Title: Understanding Healthcare digital platform using affordance theory.

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Abstract

Digital platforms like unified health interface (UHI) attempts to facilitate interoperable healthcare services as a part of the Health care ecosystem, although promising efforts to implement UHI are underway, social and organizational challenges may plague its development and widespread use. Based upon three stakeholders' needs and the issues that await to be addressed for greater public outreach are analyzed in this study, I use affordance theory to identify possible affordances of events and analyze them along with stating benefits, roadblocks, meta characteristics associated. I choose to contribute by building a conceptual framework with propositions that can be used to analyze the affordance actualization of an event. I conclude with a briefing about the necessity to look into potential roadblocks along with the long and short-run effects of event actualization. I suggest broad areas that need immediate attention as a part of future direction for the field advancement that can give an overall benefit of better health care for tomorrow.

Keywords: Unified health care, affordance theory, healthcare, digital affordance, actualization.

Introduction

Of all the forms of inequality, injustice in healthcare is the most shocking and inhumane."

- Dr. Martin Luther King, Jr.,

At Medical Committee for Human Rights, 1966.

The disparity in access to healthcare can be worth costing a life. Though the quote has been stated in 1966, it remains valid. Healthcare access to every individual has not yet been achieved globally even after rapid advancements in digital technologies. According to the UN's sustainable development goals (SDG) report (2020), "In 2017, only around one-third to half of the global population was covered by essential health services." It suggests, "If current trends continue, only 39 percent to 63 percent of the global population will be covered by essential health services by 2030". According to them the period between 2020 to 2030 is said as a "need of action" to achieve the 17 sustainable development goals(SDG). In this list of 17 goals, health has been considered as goal number

three following poverty and hunger, indicating its urgency to action. Working towards this goal may also lead the nations to overcome the baby boomers problem related to the aging workforce that is expected to hit economies if not acted upon by 2030.

In Orji, A., et.al(2021) it is stated that "Good health has been seen as one of the important variables and necessary conditions for the attainment of growth and development of any economy. A healthy workforce is known to be a productive workforce; therefore, the quality of health in the economy determines the kind of economic activities that will be inherent in the economy". Thereby making it a global priority to be addressed by every nation. In a similar context, Kim et.al (2020) mention how public spending on healthcare is one of the largest shares of GDP in OECD countries, According to that paper, it expects and projects that the national health expenditures may account for up to 19.4% of GDP by 2027.

Kohli, R., et.al(2016) paper motivated me as it states the necessity of access to longitudinal EHR data, by authorized clinical decision-makers. Which would enable timely treatment for patients in emergency and criticality, along with an overview of how different countries understood healthcare prominence or the need to focus on the healthcare system and initiated a few activities. Dwivedi, Y. K., et.al(2016) in their paper states that "citizens are considered to be as a part of the system and have expectations from implemented health care systems. A global demand pattern, that has been identified. Where countries like the USA, Canada, UK, Sweden, and the Netherlands initiate and implement health care IT systems(Geier, 2006). The necessity of having a safe, secure, and smart digital platform that is easily accessible by the general public has been experienced by every nation globally with recent events of pandemic (Covid -19), National health authority (NHA) of India in 2021 in its consultation paper states how situations like this forced to people to adapt by overcoming inhibitions to use digital services partially.

Here, I extend the notion related to specific issues salient for the event response concerning digital platform UHI, in the domain of sociotechnical IS. Explicitly, I draw on affordance theory (Gibson,

1986) defined as "possibilities of action".I explain what digital affordance is, analyze the UHI, its expectations, and the affordances of stakeholders. This is done by considering an event corresponding to each stakeholder respectively, later identifying their meta-characteristics that might lead to the actualization of the event. Along with probable roadblocks. Doing so, will enable us to predict and contribute towards more public outreach by motivating future IS researchers, policymakers, and government to study. This will fill the research gap of health care improvement in developing countries, which has been discussed by Braa, J., et al (2007), but failed to progress comparatively even after the advent of digitalization. Because of which the questions like, " Are digital platforms contributing or cribbing a divide, that persists in the attainment of equal access in general and healthcare in particular ?" are left unanswered.

For achieving the answers to the question, it is important to identify meta-characteristics that contribute towards the actualization of major effects related to digital healthcare platforms like unified health interface (UHI) by different stakeholders? And also to Identify likely roadblocks on affordance actualization? The philosophical stance I consider in this paper is critical realism as it supports our objective of identifying the underlying mechanism that generates the phenomenon. With adherence to two prerequisite caveats as suggested by Volkoff, O., et. al(2017) for making use of affordance theory in IS research.

The remainder of this paper is structured as follows: I shall explain about UHI in following section 2, later in section 3, I shall introduce the reader to the theoretical background of affordances. Section 4, About the Methodology, followed by section 5 in which UHI phenomena are analyzed for expected outcomes and a conceptual model with propositions is present. Further in section 6, I discuss the need for future focus along with the conclusion.

2 About UHI

UHI is a digital platform envisioned as an open protocol for conducting various digital health services in India. UHI Network will be an open network of End-User Applications (EUAs) linked with

participation from Health Service Provider (HSP) applications. It enables a wide variety of digital health services between patients and health service providers (HSPs). The objective of UHI is to provide fair discoverability of HSP's, by allowing only verified entities to be part of the network, It also aims in providing interoperability of services, transparency in financial settlements, grievance collection, or feedback on post-service fulfillment with adherence to open protocol, thereby it could be technology agnostic by allowing applications to exist in any desired format. It is not limiting their availability only to mobile apps, web applications, voice interfaces, etc but is open to suggestions from the developers of applications, as it ultimately aims at accessibility outreach into public to avail of health care services.

