A CONCEPTUAL FRAMEWORK FOR MANAGING HEALTHCARE INNOVATION PLATFORMS: A VALUE CHAIN PERSPECTIVE

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ABSTRACT

A key challenge that South Africa faces, pertains to the difficulty of achieving integration across healthcare value chains (VC). This study investigates innovation platforms (IP) as an approach towards addressing some of the shortcomings of previously implemented solutions. IPs are mechanisms employed in an attempt to pull together stakeholders from different backgrounds driven to address a particular issue of common interest. This study proceeds to develop a framework that provides a guideline towards the formation and functioning of IPs that aim to solve challenges within healthcare VCs. This allows for the integration and consideration of opinions of all VC actors during decision-making and policy development.

Keywords: Innovation platform, value chain, healthcare, framework

INTRODUCTION

There is convincing evidence in literature that supports the notion that healthcare systems across the globe are under pressure and are struggling to meet patient needs and demands (Greiner, A.C., Knebel, 2003; Streefland, 2005; Davis and Robinson, 2010). The prevalence of disease is especially high in developing countries (Meso, Musa and Mbarika, 2005; Kariuki, 2009; Chanda, 2010). According to the World Health Report (2006), “Africa has 24% of the [World’s] burden [of disease][1] but only 3% of health workers commanding less than 1% of world health expenditure.” The devastating effect that the lack of access to basic healthcare has on Africa is reflected in the reduced life expectancy for Africans (60 years in comparison to 71.4 years globally)(World Health Organization, 2016) and adversely influences the number of people

[1] The WHO measures the burden of disease using the disability-adjusted-life-year. This time-based measure combines years of life lost due to premature mortality and years of life lost due to time lived in states of less than full health.

contributing economic development (Gradl, Knobloch and Emergia Institute, 2010).

Several traditional problem-solving approaches have been adopted to address the challenges faced within the healthcare system, these have unfortunately yielded limited success. In Sub-Saharan Africa (SSA), the interaction between healthcare value chain (VC) participants and stakeholders in pursuit of solutions to common issues and challenges is often limited. VC actors are focused on the silo in which they operate, disregarding the importance of integration amongst VC actors (Jobson, 2015). This disregard results in a lack of shared responsibility across the VC, making it susceptible to miscommunication and inefficient functioning. This inaction between the actors becomes a major issue.

Essentially, this means that challenges within and across the VC are left unaddressed, regardless of the completion of VC actors' tasks. The aftermath of these overlooked challenges may present themselves externally or internally with respect to the VC.

Innovation platforms (IP) introduce a way to operationalise VC approaches towards more inclusive processes. IPs are adopted as the new lenses of strategy and addresses the lack of informal demand-side actors and intermediaries in the traditional VC approach.

Homann-Kee Tui *et al.* (2013) defines an IP as a forum for shared learning, collaborative planning, scalable action and change. In this sense, IPs are mechanisms employed in an attempt to pull together stakeholders from different backgrounds driven to address an issue of common interest (Cullen *et al*., 2014; Swaans *et al*., 2014).

IPs are categorised as multi-stakeholder processes because they fundamentally drive the participatory involvement of stakeholders in the decision-making process in iterative steps. Stakeholders come together to diagnose the problems, identify the opportunities and to find ways to attain goals. IPs develop an environment that is conducive to interaction amongst actors which in turn leads to knowledge sharing and co-creation. This allows the intended beneficiaries to be included throughout the development of a solution (Grobbelaar, Tijssen and Dijksterhuis, 2016).

PROBLEM STATEMENT

The application of IPs in the healthcare context is still relatively poorly understood within a developing country context. The extant literature predominantly pertains to applications within more developed countries (Dias and Escoval, 2012). The hurdles that arise in the process of adoption of IPs are to be addressed, if their full potential is to be reached (Dias and Escoval, 2012). Beyond the barriers to adoption, the context in which the IPs are to function present their own set of challenges.

The tools that are currently employed to manage access to healthcare have failed to implement scalable solutions to address healthcare challenges. To address the lack of access to healthcare in Africa, a new approach to the adoption of innovation across the VC is requisite. This calls for actors to abandon fragmented approaches to problem solving and to adopt an approach of inclusive coalitions (Gray, Vawda and Jack, 2011).

The goal of IPs implies a shift away from the traditional linear approaches of problem solving to include the additional complexities of the interrelatedness amongst VC actors. The desired approach should allow for collaborative investigation that draws on the expertise from a wide range of actors, including non-traditional actors. To create an open dialogue that promotes transparency and builds trust, the existing silos within the healthcare sector must be broken down.

