



Using Scenarios to Support Innovation and Mutual Linkages

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INTRODUCTION

The strengthening of health systems through innovation is a continuous process that involves countless activities by a huge range of actors. Though we may refer at times in everyday conversation to healthcare innovation as if it were an easily locatable process, in practice we usually find it to be a fuzzier and harder to pin down phenomenon, distributed across multiple sectors, geographies, and, crucially, multiple timelines. Nor is health system innovation a process led by health sector actors

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alone. Health systems change because of the action of stakeholders across multiple sectors, ranging from education and hospital facility management to manufacturing and international logistics.

Our focus in this chapter is on the linkages between two sectors critical to cancer care innovation: industrial production and healthcare. These two emblematic sectors span the activities of diverse actors with wide-ranging day-to-day responsibilities and long-term agendas. They include pharmacists dispensing drugs to patients, hospital administrators managing staff rotas, doctors prescribing different treatments to patients, factory plant owners investing in a new production line, supply chain operators upgrading security infrastructure around a medical supplies distribution hub, drug regulators monitoring compliance with different licences, R&D institutions, policymakers health insurance systems, and family members saving for treatment.

The current realities, as well as the futures, of these actors are highly interlinked—even if the linkages are not necessarily always visible to everyone as they go about their work and social activities. The choices and planning by one group will unavoidably impact those of others. Changes made by one group can end up significantly enabling or constraining future outcomes for others. In upgrading of a manufacturing plant, an engineer's technical appraisal in favour of one cold storage option over another may, for example, constrain in future the local availability of medical supplies to a region. Similarly, a hospital records manager who complies with requirements to report only prescribed medication, rather than also estimated future needs, may distort the demand data used by an investor appraising the viability of localising manufacturing.

To enhance and coordinate the alignment of the behaviours of such diverse health and industrial sector stakeholders, we can benefit greatly from identifying where there might be a common 'direction' along which to steer future innovation pathways. Searching for and revealing such mutually desirable pathways needs tools with which health and industry actors can share and explore their respective visions, agendas and plans for the future. One locus of this knowledge about the future lies within the future sociotechnical 'imaginaries' held by health and industry actors (see Chapter 2 for an introduction to such imaginaries). Embedded within these imaginaries are values, ideas, and other knowledges that exist today and are likely to shape what the future may look like. Ultimately, a deeper understanding of the similarities and differences across future health and industry imaginaries can guide, and even coordinate, mutually supportive

action and health system development—strengthening the likelihood of accessible, affordable, timely cancer care for patients both now and in the future.

Tools to Support Innovation and Health-Industry Linkages

In this chapter, we focus on a set of practical questions: how can stakeholders explore linkages across industrial production and health-care futures? What tools can aid health and industry actors in exploring different visions for future cancer care? And what lessons can be shared from recent experiences with these tools when examining systemic innovation in highly uncertain contexts?

We respond to some of the historical and current calls to bridge industrial production and health systems sectors. The health systems community has called for greater use of ‘systems-based’ tools to support cross-sectoral improvement of care (Greenhalgh & Papoutsis, 2018; Kwamie et al., 2021; UNU-EHS & UNDRR, 2022). Likewise, systemic innovation scholars argue that any efforts to co-create value across sectoral boundaries would benefit greatly from drawing more directly on the body of work on ‘systems thinking’ theory and practice from the past 50 years (Midgley & Lindhult, 2021). For those working towards better cancer care, we need practical examples of such ‘systems-based’ tools, how they work, when, and for whom, for the improvement of future healthcare.

Recent efforts have proposed new mechanisms for driving systemic innovation at policy and governance levels (UNU-EHS & UNDRR, 2022). These have focused on improving accessibility for industry and health leaders, researchers, and policymakers to participate in cross-sectoral events and processes. New health system governance structures, health-industry policy fora, and dedicated funding for research and innovation have been developed to support cross-sectoral collaboration (for example, the GAVI public–private vaccine partnership). Yet there are few available accounts of how dialogue is facilitated once these actors from different sectoral contexts, professions and backgrounds participate in these cross-sectoral spaces. For those wanting to improve cancer care, there are few publicly documented experiences with different tools to share the lessons learned on what works in facilitating cross-linkage conversations.