This initiative has not been an overnight idea implementation, It has been a planned, process development initiative taken by the Indian government by being a part of the UN. It started in 2017 with the development of a National health policy defining the aims, followed by a document from the national institution for transforming India (NITI Aayog) in 2018 discussing the strategy and approach to achieve the aims, In 2019 National Digital Health Mission (NDHM) came up with a blueprint i.e., National Digital Health Blueprint (NDHB) on how to materialize the thought, thereafter tested its working as a pilot project in 2020 and finally launched the ecosystem for public use in 2021.

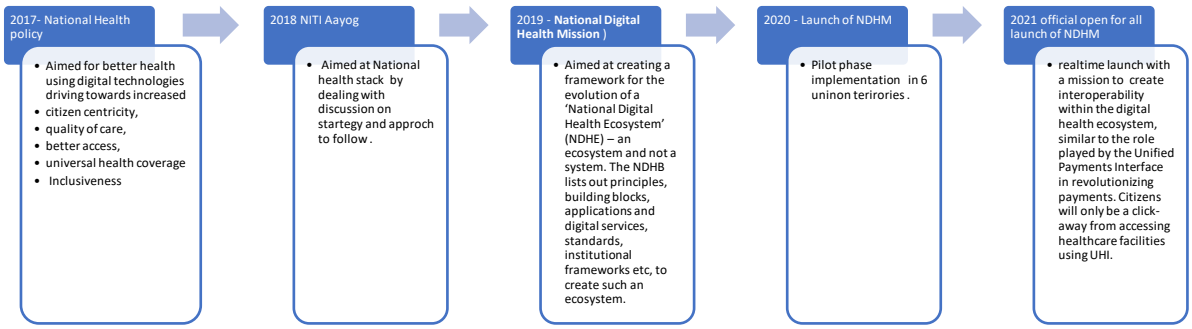

Figure 1: Timeline of UHI evolution as a part of the healthcare ecosystem.

In appendix figure 2, I depict the overall architecture provided by NDHM. On observation, one can understand how a digital platform like UHI acts as an intermediatory in providing digital health services. Its key building blocks are registries, UHI gateway, health information exchange, and consent manager as shown in appendix figure 3.

3 Theoretical Background

Within IS Literature, affordance theory (Gibson, J. J., 1986) is a conceptual framework to study how actors (individuals, groups, and organizations) appropriate and use various types of digital technologies (Strong et al., 2014; Volkoff, O., et.al., 2013). The origin of this concept has happened in Gibson's study in the domain of ecological psychology. According to his original definition, affordance is what is offered, provided, or furnished to someone or something by an object. Volkoff, O., et. al(2017) mentioned that in 1988, Norman used the term affordances to refer to both perceived and actual properties of an object, without reference to an associated actor. While even in this original use Norman acknowledged his deviation from Gibson, some years later he publicly regretted his use of the term, as it had taken on several new and sometimes inappropriate meanings. To clarify it, Norman, D. A. (1999) points out the differences across three related but separate elements specifically, namely (a) an affordance, (b) an actor's perception of that affordance (where the two may or may not coincide), and (c) the visual feedback or information the object supplies to suggest an affordance.

Affordance Theory takes a socio-technical perspective that deals with being specific about the technology while simultaneously incorporating social and contextual elements surrounding it. It has been widely adopted by various IS researchers which have been summarised as in below table 1, but usage of affordance theory to understand digital infrastructures/platforms along with identifying probable reasons that inhibit actualization is not yet studied in literature which is the gap this study aims to contribute. Table 2 in the appendix consists of a brief about recent affordance categories and respective citation of papers associated.

Theme	Few prominent citations	Content
Definition of Affordance	Markus, M. L., et.al.,(2008)	"The possibilities for goal-oriented action afforded to specified user groups by technical objects".
	Strong D.M.et.al. (2014) ,	understanding of affordances in the context of understanding organizations as " the potential for behaviors associated with achieving an immediate concrete outcome and arising from the relation between an artifact and a goal-oriented actor or actors".
	Pozzi, G., et. al(2014)	listing prominent seminal works in IS area related to theory and also mention how to model as a study into four phases

Application /How to Use the theory	Strong, D.M.et.al (2016)	mentions six principles, three unresolved issues, and two caveats that an IS researcher has to consider while making use of the affordance theory lens
	Leidner et al. (2018)	Indicates that affordances do not arise in between the actor and the technology itself, but that they emerge in the relationship between the actor and the technology use.
Outcomes of Affordance actualization	Volkoff, O. et.al., (2013), Stoffregen, T.A, (2000), Du, W. D., et al.,(2019)	immediate concrete outcomes of the affordance actualization process
Digital Affordance	Ostern, N., et.al(2021)	Model of using affordances that can be made a note of digitally.

Table 1: Prominent themes of how affordance theory is studied in existing IS literature

4 Research methodology

To identify, understand and avoid adverse situations in real-time that occur due to lack of knowledge, It is necessary to come up with a conceptual framework. Generating a conceptual framework helps one to shape a priori understanding of the variables in the theory-building process as per Eisenhardt, K. M. (1989). Thereby in this paper, I aim to understand the affordances framework and the holistic affordances model by first identifying and explaining the definition of meta-characteristics(appendix table 3). And later, integrate these meta-characteristics into previous literature of IS theory to analyze the events faced by the identified stakeholders respectively. To do so, I lend to take a critical realist perspective as my epistemological stance to understand the mechanisms of the event based on the advantages mentioned by Mingers, J., et.al(2013); Henfridsson, O., et. al(2013), Wynn Jr, D. E., et. al(2020).