Currently, there is a gap in the literature regarding the formation and functioning of IPs and their capabilities in improving the integration amongst VC actors, especially in the healthcare sector. The conceptual framework is developed to review areas of practice and to provide design guidelines that will facilitate improved problem solving in the healthcare domain.

METHODS

The paper presents the development of a conceptual framework of IPs through following the Conceptual Framework Analysis (CFA) process (Jabareen, 2009). The CFA approach consist of eight distinct steps, namely: 1) mapping selected data sources, 2) extensive reading and categorizing of selected data, 3) identifying and naming concepts 4) deconstructing and categorizing concepts 5) integrating concepts 6) synthesis 7) validating conceptual framework and 8) modifying the conceptual framework. This paper presents the development of a conceptual framework and documents the process up to step 6 of the CFA process. The conclusion section provides insight into follow-up work to be completed for validating the framework and adjusting it to the real work findings.

In order to complete stages 1 to 5 of the CFA, a systematic literature was completed to lead to the identification of gaps in the literature where insufficient research has been done and opportunities for future work can be explored (Bearman and Dawson, 2013)(Petticrew and Roberts, 2006). This included an extensive review of empirical data and practices (Morse and Mitcham, 2002). The web-based search engines that were consulted include Scopus, Google Scholar and Researchgate. A comprehensive literature database was compiled by adding additional papers through the use of the ancestry approach[2]. The selected papers were logged for further investigation. Literature pertaining to agricultural IPs were also included as the Body of Knowledge (BOK) of theoretical foundations upon which IPs are built is predominantly discussed in terms of its application in the agricultural domain. The final data set included 44 academic papers. The

[2] The tracking of research cited in already obtained research.

literature sources were reviewed and coded according to main categories. Patterns within the information emerge during this part of the process. Atlas.ti[3], a qualitative data analysis and research software, was used to review the selected studies.

Based on the results of the systematic literature review, the concepts are categorised according to 1) core capabilities and 2) structural components. This process substantially reduced the number of concepts to include in the framework. The concepts were then mapped based on the life cycle phase, which they are most prevalent in. This was followed by an iterative process in which concepts are synthesised and resynthesised until a logical theoretical framework emerged.

LITERATURE REVIEW

Exploring core concepts and dimensions

The systematic review explored the foundations of IPs in healthcare and underlying fundamental concepts. The descriptive findings regarding IP literature, present evidence of the novelty of this field of study in healthcare. It also shows that causal links exist between the various concepts upon which IPs are developed. The review elucidated the seven core dimensions and 39 concepts that facilitate the formation and functioning of IPs. The review also categorised and illustrated how the different types of IPs are primarily utilised to address a specific challenge or opportunity. The 44 publications included in the review highlight 16 fundamental theoretical concepts. These concepts are illustrated in Figure 1.