In the following sections, we propose the use of ‘scenario tools’ for exploring linkages that can shape innovation to be mutually beneficial

for health and industry sectors. We briefly introduce: what scenarios are; what they can be used for; how they can be developed and used; and to what extent they are used already in health. We then share two experiences where scenario tools were used to take a systems-based approach to developing future cancer care innovation imaginaries in Tanzania and Kenya (see Chapter 1 for background on data and research). We hope not only to demystify scenarios for readers, but also to share our experiences in using them to facilitate systemic innovation dialogues. A final section summarises some key principles for using scenarios.

A PRACTICAL TOOL: SCENARIOS

Scenarios are coherent descriptions about hypothetical futures (van Notten, 2006). At the heart of scenarios are ‘what if ...?’ questions about how future events might unfold. Such what-if narratives might explore, for example, how a national election in a high-income country might lead to very different health policy priorities, which in the longer term might change the need for international health infrastructure finance. Other what-if scenario questions might instead explore more local and operational health issues, exploring how a new disease might increase district hospital visits and simultaneously result in an increase of staff illness and absence. Such ‘what if ...?’ scenario narratives all explore how hypothetical actions can potentially lead to different future outcomes. Scenarios are thus not tools for predicting what *will* happen, but rather for learning from what *might* happen.

The flexible and open nature of scenarios means they are used for a wide range of purposes. A common scenario use is to convene stakeholders and elicit their hopes, fears, and ideas about possible futures (Wilkinson et al., 2013). This ‘visioning’ use of scenarios asks: ‘what future would be possible, and what future would be preferred?’ (Gordon, 2011). A second common use of scenarios is for exploring action and innovation pathways that might increase the likelihood of specific futures being realised (Sarpong & Maclean, 2011). When used in this way, scenarios become tools for comparing and appraising options for action through their simulation of possible future stakeholder interactions and outcomes. This ‘planning’ use of scenarios serves as a basis for action and asks: ‘how could a target future be achieved?’ (Börjeson et al., 2006).

The strength of scenarios lies in their hypothetical ‘what-if’ simulations. This supports learning about potential opportunities and risks

without experimenting with those actions in the real world (Pruyt, 2011). Scenarios force us to reflect on causal linkages and understand how systems can change, thus helping their users avoid the pitfalls of simplistic prediction (Wright & Goodwin, 2009).

Validity and quality in scenario construction and use are not determined by whether a scenario is ‘right’. Instead, value and quality emerge when ‘scenario thinking’ supports different stakeholders in gaining new insights and deeper understanding of innovation in the past, present, and future (Sarpong & Maclean, 2011).

For those unfamiliar with scenarios, it can be mystifying as to where scenarios derive this power for learning, meaning-making and inference. As Ramirez and Wilkinson explain, their analytical power is contributed by their users. Scenario construction and use are typically highly participatory processes since the analysis and interpretation of scenario insights rely firmly on ‘the inherent human capacity for imagining futures to better understand the present situation’ (Ramirez & Wilkinson, 2016, p. 1). Figure 13.1 summarises this way in which participatory multi-stakeholder processes can construct alternative ‘what-if’ scenarios that explore different causal linkages, facilitating shared learning about what could happen in different future imaginaries.

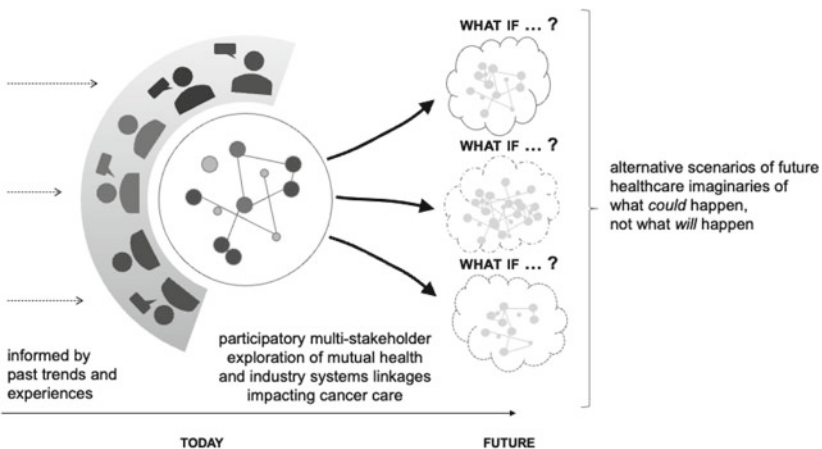


Fig. 13.1 Scenarios are tools for exploring how mutual health-industry linkages can shape a wide range of possible health innovation futures (*Source* Authors)