5 Analysis & Findings

To understand better what UHI is, it is a necessity to know the service's delivery aims for, few of the services from the consultation paper are the discovery of healthcare providers, hospitals, labs, along with Booking of ambulance services, sample collection for diagnosis, and delivery of medicines on order. Additional services such as storage, access, and sharing of personnel health records, to provide access to multiple applications, to provide updated information related to welfare benefits that could be availed by the end-user, etc. Also, help in making cross geographical teleconsultation possible.

All these actions are possible only when stakeholders perceive affordances related to actions such as (a) Service Discovery (b) Service Booking (c) Service Fulfilment (d) Financial Settlement (e) Post Fulfilment. For a better understanding figure 4 depicts how three main stakeholders are connected with the UHI .where they avail services and indirectly contribute towards the platform.

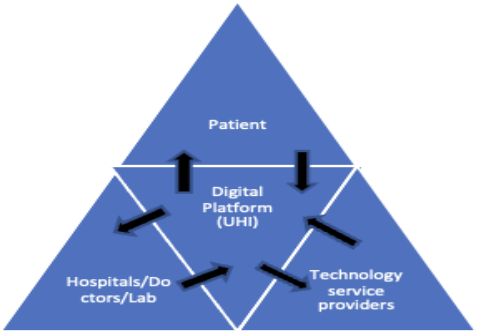

Figure 4: Depiction of Stakeholders interaction with UHI

A brief view about different stakeholders and their understanding of the possible perceived affordances, expected contributions on actualization, incentives, and disincentives on being a part of the digital platform UHI are described in detail in table 4. Whereas to identify, understand, and help in designing for specific affordances as a part of attaining a meta-view, it is necessary to know about meta characteristics that act as a basis, mentioned in Table 3 in the appendix. Figure 5 in the appendix sourced from Ostern, N., et.al(2021) act as the basis for our analysis to understand which meta-characteristic probably plays a role at a certain stage in an affordance actualization cycle. To fulfill the aim of the paper I am limiting to choose only one context related to each stakeholder for further analysis. To do so, for selection of which I rely on the statistics displayed by Ayushman Bharat Digital Mission (ABDM).

Stakeholder	Actors	Aimed affordances to perceive while using the platform	Contribution to the platform on affordance actualization	Incentives of UHI participation	Disincentives of UHI participation
End-user	Patient	To access their medical and health records such as medical reports, lab results, clinical records, etc, electronically, and share them with chosen healthcare providers.	Data (detailed /anonymous) is the contribution in the wholesale. Which can be further used efficiently for welfare activity planning etc.	Equal access in consulting doctor of choice. Ability to consult and share documents digitally irrespective of location. Transparency is related to the price charged.	Absence of physical examination. No prescribed plan is in place for the recovery of old medical records. Error handling in health record entry has not been mentioned.
Health service provider (HSP)	Doctors of any system of medicine. Hospitals, Labs, Pharmacies, health service aggregators(platform players that partner with various health organizations to offer services to end-users), Home care providers (including home nursing care, teleconsultations, and labs offering home sample collection services.	To provide their services digitally. To control the price, service availability, and service delivery using any UHI compatible HSP application of their choice.	Detailed data about the hospital, staff count along with geographic details. Analytics can be applied to understand if any discrepancies in consultation fee structures and hospitalization costing charges. Statistical data related to diagnostic services.	Ease of business Benefits by being discoverable for service provision. Independence to set the service price. Connect to patients digitally. Enabled group practices. Labs can enhance business by providing customized services. Discovery of availability for homecare. Cost reduction.	Health Services will not be reachable unless the patient is digitized. May Impact associated Individuals Stress level with the workload as hybrid model enablement may disrupt the work boundary lines.
Technology service	Organizations provide	To build and market software application	Open-sourcing is the backbone for platform	Easy integration	Lack of knowledge about customer

provider (TSP)	technical support in form of compatible applications that can be used by the end-user.	that adheres to all protocols, certifications, or policies as defined by UHI.	development. Technological customizations are made possible.	among stakeholders Expanded access in reduced cost	behavior, customer base.

Table 4: Key stakeholders, takeaways, contributions, incentives, and disincentives

On their website, It has been stated that as of 14th October 2021, there have been 13,02,39,493 Health IDs created, Health Facilities that registered and were approved count to 1,538; 3,212 Doctors have registered, and 1,31,965 times Health Records Application has been downloaded. This study will only include events such as the creation of health Id by end-user, registration of hospitals for approval by a health service provider, and analyzing the download action of Health records application developed by technology service provider. Each of these has been chosen to benefit the majority, as these are said to be the most utilized events by the public from ABDM.

From tables 5,6,7 reader can understand the flow of affordance actualization along with described probable roadblocks which help in attaining our research objective, but to articulate, understand and generalize the process of identifying the roadblocks and possible learning, I develop the conceptual model as in figure 6, which details in a two-step approach where first step talks on how organization's (here it includes for example as hospitals, imaging centers, diagnostic centers, government departments, etc)are influenced and respond to the event. Second, I articulate the learning capabilities of organizations in this process. If observed with birds view step1 mentions the immediate outcomes and step 2 is related to the learning that results in the long-run effects.