[3] www.atlasti.com

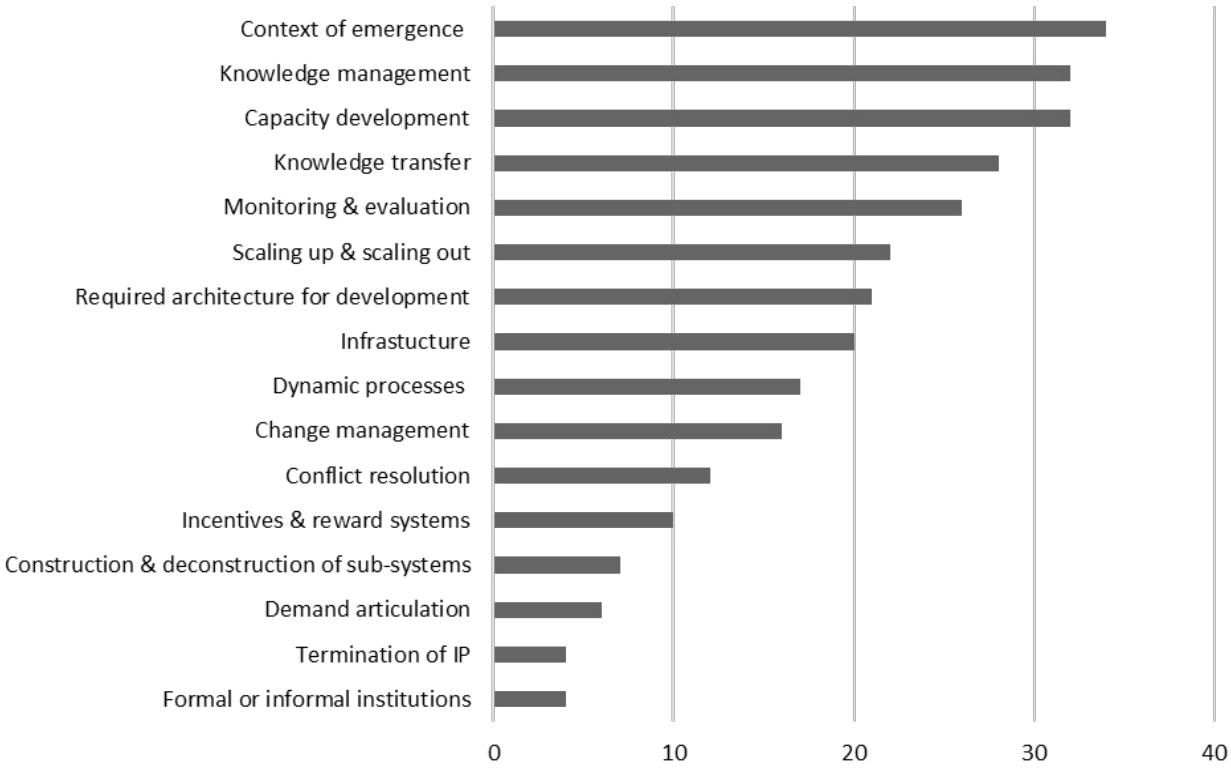

Figure 1: Innovation platform concepts

IPs are widely used to postulate a system infrastructure that addresses the interdependencies amongst stakeholders to allow them to operate effectively (Dubé *et al*., 2014). This system infrastructure is built on a set of fundamental concepts defined in Table 1. The table provides a definition of each of the identified concepts, as it pertains to IPs. It is evident that the consideration of the context of emergence is of crucial importance in this field of study as 34 publications addressed this concept, this is followed by knowledge management and capacity development addressed in 32 publications respectively. These concepts are hugely complex and for this reason we provide a brief outline and summary of the issues included under these ideas in the following table.

Table 1: Innovation platform concepts

IP Concept	**Role in IP**	**Concept**	**References**
Capacity development	Innovation capacity is the invisible glue that ties successful IPs together. Key elements of innovation capacity include: self-organisation, changing mindsets, valuing others' roles in innovation, skill learning, having a holistic view, adapting to changing situations, creating new ideas, being proactive, recognising opportunities, using indigenous ideas, and looking to the future.	• Drawing on existing capacity & developing new ones • Inclusiveness; Bottom-up processes • Supporting entrepreneur activity	(Liyanage, 1995; Whitworth *et al*., 2008; Hurley *et al*., 2009; Ciriello and Kulatilaka, 2010; Ayele *et al*., 2012; Dias and Escoval, 2012; Meersman and De Leenheer, 2012; Bullinger *et al*., 2012; Duncan *et al*., 2013; Homann-Kee Tui *et al*., 2013; Kilelu, Klerkx and Leeuwis, 2013; Kuenne, Akenroye and Moeslein, 2013; Birachi *et al*., 2013; Mende and Roseman, 2013; J. Tucker, Schut and Klerkx, 2013; van Rooyen *et al*., 2013; Victor *et al*., 2013; Birgit Boogaard *et al*., 2013; Cadilhon *et al*., 2013; Cullen, Tucker and Homann-Kee Tui, 2013; Bennett *et al*., 2014; Dubé *et al*., 2014; Huesch and Szczerba, 2014; Pinho *et al*., 2014; Swaans *et al*., 2014; Conway *et al*., 2014; De Almeide and De Moreas, 2015; Lemma and Tesfaye, 2016; Sanyang *et al*., 2016; SCHUT *et al*., 2016; Olson *et al*., 2017)