Scenarios in Health Policy

The primary use of scenarios in the health sector has been for local health-care provision and resource planning. Typical uses of scenarios have been: to explore future hospital needs (e.g. (Haghdoost et al., 2017)); modelling of future health workforce availability challenges (e.g. (Hayhoe et al., 2018)); resource and asset management of, for example, bed availability in different future scenarios (e.g. (Mackay & Lee, 2005)); or emergency planning for disasters (e.g. Amorim-Lopes et al., 2021).

Far less shared and discussed is the use of scenarios for strategic health system innovation management, despite calls for their more widespread use (De Savigny et al., 2017). Fourie (2007) noted that scenarios bring the critical long-term view needed to ‘galvanise political will and action across the African continent and beyond’ on health issues. It is likely that the absence of widespread visible experiences with scenarios in health systems policy development constrains the confidence that is needed in experimenting with them. Vollmar suggests that ‘with greater transparency, the scenario method could become an excellent tool for ... strategic decision-making in public health’ (Vollmar, 2017, p. 209). To help bridge this ‘scenarios transparency gap’, we share an account of how scenarios were used in two health policy cases in Tanzania and Kenya, and reflect on what was useful in meeting different purposes across different contexts.

DEVELOPING SCENARIOS

How scenarios are constructed and developed varies widely (Bishop et al., 2007). Methods and tools used can range from entirely dialogue-based processes, to using pen and paper for sketches, to photos, physical speculative design objects, or the use of computational power for simulation models that produce quantitative descriptions of different future outcomes. In terms of who is involved in scenario construction and use, this too can vary, ranging from individual reflection to large group engagement, often at different times and even different locations.

Irrespective of the many variations between scenario development methods, the historically typical approach begins by identifying a small set of specific variables believed both important and highly uncertain in their likely influence on the behaviour of a future system.¹ Such ‘top-down’ scenario development approaches might take variables such as, for

example, population growth and affordability of healthcare, and explore how changes in their future levels might impact other future outcomes such as the level of demand for hospital healthcare.

In a strategic innovation context there are many interrelated uncertainties that are likely to influence future healthcare innovation outcomes. Examples include future education demand, structure of international supply chains, models of manufacturing investment and technological advances in cancer diagnostics and treatment for better cancer care. Scenario builders may therefore prefer not only to consider multiple uncertainties, but also to allow for the later inclusion of additional causal influences of interest. In such contexts, we can adopt a more open and exploratory approach to scenario construction. While there is no single best approach for doing this, open and exploratory approaches typically begin with initial exploration and ‘mapping’ of system issues that make explicit the causal linkages between them (Wright et al., 2013). Some of the typical ‘systems mapping’ methods include ‘cognitive mapping’, ‘causal loop diagrams’, and ‘issue mapping’ (Barbrook-Johnson & A. S. Penn, 2022; Sterman, 2000).

Three-Stage Process for Health System Scenarios

We suggest a three-stage scenario process to explore the complex linkages between industrial and healthcare innovation. Prior to any in-depth development of any scenario, the intended uses of scenario building must be identified and the selection of overall scenario topic and subject focus justified. This is essential for managing the overall scope of the work in what are often highly participatory processes. It also informs subsequent choices in the design of bespoke processes suitably aligned to meet the hopes and expectations of intended users. This process is adaptable for a broad range of analytical needs and healthcare innovation contexts.