Table 5: Affordances related to End-user / Patient as stakeholder

Contextualization			Affordance exisitence		Affordance perception (Awareness about)			Affordance actualization			Event actualization		Implications drawn		
Physical/ digital artefact reponsible for affordance	Actors and their characteristics	Event context	Recognizing (prior knowledge/ dependency)	Chances for them to be false or hidden	Type	Impact	Level	Expected goals	Action needed	Prerequisite affordances that enable action	Immediate outcome (short term effects)	Changes the event actualization bringsin (Long run effects)	Enabling sub-metacharacteristics involved	Road blocks and Disadvantages	Top 3 meta characteristics that make major contribution to an effect
Creation of Health Id by Patient /End user															
Aadhar number / mobile and computer or phone or tab where ABDM website is accessible	Indian citizen who is a digital literate with Aadhar /mobile number .	Generation of Unique 14 digit health ID by end user /Patient from ABDM website.	citizens can identify connonical and relational digital affordances while signing up only when need for object actor relation is understood . Knowledge and interest related viability associated drives individual to know more about feasibility , that may result in desirability.	When no complete knowledge about benefits and purpose of health id is known false affordances are possible .	Anticipated to be a composite affordance as basic affordance for its need to be priorly understood , which comes with more information outreach to public by publicizing acts	Anticipated perception by end user may lead to have a functional affordance- i.e specific goal that he wishes to fulfill, This may include a tele consultation, Longitudinal store of Digital health records etc , motivational affordance is also possible to observe if he / she finds ease in use of health ID , which would lead to a possibility of stepping towards Societal goal unkowingly there by bringing in presence of social affordance.	Anticipated affordance perception may lead to impact at Business operation level, design and technology level	on sucessful creation of ID , one can proceed to download and log into APP. Using ID to avail benefits of UHI. This actualization is possible in a syncronised way.	For actualization one has to be a literate in either hindi or english language to register with a valid aadhar or mobile number	NA	a unique 14 digit health Id that can be used for logging in to Health Applications Interfaces that enable services .	Improved national health database and statistics , better diagnosis and service accesscibility , reduced dependency of physical and logistic actions that consume time.	Cannonical affordance, Relational affordances , feasibility affordance, vaibility affordance , desirability affordance, syncronised affordance that are both homogeneous and heterogenous in nature, composite affordance, business affordance, design affordance, Technology affordance	he/she should atleast be aware of one own valid mobile number or aadhar number. As of now only english and hindi is the language i.e Digital divide enhancement . They should be aware of what its existense and purpose inorder to understand the benefits.	Property- cannonical and relational , Driver- feasibility and desirability , Impact-- functional & personal

Table 6: Affordances related to the health service provider as stakeholder

Contextualization			Affordance exisitence		Affordance perception (Awareness about)			Affordance actualization			Event actualization		Implications drawn		
Physical/ digital artefact reponsible for affordance	Actors and their characteristics	Event context	Recognizing (prior knowledge/ dependency)	Chances for them to be false or hidden	Type	Impact	Level	Expected goals	Action needed	Prerequisite affordances that enable action	Immediate outcome (short term effects)	Changes the event actualization bringsin (Long run effects)	Enabling sub-metacharacteristics involved	Road blocks and Disadvantages	Top 3 meta characteristics that make major contribution to an effect
Registering of hospital by healthcare service provider															
Physically present health facilities in India belonging to Modern Medicine (Allopathy), Dentistry, Physiotherapy, Ayurveda, Unani, Siddha, Homeopathy and Sowa-Rigpa systems of medicine and computer or phone or tab where ABDM website is accessible .	Facility manager or administrators of hospitals, clinics, diagnostic laboratories and imaging centres, pharmacies, etc. Will execute the process on behalf of organizations. Government officials reponsible for verification and approval .	Generation of healthcare professional ID that can be used by organization to complete the registeration and approval process by Government and to avail the benefits of UHI.	identification of need to register the health facility , i.e. have prior knowledge. Institutes that are already part of government supported welfare activities would have better awareness.	Benefits will not be understood at first glance as it is totally digital. Misconceptions would rise related to understanding benefits and fees being charged. Feedback or grieveinece loop will not be totally effective as number of users are still low.	need for composite affordance reflects as it involves decision of management and health care individuals together.	Impact that is made sense by hospitals could include Functional - understaniding about what is the direct benefit that could be achieved , Motivational - Possible thought obout new avenues of oppurtunities on attaining a relation with application as an artifact and Social - Towards ultimate contribution towards society .	Hospitals will think about on probable Business affordances i.e . If not adapted to latest implements and way of working , will it lose its position in the business and Design affordances result in the though if by adopting to the change will ehnace their way of work and help them sustain their busniess goal inthe long run .	On sucessful registration by the hospital it expects to Build Trust and Reputation as an institute,provide Ease of Access for individuals there by more patient discovery that enhances business,Go smart with paperless operations by being paperless asmuch as possible , thereby save time and money to have an improved Ease of doing business,and showcase their Telemedicine readiness to attract patients from all over the nation. For this to get actualized there is a syncronised affordance that has both homogeneous and heterogenous in nature that contributes to the value .	For actualization to take place institute management ,actors should have a same decision . Institutes should be equipped with needed infrastructure and skilled people.	technology affordance will have value addition,	Recognition of hospital as a valid institute on receiving approval.There by leading to more oppurtunities of service and new avenues. Hospitals will have the approval to store health reports on receiving consent thereby will be able to share them on need basis.	change could be seen in the mode of working, Essentiality of advanced planning would be needed for a physical consultation.	Canonical and Relational affordance, along with chances for hidden , false affordance, fucntional and social addordance with impact at design and business level that could lead to attain a composite affordance.	Dual registration possibility of doctors under hospital aswell as as an. Individual would create a confusion to technical system. And also highlight the oppurtunity disparity . An out come of adverse adaptability would be loss of skill by health care individuals to provide care physically. Chances of Health care workers to be over-burdened with documetation is a possibility .Actualization would increse the gap of digital divide. Staffing and employment issue would rise based on situations. If an emergency critical case that needs doctors attention occurs because of which there might be rescheduling of prior booked teleconsultation which might result into wrong feedback and grievence issues. Hospital management would be more favouring in income generating activities than being service oriented. i.e More teleconsulations could be encouraged due to variation in the consulatation fee. which might disrupt equality in service provision to public in general.	Driver with viability and desirability of an hospital. Level as it might impact their sustainance in long run, value to attain for an individual benefit on registering