IP Concept	Role in IP	Concept	References
Change management	The resolution of bottlenecks often requires change. Change is frequently met with resistance as it introduces alienation and commotion. Change is a continuous process and requires creative adaptation and sustained reflection. Combining theories of change with practice through the application of IPs in development initiatives, increases the options for effective intervention and adoption.	• Evolving roles and responsibilities •	(Whitworth *et al*., 2008; Bullinger *et al*., 2012; Dias and Escoval, 2012; Birgit Boogaard *et al*., 2013; Kuenne, Akenroye and Moeslein, 2013; van Rooyen *et al*., 2013; Cullen, Tucker and Homann-Kee Tui, 2013; Duncan *et al*., 2013; Homann-Kee Tui *et al*., 2013; Kilelu, Klerkx and Leeuwis, 2013; Swaans *et al*., 2014; Dubé *et al*., 2014; De Almeide and De Moreas, 2015; Dwivedi, 2015; Lemma and Tesfaye, 2016; Sanyang *et al*., 2016; SCHUT *et al*., 2016)

IP Concept	Role in IP	Concept	References
Conflict resolution & dealing with power dynamics	Power relations between people and organisations within the platform can bias the discussions and influence decision-making. This can impair relationships and destroy trust between members. Structural power inequalities amongst stakeholders should be investigated and addressed.	• Power relations amongst stakeholders • Stakeholder analysis • Mediation processes	(Hurley *et al*., 2009; Deverka *et al*., 2012; El-Jardali *et al*., 2012; Guldemond and Geenhuizen, 2012; Meersman and De Leenheer, 2012; Cullen, Tucker and Homann-Kee Tui, 2013; van Rooyen *et al*., 2013; Kuenne, Akenroye and Moeslein, 2013; Dubé *et al*., 2014; Pinho *et al*., 2014; SCHUT *et al*., 2016)

IP Concept	Role in IP	Concept	References
Context of emergence	The context of emergence of the IP is viewed as a driver for innovation as well as the foundation from which to develop the IP. IPs require deep contextual knowledge to foster engagement in a sustainable manner. This aligns stakeholder goals and determines the activities to proceed with. It also provides insight into the landscape in which the IP will function.	• Cultural context • Motivation behind IP • Addressing physical, socioeconomic & political factors	(Liyanage, 1995; Whitworth *et al*., 2008; Hurley *et al*., 2009; Omachonu and Einspruch, 2010; Ciriello and Kulatilaka, 2010; Ayele *et al*., 2012; Dias and Escoval, 2012; El-Jardali *et al*., 2012; Guldemond and Geenhuizen, 2012; Idelchik and Kogan, 2012; Meersman and De Leenheer, 2012; Bullinger *et al*., 2012; Duncan *et al*., 2013; Kilelu, Klerkx and Leeuwis, 2013; Kuenne, Akenroye and Moeslein, 2013; Mende and Roseman, 2013; Trifan *et al*., 2013; Van Geenhuizen and Guldemond, 2013; van Rooyen *et al*., 2013; Birachi *et al*., 2013; Victor *et al*., 2013; Birgit Boogaard *et al*., 2013; Cadilhon *et al*., 2013; Huesch and Szczerba, 2014; Bennett *et al*., 2014; Pinho *et al*., 2014; Conway *et al*., 2014; De Almeide and De Moreas, 2015; Amann, Zanini and Rubinelli, 2016; Lemma and Tesfaye, 2016; Sanyang *et al*., 2016; SCHUT *et al*., 2016)
Demand articulation	Prior to getting members on-board with the IP, it is important to ensure that the IP's goals are well communicated. Demand articulation can be used for consumer engagement towards developing a common vision.	• Mobilising resources • Guiding search • Strategy vision development • Visioning & planning • Driving participation, commitment, ownership	(Hurley *et al*., 2009; Kilelu, Klerkx and Leeuwis, 2013; Lema and Schut, 2013; Mende and Roseman, 2013; Dubé *et al*., 2014; De Almeide and De Moreas, 2015)

IP Concept	Role in IP	Concept	References
Dynamics processes	IPs operate in dynamic environments. Each stakeholder needs to feel valued within the IP and support each other towards attaining the IP goals. A clear understanding of the expectations of all stakeholders will promote open communication and foster trust amongst one another.	• Continued guidance of search activities • Facilitation,management & interaction • Open communication • Monitoring & Evaluation	(Omachonu and Einspruch, 2010; Deverka *et al*., 2012; Dias and Escoval, 2012; Guldemond and Geenhuizen, 2012; Cullen, Tucker and Homann-Kee Tui, 2013; van Rooyen *et al*., 2013; Kilelu, Klerkx and Leeuwis, 2013; Lundy *et al*., 2013; Mende and Roseman, 2013; Pinho *et al*., 2014; Swaans *et al*., 2014; De Almeide and De Moreas, 2015; Amann, Zanini and Rubinelli, 2016; Sanyang *et al*., 2016; Lemma and Tesfaye, 2016)