Stage 1: ‘What?’ landscape analysis

The first stage elicits descriptive knowledge in response to ‘what?’ questions about the problem context. This includes questions such as: What do we know about the issues faced and why they exist? What are key trends, patterns, and underlying drivers of change? Who are different stakeholder groups influencing change, and what are their needs and interests? What is known about the dependencies between activities in

healthcare and industrial production systems? What are the key uncertainties faced? What are known knowledge gaps? As this stage aims to produce a ‘whole system view’ that situates the policy issue of interest within its associated sector and policy contexts, it is sometimes also termed a ‘landscape’ analysis of the evidence. Inputs are typically mixed empirical data sources—for example, patient experience reports; industrial capability forecasts; research on policy barriers and historical imports data. Collaborative, multi-stakeholder processes are common for collecting and combining these different knowledges, and exploring what challenges faced in one sector might be linked to those faced in another.

Stage 2: ‘What if?’ and ‘so what?’ scenario construction

A second scenario stage uses the preceding foundation of descriptive, contextual knowledge and asks ‘what if?’ questions to construct scenarios. It also asks ‘so what?’ questions to generate interpretative knowledge with both stakeholders and scenario builders about the possible implications of different future outcomes. This requires exploration of possible actions and events sequences and their impacts on different groups in society. This stage also makes inferences about what causal mechanisms might generate very different future outcomes. It typically draws on discussion for exploring potential ideas and systematically investigates the sequential ‘what-if’ chains of influence.

Stage 3: ‘Now what?’ scenario recommendations

A third and final reflection stage asks ‘now what?’ questions to identify and propose potential areas for action. This explores what actions in the short term could support longer-term planning or policy and strategy development.

Following the scenario analysis, construction and exploration stages, the insights and evidence generated about the innovation and policy issues of interest, can be summarised, and shared with their users and wider communities of interest with summary notes, briefs, reports, etc. Additionally, we encourage recording reflections and lessons learnt about the building and use of scenarios for health systems. Table 13.1 provides an overview.

TWO SCENARIO CASE STUDIES FOR CANCER CARE INNOVATION

Over a year-long period in 2020–2021, ICCA research developed several scenarios for different uses. To contribute to the reduction of the ‘scenarios transparency gap’ in the health systems innovation context, this

Table 13.1 1 Health systems scenarios process overview

<i>Stage</i>	<i>Purpose</i>	<i>Guiding questions addressed</i>
Preparation	Scenario topic identification	What are the critical issues of interest for investigation?
	Scenario use identification	What evidence and/or learning is needed, who will use it, and when is it required?
Stage 1	Landscape analysis	‘What’ do we know about the issues and problem context? What linkages exist between different systems and sectors?
Stage 2	Scenario construction	‘What if’ we imagined different future events and activities? Which of the possible innovations do we want to explore in greater depth? So what would need to happen for the innovation scenario to be possible? What with a more detailed scenario?
Stage 3	Scenario recommendations	‘Now what’ does this mean for our actions today?
Follow-up	Lessons capture	What was learnt from this scenario construction and exploration?

chapter shares details of activities used to scope, develop, and interpret scenarios.

Experiences from two scenario case studies are described. The first case study describes the development of a scenario about a future with greater access to medication for management of severe pain including the scope for localised pain medication manufacturing capability in Tanzania. This scenario description builds on the pain management case study in Chapter 12. The second case study shares experiences with initial scenario development activities about a future with greater access to essential cancer care commodities and consumables in Kenya including scope for local manufacturing, picking up from some evidence in Chapter 7. Combined, these two cases reflect two distinctive but complementary uses of scenarios in healthcare policy innovation. The first case study illustrates the use of scenarios for exploration of pathways for action. The second case study illustrates the use of scenarios for more aspirational and collective visioning of what a preferred future might look like to identify possible areas for further work.

EXPLORING INNOVATION PATHWAYS USING SCENARIOS: A TANZANIA CANCER CARE CASE STUDY

A striking and unexpected experience of the ICCA project was the emphasis that emerged from early project workshops in Tanzania and Kenya foregrounding issues of care, palliation, dignity, and ability to work. These wider aspects of cancer care are considered more fully in Chapter 3. When the multidisciplinary ICCA teams discussed what potential topics could benefit from further investigation with the use of relatively unfamiliar scenario-based methodologies, the Tanzanian team selected this problem topic as its scenario analysis focus: pain management.