Contextualization			Affordance existence		Affordance perception (Awareness about)			Affordance actualization			Event actualization		Implications drawn		
Physical/ digital artefact reponsible for affordance	Actors and their characteristics	Event context	Recognizing (prior knowledge/ dependency)	Chances for them to be false or hidden	Type	Impact	Level	Expected goals	Action needed	Prerequisite affordances that enable action	Immediate outcome (short term effects)	Changes the event actualization bringsin (Long run effects)	Enabling sub-metacharacteristics involved	Road blocks and Disadvantages	Top 3 meta characteristics that make major contribution to an effect
health records application developed by technology service provider i.e downloadble															
Mobile/Tablet/ Personnel computer that supports	team members working for application developme nt, Expected end user who utlimately uses it, Governmen t officials who inspect the app developed for providing approval	Technology service provider is expected to handle the working of the application, to provide 4 basic services to end user. For which it has to act as a link connecting with the databases and end user . So it would be useful to out reach into public efficiently by providing an easy of use, Downloadable	TSP should have the knowledge about purpose of the app development, actors interfacing it, along with its arena of use to design the way application will work. i.e. have a knowledge about possible cannonical and relation affordances, along with a expected false affordance . So to build a downloadable application one need s blue print that could help in understanding the technical /functional architecture lay out. .	There is high possibility of occurrence of and hidden affordances related to development, as there are multiple interfaces in developing the application . That may be related to data availability, outcomes it could provide etc.	anticipated to be a have an Autonomous and composite affordances, As TSP who build an End user application they can have their own design and way of working related to look and feel of APP to suffice the expected goals. Basic affordances that are needed by each TSP may differ.	Anticipated perception expected by majority of end users may lead TSP to decide on design .i.e about targeting functional affordance- i.e compatability, ease of use related to achiving specific goal that are expected to be fulfilled, This may include a tele consultation, Longitudinal store of digital health records etc., realizing about the responsibility affordances give a clarity about expectations that can help understand the degree of desirability.	TSP are concerned more on the expected level of Impact possible with usage of technology, life span of technology, its task fit competency etc. As Frequent change that needs to be inculcated to survive may be a financial burden ,TSP's lack of awareness may result into complicated situations of finance , growth and sustainance . Its design to suffice the needed business and design affordances atleast at a minimum level to achive approval from Governement.	The services provided by the app to the citizens are: 1) Option to Create a unique Health ID to manage the health records 2) Option to Link the health ID with various health care facilities including Hospital, Clinic and Labs 3) Option to Request the health data from the linked health care facilities on to the phone and have a longitudinal view of the health data at the finger tips. 4) Option to deny or grant permission, If any doctors, labs or clinics request to view the health data	TSP working application has a to be developed in such a way that it has compatibility to work same on the different digital artifact s(mobile/TAB etc) , AS UHI follows an open protocol , multiple data providers and consultants to be handeled .	Awareness related to Health ID creation is needed to make use of the application. Knowledge /Expertise about technology is important to build a better performing application	on successful actualization , An application that is compatable to download on to different devices that enables end user to have access to services from any where,anytime is ready to use.	In long run even physical consulation may need health ID , TSP may keep providing updates that might result to differences in working . Technology advancement may prove to be either beneficial or adverse. Loop holes in governence proccess may lead to misutilization .	Cannonical affordance, Relational affordances , affordance, affordance , desirability affordance, syncronised affordance that are both homogeneous and heterogenous in nature, anticipated composite affordance, business affordance, design affordance, affordance, Technology affordance in priority .	TSP 's development could perform differently with real data when compared to limited sand box access . Usage of application may be hindered due to language barrier . Few compromises might be needed related to working / developing app to attain approval . Availability of TSP organizations may result in a competetive environment that may be either advantageous or not.	Level, driver, Impact that may help in future prospects