IP Concept	Role in IP	Concept	References
Incentives & reward systems	The relative importance of incentives is influenced by the type of IP and the infrastructure that is available. Monetary incentives are commonly adopted. This attracts diverse stakeholders and motivates them to stay involved in the platform activities. Alternatively, the potential for stakeholders to influence policy making processes or to achieve a specific objective is often incentive enough.	• Monetary incentive programs • Introduction to new markets	(Dias and Escoval, 2012; Birachi *et al*., 2013; Duncan *et al*., 2013; Homann-Kee Tui *et al*., 2013; Kilelu, Klerkx and Leeuwis, 2013; Trifan *et al*., 2013; Bennett *et al*., 2014; Dwivedi, 2015; Amann, Zanini and Rubinelli, 2016; Hasche, Linton and Öberg, 2017)

IP Concept	Role in IP	Concept	References
Infrastructure	When considering the phenomenon of IPs, they can be defined in terms of their physical requirements or in terms of their social interactions. The infrastructure merely provides structure to allow for the required processes to take place.	• Access to resources & facilities • Focus level of IP • Access to resources & facilities • Supporting development of technology services • Policy-making • Legitimacy; resources & commitment • Construction & deconstruction of sub-systems • Formal & informal institutions	(Fottler *et al*., 1989; Liyanage, 1995; Hurley *et al*., 2009; Van Oerle, Lievens and Mahr, 2011; Ayele *et al*., 2012; Deverka *et al*., 2012; Dias and Escoval, 2012; El-Jardali *et al*., 2012; Guldemond and Geenhuizen, 2012; Kilelu, Klerkx and Leeuwis, 2013; Kuenne, Akenroye and Moeslein, 2013; Mende and Roseman, 2013; Swaans *et al*., 2014; De Almeide and De Moreas, 2015; Amann, Zanini and Rubinelli, 2016; Sanyang *et al*., 2016; SCHUT *et al*., 2016; Olson *et al*., 2017; Hasche, Linton and Öberg, 2017)

IP Concept	Role in IP	Concept	References
Knowledge management, transfer & co-creation	The ability of the stakeholders to interact in a constructive manner that promotes participatory learning is a vital element in IPs. By increasing the stakeholders' capacity to learn from the perspectives of others, the likelihood of the IP succeeding and reaching its goals also increases. Knowledge transfer should be a dyadic communication process. With any knowledge transfer activities, M&E of the processes is key.	• Knowledge transfer, learning & diffusion • Drawing on existing capacity & developing new ones • Collaboration • Information exchange & communication Establish knowledge sharing platforms & machinery	(Liyanage, 1995; Whitworth *et al*., 2008; Ciriello and Kulatilaka, 2010; Van Oerle, Lievens and Mahr, 2011; Ayele *et al*., 2012; Meersman and De Leenheer, 2012; Bullinger *et al*., 2012; Dias and Escoval, 2012; Guldemond and Geenhuizen, 2012; J. Tucker, Schut and Klerkx, 2013; Kilelu, Klerkx and Leeuwis, 2013; Kuenne, Akenroye and Moeslein, 2013; Lema and Schut, 2013; Mende and Roseman, 2013; Trifan *et al*., 2013; Van Geenhuizen and Guldemond, 2013; van Rooyen *et al*., 2013; Victor *et al*., 2013; Bennett *et al*., 2014; Pinho *et al*., 2014; Swaans *et al*., 2014; Conway *et al*., 2014; Huesch and Szczerba, 2014; De Almeide and De Moreas, 2015; Lemma and Tesfaye, 2016; Sanyang *et al*., 2016; SCHUT *et al*., 2016; Hasche, Linton and Öberg, 2017)