The aim of using a scenarios-led methodology in this case was to engage local researchers and stakeholders across the industrial and health sectors in a systematic but flexible collaborative process exploring pain management issues and linkages. This section narrates the scenario building process in Tanzania—despite pandemic constraints—and its interim outcomes.

Stage 1: ‘What?’ Landscape Analysis

By the time the Tanzanian and UK researchers agreed the pain management focus, and could come together to work on it, the pandemic was underway. The research teams therefore worked online to develop an initial ‘landscape analysis’ of the potential pain management issues to be considered.

As a way of mapping the team’s diverse insights, a visual ‘systems map’ was constructed depicting an overview of the multiple sectoral and cross-sectoral linkages generating the problem structure of pain management in Tanzania and internationally. The researcher leading the scenarios development undertook real-time ‘system mapping’² while listening to research team members’ presentations and discussions of their current understanding of critical issues impacting pain management. Their possible interdependencies and relationships of influence were noted. Issues were captured as individual notes on the online Kumu relationship mapping software (Kumu, 2022), though other platforms and media can be used. Systems mapping can also be done using post-it notes, or pen and paper. Where a relationship of influence was described between two issues (for example, where high travel costs for patients to access hospitals lead to reduced levels of patient trips for pain medication collection), this is depicted on the systems map with an arrow from the first driving issue to the second impacted one.

The resulting systems map was validated through a group-based review of the areas of significant cross-sector linkages that emerged across the map. Figure 13.2 shows an extract of the overall systems map produced. Cancer pain, it was noted, not only severely reduces patients' quality of life but also limits their ability to participate in daily social and economic activities (Chapter 3; marked on Fig. 13.2 as 'work and social participation of patients'). The most effective and important form of severe pain management for cancer care involves opioid derivatives which were and are undersupplied, and not manufactured, in East Africa (Chapters 11 and 12; marked on Fig. 13.2 as 'local opioid production capacity'). The whole map can be accessed using the link in Endnote 2.

It was agreed that more in-depth landscape analysis specific to key trends, issues and drivers of change affecting the undersupply of opioids for cancer care in Tanzania would corroborate and provide helpful empirical detail of the mutual sector linkage areas identified with the systems mapping discussions. The output of this follow-up analysis was a working paper summarising the landscape analysis of crucial issues and linkages framing the pain management problem and key uncertainties. This working paper informed the next step in scenario planning; it also forms the basis, in reworked form for Chapter 12 in this book. In brief, this working paper considered that the undersupply of critical pain medication appeared to arise from a set of interlinked issues including: healthcare worker education and training, hospital purchasing practices, inventory forecasting methods, reporting requirements, prescription norms, policy priorities, local manufacturing capability, and wider awareness of the significance of pain management in cancer care (Chapter 12).

Stage 2: 'What If?' and 'so What?' Scenario Development

For the second scenario stage, a hybrid online and in-person full-day workshop with the researchers and high-level local stakeholders was organised by the Tanzanian team. Participants included officials from relevant Ministries; professional pharmaceutical and clinical associations; regulatory and procurement bodies; leading clinical oncology centres; local pharmaceutical manufacturers; as well as local healthcare professionals. The range of participants illustrates the level of local concern and importance given to this issue at this stage. As preparation for this workshop, participants received the working paper on the landscape analysis of pain management issues, from Stage 1, and heard presentations summarising early findings evidencing the significance of industrial-health linkages.

The workshop aimed to explore possible future options for improving pain management in cancer care and involved two key activities. First, the group explored possible areas of innovation by exploring different future events and activities different from today. The group's exploration