Table 7: Affordances related to Technology service provider as stakeholder

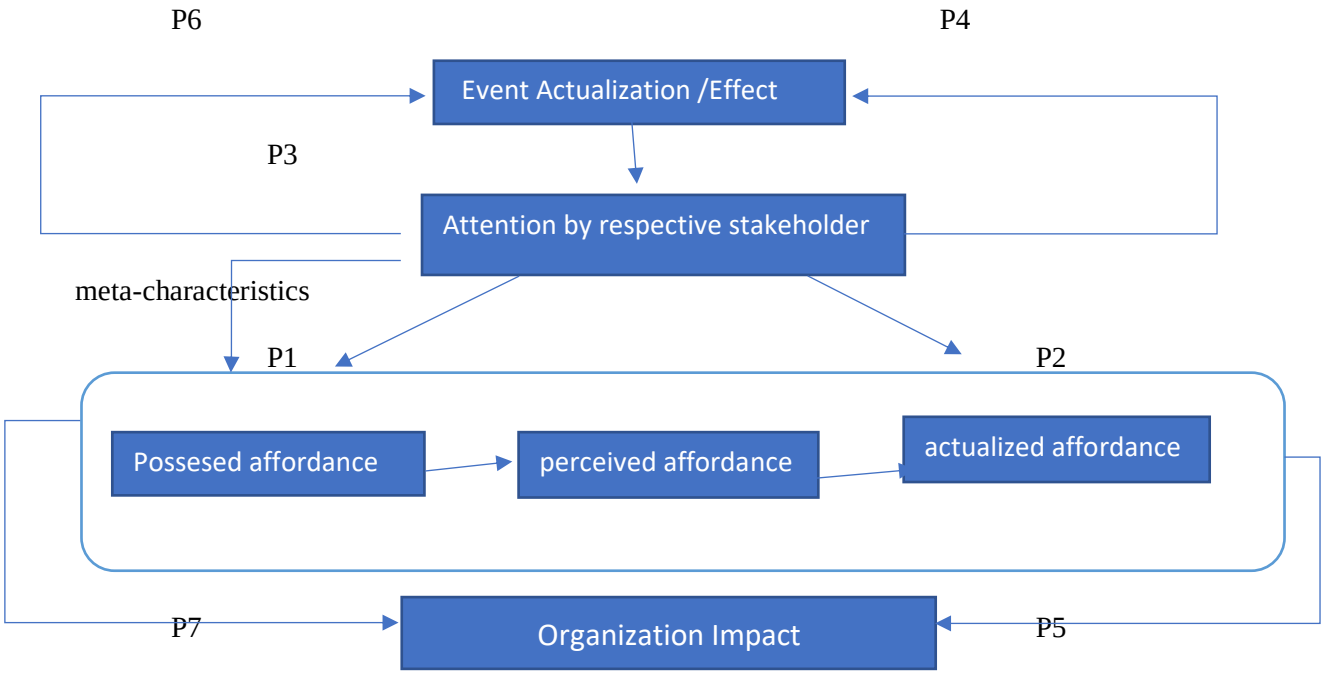

Figure 6: Affordance actualization conceptual model

The list of propositions possible as a part of affordance actualization related to the immediate response to events, which are related to information gathering, mobilization, identification, and actualization of affordances in the short-run are as below(P1, P2, P3, P4).

P1. An event brings attention to issues specific to coping with, leading to information gathering and discovery of an unactualized affordance, a partially actualized affordance, or lack of affordance.

P2. An event brings attention to identifying immediate goals to achieve, which triggers the mobilization of resources and efforts to facilitate affordance actualization conditions.

P3. The attention brought by the event helps mobilize development efforts on digital artifacts associated with the partially actualized affordance.

P4. Actualized affordances addressing the event issues consist of a cluster of affordances as a response to the event presenting new operating possibilities.

A list of propositions possible as a part of affordance actualization related to learning and possible consequences beyond the immediate response (long-run influence) are stated as below.

P5. Actualized affordances addressing the event identify possible structural, managerial, and relational impacts beyond the event.

P6. Evaluation of the affordance actualization process helps organizations build knowledge and expertise to handle similar situations in the future.

P7. Learning through the actualization of affordances informs the organization about its ecology of affordances and its ability to transform the affordance ecology.

6 Conclusion and outlook

As a contribution for one to understand how a digital platform like UHI in the context of a developing nation like India will outreach into public to achieve an efficient health care ecosystem, I list the expected disadvantages/ roadblocks that need the attention of IS researchers in detail in appendix, These are identified along with the prioritized meta characteristics with the analysis of events of affordances from stakeholders perspective from our analysis. A conceptual model for better affordance actualization cycle understanding with a contribution towards learnings for an organization in the short and long run is mentioned and most probable propositions have been stated.

As a part of future direction i.e., outlook, I suggest scholars should aim to study digital platforms in healthcare for contributing more towards the knowledge by understanding and being ready to handle perspective roadblocks associated with main stakeholders, as to know why there is no achievability of equitable access that may lead to a divide. And also to make use of other possible theories such as sensemaking, task-fit, etc. To know perceptive differences and understand determinants for successful implementation of digital platforms. It would be worth verifying the phenomenon empirically.

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Appendix

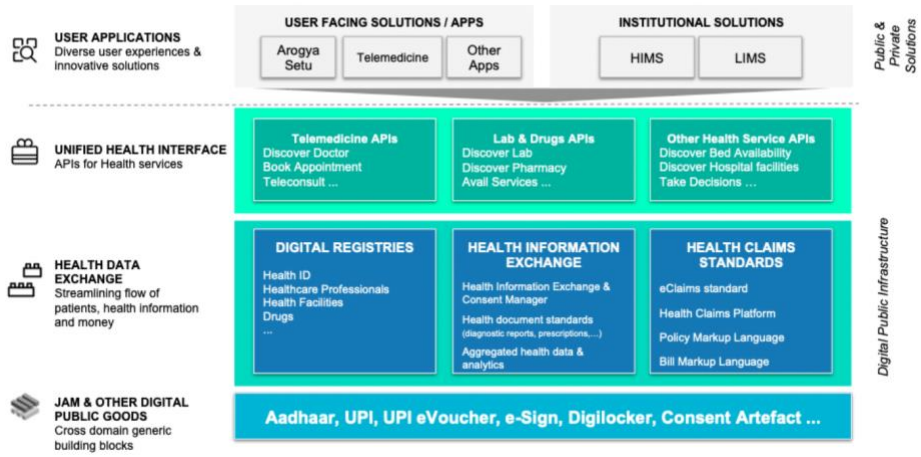

Figure 2: Depicting building blocks of NDHM architecture including UHI representation i.e expected
Source: Consultation Paper on Unified Health Interface (2021) by NHA.