IP Concept	Role in IP	Concept	References
Scaling up & scaling out	IPs can be viewed as a vehicle that overcomes the traditional boundaries between stakeholders, as it pertains to finding innovative solutions. The scaling up and scaling out of platforms refers to the sustainable dissemination of knowledge across different levels of functioning and the approaches adopted towards piloting similar IPs in alternative areas.	• Celebrate successful idea execution Supporting access to markets	(Liyanage, 1995; Whitworth *et al*., 2008; Hurley *et al*., 2009; Omachonu and Einspruch, 2010; Ciriello and Kulatilaka, 2010; Van Oerle, Lievens and Mahr, 2011; Ayele *et al*., 2012; Guldemond and Geenhuizen, 2012; Meersman and De Leenheer, 2012; El-Jardali *et al*., 2012; Homann-Kee Tui *et al*., 2013; J. Tucker, Schut and Klerkx, 2013; Kilelu, Klerkx and Leeuwis, 2013; Kuenne, Akenroye and Moeslein, 2013; Mende and Roseman, 2013; Birgit Boogaard *et al*., 2013; Trifan *et al*., 2013; Van Geenhuizen and Guldemond, 2013; Victor *et al*., 2013; Cadilhon *et al*., 2013; Cullen, Tucker and Homann-Kee Tui, 2013; Conway *et al*., 2014; Dubé *et al*., 2014; De Almeide and De Moreas, 2015; Amann, Zanini and Rubinelli, 2016; Sanyang *et al*., 2016; SCHUT *et al*., 2016; Olson *et al*., 2017)

IP Concept	Role in IP	Concept	References
Termination of IP/members	IPs are developed with a strategic aim and thus require an evolving membership from which relevant expertise can be drawn, depending on the problem at hand. An IP can be dismantled, once the initial problem has been resolved and the objectives have been achieved. The most sustainable outcome for an IP is to achieve increased innovation capacity. Once capacity for innovation is established in a system, the platform itself may not be required.	• Evolving membership • Inclusion & representation • Focus tasks & roles • Seek opportunities for participation • Explore knowledge, skills & interests • IP dismantling	(Birgit Boogaard *et al*., 2013; Homann-Kee Tui *et al*., 2013; Lemma and Tesfaye, 2016; Schut *et al*., 2016)

Life cycles of Innovation Platforms

The life cycle of an IP covers the sequence of activities from initiation to implementation. The life cycle phases provide a structured way of addressing the development of an IP. This allows for accountable deliverables through addressing the requirements at each phase with the inputs received from the previous phase. Table 2 presents an overview of the different IP life cycle phases discussed in literature. The various different phases that can be followed to describe the development and management of platforms is highly covered in literature.

Table 2: Overview of innovation platform phases according to various authors (Adopted from Boogaard *et al.* (B. Boogaard *et al*., 2013)**)**

Platform phases	**Authors**
2 phases: Formation; Functioning.	(Swaans *et al*., 2014)
4 phases: Scoping and preparation; Process management; Learning and restructuring; Renegotiating.	(Nederlof and Pyburn, 2012)
6 phases: Initiation; Establishment; Management; Sustainability; Innovation; Learning and knowledge.	(Makini *et al*., 2013)
6 phases: Identify stakeholders; Establish learning alliance; Assessment, knowledge sharing and consensus building; Visioning and prioritising; Planning and implementation; M&E.	(Varma *et al*., 2009)
6 phases: Identification of R&D challenges; Site selection; Consultative and scoping study; Visioning and stakeholder analysis; Development of action plans; Implementation of action plans.	(Tenywa *et al*., 2011)
7 phases: Initiate; Decide on focus; Identify options; Test and refine solutions; Develop capacity; Implement and scale up; Analyse and learn.	(Homann-Kee Tui *et al*., 2013)
10 phases: Location of sites; Identification of commodity or system; Identification of stakeholder; Engagement of researchers; Development of governance and management guidelines; Facilitation of interaction with stakeholders; Development of business plan; Establishment of participatory M&E measures; Review of implementation; and Lessons learnt.	(Adekunle A A, Fatunbi and Jones, 2010)

There are also common elements that are present across the different life cycle phases in Table 2. These include:

- The level at which the IP functions must be decided at the onset of the project. This will either be local, sub-national, national or international.
- The focus area within healthcare must be determined by the platforms members. Specific disease areas, process layout, management and device development are all areas of potential interest. VC analysis may introduce a viable platform focus area.
- All the different approaches highlight the need for multiple perspectives from actors with diverse backgrounds.
- A prerequisite for an IP to operate is cohesion. United stakeholders across the VC along which there is mutual interest and potential to meet the interest of individuals on board.
- The operation of the life cycle phases are built on a strong infrastructure that improves access to a spectrum of data and knowledge.
- Contingency plans are always required when addressing the entire scope of a life cycle. It is thus required to include/develop procedures for monitoring threats to critical infrastructure.

DEVELOPING A CONCEPTUAL FRAMEWORK

The phase where the framework is formulated entails mapping each concept along with a description including its main attributes, characteristics, assumptions and role. This is to be followed by a categorisation of the concepts based on their features and goals.