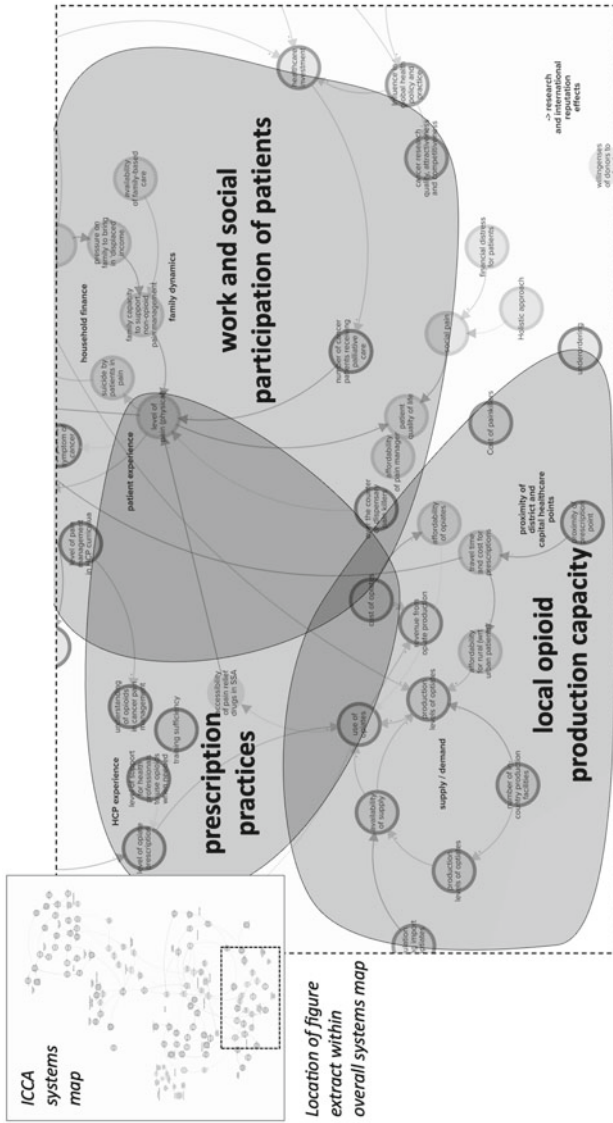


Fig. 13.2 A partial view of the systems map of the systemic problem of systemic cancer care pain management and opioid undersupply. It highlights three sub-themes across the driving health-industry linkages discussed

of different future innovations was facilitated by inviting participants to suggest ‘what-if ...?’ questions that could describe an eventual, better cancer care future. Participants were encouraged to share ideas that might improve pain management, regardless of their perceived plausibility. Contributed ideas ranged across sectors from ideas for education (“what if ... health care practitioner education significantly enhanced palliative care curricula?”), to alternative medical protocols (“what if cannabis was provided for terminally ill patients?”), to manufacturing innovations (“what if there was local manufacture of opioid medication?”). All ‘what-if’ ideas and discussion points were captured by the facilitator on a shared online whiteboard (Miro, 2022). This process aimed to support participants in recalling and reflecting on ideas shared, as well as identifying topics potentially not yet suggested.

As the second key activity, the group discussed what different innovations might be imagined, and what possible sequences of events might be involved in achieving them. The facilitator used a set of ‘so what?’ questions. These included questions of what inputs would be required to initiate essential activities, what results would be expected, what outcomes might be observed, what eventual impacts would be anticipated, who might benefit in what way, and what undesirable consequences and uncertainties are faced (some readers may recognise these as common questions used in evaluation techniques such as ‘logic models’, or ‘theories of change’).

At this point, the discussions had generated a rich set of ideas for innovation, as well as insights into possible activities and sequences of events that could result in the imagined outcomes. In order to provide a reference point to support the group in synthesising some of these ideas about future innovations and possibilities, a visual scenario of a possible chain of future events was sketched to summarise some of the key discussion points. One particular innovation, the localisation of opioid medication production was selected for this visualised scenario. The tidied post-workshop version is depicted in Fig. 13.3. It imagines a future scenario where investment in Tanzania-based opioid production facilities will result in increased procurement of pain medication, leading to greater opioid prescription across national and local levels. The direct anticipated effect is a major reduction in patients’ pain, with further direct and indirect effects of reducing future costs of care, as well as also enabling patients with reduced pain to return to work and social activities.