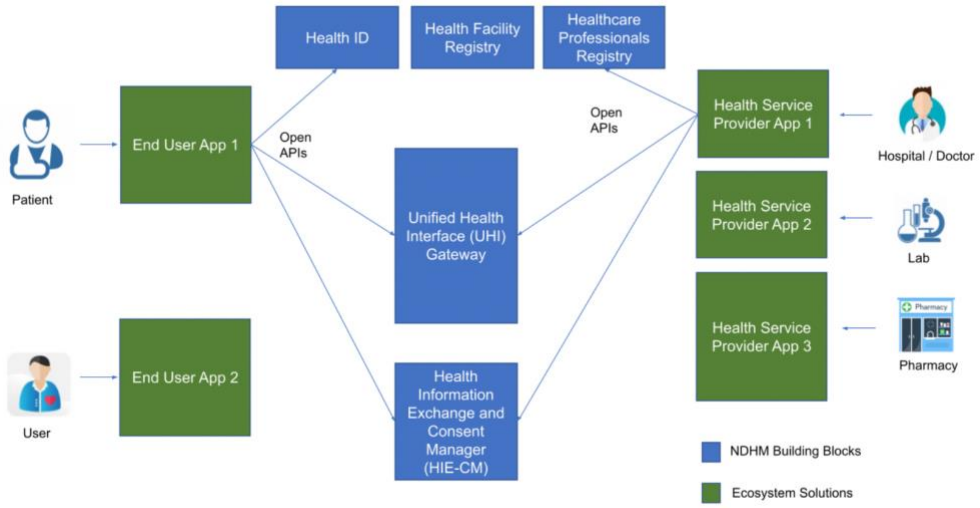

Figure 3: High-level UHI Architecture,
Source: Consultation Paper on Unified Health Interface (2021) by NHA.

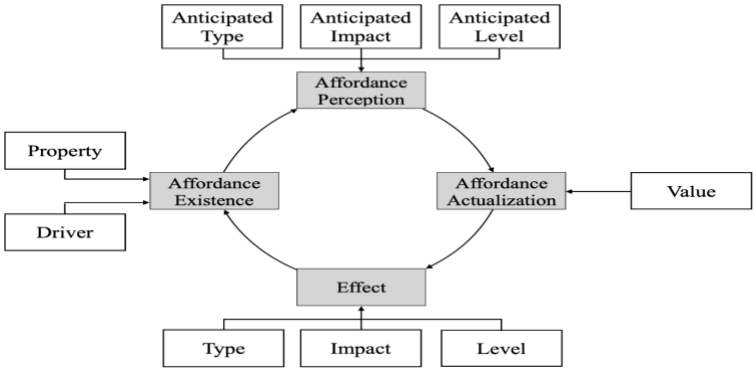

Figure 5: Affordance actualization cycle

Affordance category	Citied by papers
Affordances-for-practice	Zheng, Y., et.al 2016
Blockchain affordances	Rossi et al., 2019
Connective affordances	Vaast et al., 2017
Convivial affordances	Waizenegger, L., et.al.,2020
Crowdsourcing work environment affordances	Deng, X. N., et.al.,2016
Digital affordances	Thapa, D., et.al., 2018
Dispositional affordances	Seidel, S., et.al., 2018
Handling, effecter, instrumental and supplemental affordances	Benbunan-Fich, R. 2019
Harmonious IT affordances	Chatterjee et al., 2020, 2021
Higher- , medium- and lower-level affordances	Bygstad et al., 2016; Cheikh-Ammar, 2018; Volkoff & Strong, 2013
Individual, collective and shared affordances	Leonardi, P. M. 2013
Informational affordances	Porter, A. J., et.al., 2020.
Infrastructure affordances	Niemimaa .M., et.al.,2019
Interface affordances	Burgoon. J. K., et.al., 1999
IT platform affordances	Arazy,O ., et al., 2016
Misperceived affordances	Demetis, D., et.al., 2021
Organizational affordances	Sæbø , Ø.,et .al., 2020
Social affordances	Lankton N. K., et.al., 2015
Social media affordances	Van Osch & Steinfield, 2016; Zheng ,Y., et.al 2016
Tool affordances	Gaskin et al., 2014
Wiki affordances	Argyris & Ransbotham, 2016; Majchrzak, Wagner, et al., 2013

Table 2 : list of literature associated with affordance category

Source: Valbø, Bjørnar. (2021).

