to non-rival goods that are not reduced in case of consumption, data even increase. For example, with the same high quality, context-, device and expert-traceable curated dataset a range of diagnoses can be made. For example, with a combination of this and other curated datasets development of drugs or applications like computational models can be done, while a selected dataset can be used to control quality, finance, and process flow. Most valuable data are curated within a cooperative that's driven by a shared long-term mission co-creating and representing stakeholders from the different communities with the right to these data: the citizens (or patients) as *consent holders*, the healthcare professionals and researchers as *knowledge contributors*, the technology developers as *technology orchestrators* and the *data curators* (or *Rentmeesters*).

C. IT&C Principles Empower Right Mindset

Speijer & Walgemoed are concretizing these principles toward a sustainable health ecosystem. All principles are needed to design its foundation.

1. Data Rentmeesterschap

The requirement for data curation by design in the orchestration of IT&C is first described as data Rentmeesterschap.³⁰ This encompasses taking care of data, maintaining, and making it accessible to the stakeholders and future generations on behalf of (healthcare) professionals, researchers and citizen including patients.

The first step starts at the moment of data creation: the consultation or knowledge contribution of the healthcare professional and context of the patient. To provide qualitative data, this needs to be open and therefore highly confidential. This cyber-physical moment of interaction determines the quality of data. In order to turn these data into valuable data it needs to be done in agreement with top performing colleagues in the specific domains of expertise; seamlessly and instantly.

The second step encompasses archiving data for now and later, as an asset on behalf of the team of the healthcare professional and patient with consent of both. This process is highly confidential between the healthcare professional and patient, with them deciding on the level of transparency for primary and secondary use together. This is the foundation for a learning health system: the patient with healthcare professional (data driven doctor) as *trusted link*, both committed to lead with their right to data for health of the individual patient and benefit of society, supported by their trust expert network.

Data curation as described above forms the prerequisite for quality, reliability, provenance, and integrity of data. This process is determining the safety and outcome of care, research, and drug and technology development.

2. Dynamic Informed Consent

Dynamic informed consent is an understandable form that describes what happens to the consent holder's data, its

26 Paul Cerrato & John Halamka, The Digital Reconstruction of Healthcare Transitioning from Brick and Mortar to Virtual Care p120, 2022.

27 World Economic Forum, You may have heard data is the new oil. It's not. Jan 10, 2018, <https://www.weforum.org/agenda/2018/01/data-is-not-the-new-oil/>.

28 G. Speijer, our values as a society are reflected in digital developments for me, Data, Cybersecurity and Privacy, Feb 14, 2022, <https://www.dbsp.nl/our-values-as-a-society-are-reflected-in-digital-developments-for-me-the-hippocratic-oath/>.

29 Eric Perakslis & Andrea Coravos, Is healthcare data the new blood? The Lancet Digital, Vol 1 issue 1, E8-9, May 1, 2019, [https://www.thelancet.com/journals/landig/article/PIIS2589-7500\(19\)30001-9/fulltext](https://www.thelancet.com/journals/landig/article/PIIS2589-7500(19)30001-9/fulltext).

30 P. Walgemoed, Datarentmeester column, CC-BY 2004, <https://datarentmeester.org/staging/index.php/2022/04/28/datarentmeester-welcome/>.

connected technology processors and knowledge contributors using that combination.

3. Data Application Independence and Freedom of Applications

Applications process data. Data is made available independent from the application. In this way data can move freely across applications and can be curated sustainably. Applications now by design can be exchanged by new and better applications, this drives innovation.

4. Timeline

Recording of all curated data with their metadata and relations over time provide the context. Because knowledge is added during a specific period in time, time traveling shows what happened when and with new developed insights. One can go back in time to see whether these could give you new insights. It now becomes possible to forecast different scenarios. In addition, artificial intelligence can then drive the support on a bigger level. This forms the technical foundation for the learning health system.

“The second step encompasses archiving data for now and later, as an asset on behalf of the team of the healthcare professional and patient with consent of both

5. Translation Engine with Underlying Living Standards ³¹

By connecting the knowledge contributors seamlessly and flexibly, international standards for semantic interoperability like SNOMED, RadLex, NANDA or LOINC supra mentioned can be integrated as underlying living standards facilitating them to curate data increasingly faster and better.

6. Self-Sovereign Identity (“SSI”) with Verifiable Credentials

For seamless, flexible, and trusted connectivity between the patient and healthcare professional in the virtual space credentialing - showing provenance of the data- is required. Technology based on blockchain can help when interacting digitally in a secure and privacy by design way.

7. Personalized User Experience (“UX”)

And since, all applications are processors (they don't keep or control data), the former 'one-size fits all' UX for every single application is now exchanged for a truly per-

sonalized virtual space for all processors optimizing over time.

8. Virtual Space

In this virtual environment stepping in and out is easy with freedom of choice as a prerequisite from both sides: the patient and the healthcare professional. Both aiming at the highest level of connectivity and trust. And therefore, health outcomes. Getting insight in the expectations and experiences with each other facilitates this process. Having access to, developing, and selecting the latest and best applications and algorithms. With the ability to specify, improve and kill applications when (potentially) dangerous for safe care delivery or compromising health.

05

SUSTAINABLE HEALTH ECOSYSTEM GLOBALLY

A prerequisite to develop the sustainable health ecosystem is healthcare professionals together with citizens taking the lead in technology as digital starts with human values and human needs. In this health ecosystem anti-trust law and legislation is embedded in its design. This is also the case for the shared human values and in particular the Hippocratic Oath as a professional value.

“Cooperatives with a shared long-term mission yielding curated data will be able to concretize the vision of Ostrom: revealing the anti-rival nature of data and their value for the entire society, instead of being financially beneficial for a small group and mainly being underexploited.”

Bringing in the maximum potential of everyone's qualities and insights, continuously. Performing on top of licenses, realizing breakthroughs. For many more people and our future generations to learn and create wisdom on it, exponentially. ■

³¹ G. Speijer, S. van Sandijk & P. Volkert, *Covid laat belang en waarde SNOMED zien. Elkaar verstaan is de basis.* ICT&health nr 4, 2020 p 64-65.

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