Seven core dimensions are extracted from the IP definition, namely: engagement/participation; knowledge management; capacity development; innovation; actors; institutions; and infrastructure. The 39 concepts identified from the systematic review are categorised according to these dimensions. The two main trends identified in the systematic review are the core capabilities of IPs and their structural components. The dimensions and their respective concepts are then categorised into one of the main categories.

The life cycles of IPs were considered and synthesised into formation and functioning. The dimensions and concepts were then mapped against the IP life cycle that is most prevalent. The study adopts Swaans *et al's* (2014) phases of IPs namely "Formation" and "Functioning". 19 of the identified concepts are addressed during formation while 20 concepts predominantly appear during functioning.

The activities adopted by the IP aim to create a shared vision for growth, to define realistic plans to overcome bottlenecks and to align the VC around the requirements for success. The framework weaves together different concepts to produce an assortment of results that drive the development of growth

pathways. During this CFA phase, the existing categorised concepts are synthesised into an integrated framework. presents the categorisation of the identified concepts according to the seven dimensions.

Table 3: Conceptual theoretical framework

		FORMATION	FUNCTIONING
Categories	Dimensions	Concepts	Concepts
CORE CAPABILITIES	Interaction/ Engagement – Consertation	Visioning & planning	Driving participation, commitment, ownership
		Incentives & reward systems	Facilitation & management of interactions within innovation platform
		Facilitation & coordination	
		Conflict resolution & dealing with power dynamics	Termination of innovation platform/members
	Knowledge development & learning	Knowledge, skills & interests exploration	Knowledge transfer & type of learning
			Consideration of various approaches to knowledge management
		Monitoring & evaluation	Disseminate & diffuse knowledge
			Continuous monitoring & evaluation
	Capacity building	Focus on inclusivity within process	Draw on existing capacity & develop new ones

		FORMATION	FUNCTIONING
Categories	Dimensions	Concepts	Concepts
		Designed for scalability (Scaling up/out)	Celebrate successful idea execution
		Consideration of dynamic processes	Approaches to change management
		Dealing with resistance to change	Address physical, socio-economic & political factors
	Innovation	Search guidance	Supporting development of technology services
		Shift in focus level of IP	Supporting entrepreneurial activity
			Continued guidance of search activities
STRUCTURAL COMPONENTS	Actors	Inclusion & representation of all stakeholders	Seek opportunities for participation
		Stakeholder-representative demand articulation	Evolving roles & responsibilities with introduction of new ideas
	Institutions	Setting up formal & informal institutions	Maintaining & strengthening formal & informal institutions
		Construction & deconstruction of sub-systems	Support and influence policy-making
	Infrastructure	Consideration of context of emergence	Overcome barriers to functioning
		Level of access to resources & facilities	Establish knowledge sharing platforms
		Required setup foundation	Mobilise resources

CONCLUSION AND FUTURE WORK

There is no formal and coherent approach to setting up IPs, because of the diversity, complexity, and dynamic nature of conditions, contexts and resources. The framework developed in this paper makes it easier to comprehend how the various IP concepts relate to and affect each other. It seeks to simplify the visualisation of key concepts and processes required for the development of an IP.

The product of this paper remains an untested framework. Future work will include the validation of the framework. The fieldwork will provide insight into the practical adoption of the framework as well as highlighting areas that require further investigation and improvement.

This project proceeds with two types of validation namely: 1) interviews with experts; and 2) the application of case studies. Each of these forms of validation exhibits its own set of advantages and disadvantages (See Figure 1Figure 2).