Meta- characteristics	Definition	Sub-categories	Definition
Property	summarizes different states of existence and perceivability of an affordance	Canonical affordances	social conventions determine the meaning and perception of affordances (i.e., perceived and understood the same way by everyone)
		Relational	affordances are determined by the relation between actors and an object emerging from the perception of the object's properties, such as their material or functional characteristics(relational and dependent on the actor(s)- object relationship)
		Hidden	object's properties offer action possibilities that are not yet perceived by actors
		FALSE	specific affordances of a designed object particularly salient for an actor or a group of actors.
level	the anticipated or actual scope of the emergence of an affordance within or beyond the structure it is enacted.	Business	Does the accordance related to IT artifact has the scope to change an entire sector of business
		Design	Does the accordance related to IT artifact design has the scope to change way of working /use.
		Technology	Does the accordance related to IT artifact technology use has the scope to change /revolutionize/advance the technologies.
Impact	the anticipated or actual effect of an actualized affordance(s) on actor(s) experiences	Functional	what an object (in the IS context: an IT/IS artifact) provides for actors to accomplish a specific goal
		Motivational	impact characterizing a relationship between an actor
		Personal	supporting a personal need,(such as self-monitoring and tracking through wearables or self-presentation in the context of social networking sites).
		Social	an object-actor relationship aimed at supporting or constraining societal goals
Driver	the measurable resource that triggers the actualization of or the design for a specific affordance	Feasibility	the actualization of affordances to satisfy certain needs related to organizational or personal.
		Viability,	signifying new opportunities and rethinking organizational command and control.
		Responsibility	driver for the actualization of an object's affordance,(realization)
		Desirability	Degree of need /necessity
Value	how a specific output emerges dependent or independent from another actor (s)	Individual	solely benefits from an affordance, meaning that this affordance is not available to others
		Synchronized	value emerges for one or more actors that might perceive an affordance. Homogenous, i.e., the value is enacted and similarly benefits all actors. In contrast, heterogeneous value enactment implies that an affordance can only be enacted in a group but benefits actors in divergent ways, e.g., a pooled individualized affordance (Leonardi, 2013)
Type	how affordances and their output emerges dependent or independent from other affordances	Autonomous	independent of the actualization of other affordances,
		Composite affordances	distinguish between the actualization of basic and higher-level affordances. To achieve high-level basic affordances need to be understood. To use the internet on a phone(high level), unlocking is basic affordance.

Table 3: definition of Meta-characteristics and their subcategories.

Drawbacks of UHI Implementation: End-user

- The actualization of the event may increase the existing digital divide at the societal level unless necessary initiatives to reduce the gap are in place.
- It may make end-user lazy in the perspective of documentation.
- It may lead to a lack of connectedness with the physician, society, etc which in long run may create a vacuum, absence of empathy.
- Time-bound consultation may lead to an improper diagnosis or minimal identification of mental issues.

Technical glitches may impact the original purpose if not handled well. For example such as access to health records enable users to view their past medical health records, the EUA should not be able to store medical history associated with any e-Health IDelse may lead to privacy and ethics concern. Access should be provided by developing a set of APIs so that only the user gets access to his/her medical records. Further, the EUA should not be

- able to use this for data for selling and monetization purposes as per CUTS (Consumer Unity & Trust Society).
- If errors related to health record data entry, or mismatched uploading of the document with ID change happen, it might result in unknown, unwanted, and risky consequences that might lead to wrong treatments.
- If end-user or patient login credentials like health ID and password are hacked, health history might be misused.
- Digitally illiterate end users may end up with two consequences i.e unable to use HSP services or Left exploited by HSP due to the end-user ignorance.

Drawbacks of UHI Implementation: Health service provider

- Loss of one's civil right to access basic needs of health may be disrupted, as the financial stability of institute to survive the competitive environment will take the priority than the motive of service provision i.e. free services will be missing.
- Doctors, nurses, etc. may be overburdened with the task of documentation/data entry.
- Doctors who are skilled in their work but are not digitally acquainted will not be of great contribution to this ecosystem. i.e. this may lead to limited knowledge flow.
- Diagnostic labs, imaging centers that do not follow similar standards may report information differently leading to a chance of different diagnoses, leaving the patient in a confused state.
- The difference in consultation fees, expertise level in using UHI may influence and have effects on their bookings. Cuts in the same line suggest that A commission per transaction-based pricing model should be adopted where business side services like HSPs, HSP Applications, and EUAs should be charged the commission. The advertising model where HSPs can advertise their products on EUAs should be discouraged because it may lead to end-users being misled. The model should be based on a no-profit no-loss principle so that consumers' welfare is maximized.
- Government free services if made available, will impact demand for other service providers.
- If HSP uses the hybrid model with both physical and teleconsultations. Already experienced doctors will handle emergencies and critical cases, where novice doctors are appointed to handle online consultation. If this continues, in long run not all doctors will have the skill to handle cases physically.
- A few of the missing actors that are necessary to be part of this UHI are as below, according to CUTS "The ASHA and ANMs should be considered as stakeholders and be included as HSPs. Further, e-pharmacies and e-clinics are also stakeholders which have not been explicitly identified in the draft." It also suggests the audits to maintain quality in service "NHA should identify periodic auditing mechanisms to ensure that only genuine HSPs are onboarded."

Drawbacks of UHI Implementation: Technology service provider

- Technology is expected to change consistently, Frequent changes may impact the user database.
- Application developing teams should have a functional understanding of how the events happen in reality to replicate them digitally.
- Change of technology service providers in the system should not impact the ecosystem. if not this might lead to disparity and advantage of a group.
- Consent management and privacy are to be handled well to not lose the trust in the ecosystem.
- As per one of the CUTS recommendations " NDHM should aim at empowering and building the capacity of the data principals adequately so that they may be able to provide informed consent and at the same time, prioritize usage convenience."
- As a whole ecosystem, grievances/feedback ii enabled only one way i.e by End-user on the user application and Service provider, not the other way round. CUTS highlights the need to develop a better grievance/feedback process accordingly as per the statement "serious concerns regarding accountability and grievance redress persist even for a digital open platform for which the draft does not provide any clarity. For instance, there is no clarity on who will be held accountable if HSPs make an incorrect/wrongful health entry in the Electronic Health Records (EHRs) of patients and they receive faulty treatment from a new HSP.

15 questions that are put forward for comments in the consultation paper are accessible to all for better implementation suggestions. For which SWATH as an organization states that there is a need for "Transparent, evidence-based and clinical outcomes-driven mechanisms to create and update healthcare standards need to emerge in India" which our study indirectly focuses on.