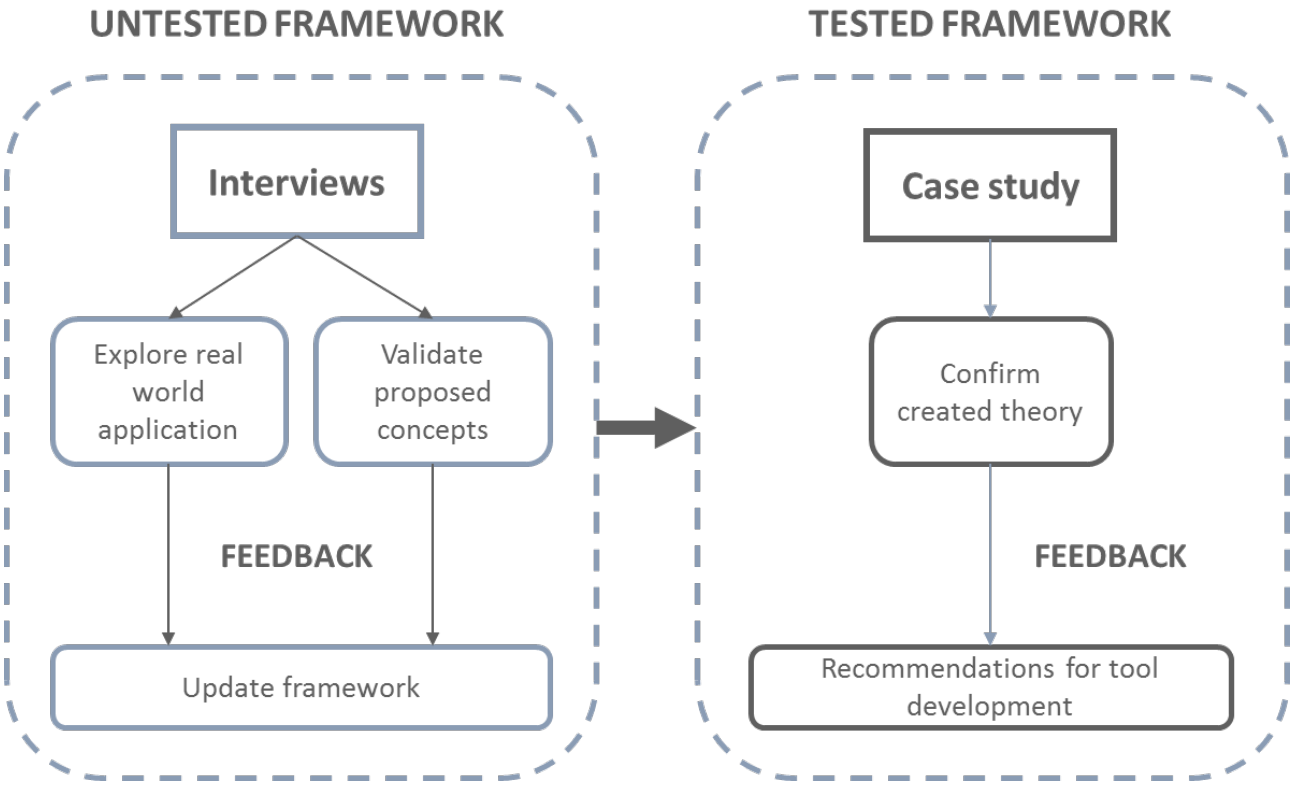

Figure 2: Validation process for framework and management tool

The validation process needs to be designed in such a manner that the collected data is analysed using both quantitative and qualitative approaches. A mixed-method approach is proposed to generate a better understanding of the phenomenon by building on the high availability of collected data.

	Interviews with experts	**Case study application**
Definition	Interviews are meetings	A case study is an up-close, in-depth

	Interviews with experts	Case study application
	conducted to obtain information from the interviewee in order to negate or confirm the researcher's findings.	and detailed examination of an already existing case. A case study aims to provide explanatory, exploratory and descriptive findings.
Advantage and disadvantages	It provides a space to obtain knowledge from experts that either contest or support the research findings under consideration. A disadvantage of this however, is that the interviewee can only answer based on their personal experience and the knowledge that has been imparted to them. The data that is gained from self-reporting often only covers an isolated portion of the overall population. Therefore data coverage requires special consideration during the selection of the interviewees.	A case study introduces a different perspective from which practical challenges and requirements are better understood. This is due to the similarities between case studies and reality. Case studies are however susceptible to manipulation and they are very strongly rooted in the setting in which they take place. The combination of these factors makes it increasingly difficult to validate the framework's applicability across a wide range of different contexts.
Planned application	Interviews with experts will conducted in different formats, each comes with its own desired outcome. **Semi- structured interviews** The one-on-one semi structured interview is a process that allows an authentic reflection to be recorded in the case of open-ended questions. This provides an overview of	The case study highlights how an IP avoids certain undesirable situations by adhering to the particular guidelines provided by the framework. The case study also validates the need and usage of the identified tools to address common challenges faced in the IP domain. To address the concerns associated with case study validation, evaluative interviews with key actors are also conducted.

	Interviews with experts	Case study application
	the study area of interest. **Framework-ranking interviews** Framework-ranking interviews provide a quantitative approach to validate the framework components, and requires elucidation of whether the framework's concepts are deemed necessary and useful by those who would have experience in the IP space	

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