Even though this scenario focuses on only one of the multiple innovations discussed, the discussion highlighted the group’s strong belief that this future scenario of improvement of pain management was dependent

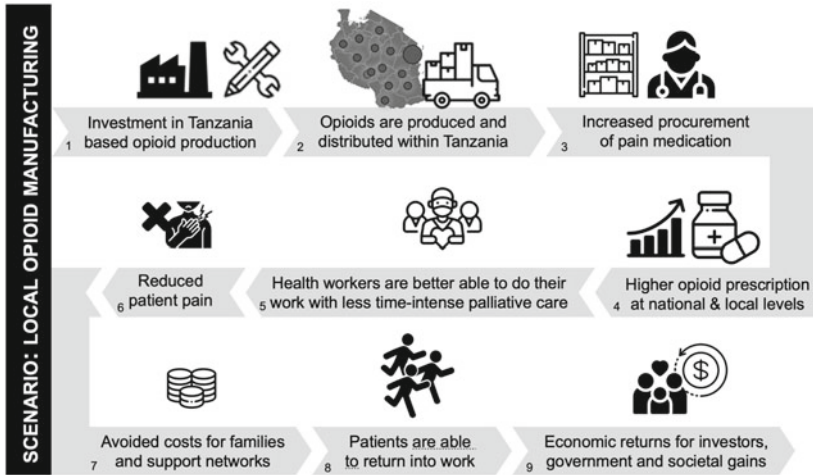


Fig. 13.3 Scenario of localised opioid manufacturing

on an integrated approach that actively addressed linkages between production and other systems. For example, greater localised production and distribution of opioids within Tanzania (step 2 in Fig. 13.3), will only have the increased prescription and pain management effects (step 4–6 in Fig. 13.3) if other issues such as hospital procurement of opioid medication is supported by changed ordering protocols in order to raise system demand, and if education and professional development systems provide the requisite training to support professionals working at more local levels of health systems in prescribing morphine.

Stage 3: ‘Now What?’ Future Insights for Industry-Health Linkages

As a final stage in validating the assumed scenario insights about possible future cancer care innovations and developing possible propositions for action, the team organised two focus groups with key stakeholders in cancer pain management, opioid supply chains, and local manufacturing capabilities. These focus groups included participants from the major Tanzanian cancer hospitals, regional pharmaceutical manufacturers, Ministry of Health, Drug Control and Enforcement Authority, national Palliative Care Association, Tanzania Medicines & Medical Devices Authority and Ministry of Trade and Investment. Table 13.2 presents the primary discussion questions used for this continuing evaluation of innovation ideas.

Table 13.2 Focus group questions for scenario validation and ‘now what?’ propositions

<i>Scenario evaluation focus</i>	<i>Questions</i>
Inputs for Tanzania-based opioid production	What is the critical pre-existing capacity of pharmaceutical manufacturers in the region? What are the major upfront costs? What cannot be done locally?
Activities of Tanzania-produced opioid distribution	What pricing is needed? Upper, lower limits? What is the level of technology challenge? What is the critical demand for skills? What barriers are faced? What do ministries need clarity about?
Outputs of Tanzania-produced opioid distribution Outcomes and impacts	What is needed to estimate demand? What are the limits on likely markets What if there are no government purchase/procurement guarantees? What other benefits to manufacturers? What are the risks to manufacturers? What are the benefits and risks to patients? What are the benefits and risks to hospitals?
Now what?	What are important areas for near-term action?

Some outcomes of these focus group discussions are summarised in Chapter 12. Focus groups participants argued that the need-demand gap for access to opioid medication faced in Tanzania critically requires ‘linked up’ innovation that recognises the linkages between training, health facility management, regulatory changes, and local manufacturing development.

Reflections on Practice

This Tanzania case study demonstrated that scenario development can support knowledge sharing across research teams and identify themes and interconnections between research insights across traditionally siloed areas of work, such as industrial manufacturing capabilities and hospital patient care practices. Crucially, it demonstrated how the process of building a

future innovation scenario can not only elicit a rich range of ideas for change, but also provide a process by which stakeholders are actively supported in making sense of the complex linkages. At each stage of the final local production scenario development, both researchers and stakeholders observed the need for mutually reinforcing innovations—a complex but crucial message to agree.

The research team also reflected that the use of a scenario-led methodology facilitated the safeguarding of time for exploratory conversations about potential future problems, rather than early on identification of a single ‘preferred’ or ‘right’ innovation pathway to pursue. This increased the team’s opportunities for evaluating and learning about health-industry linkages and ultimately led to more clearly bounded research and evidence outputs for policy.

COLLECTIVE VISIONING WITH SCENARIOS: A KENYA CANCER CARE INNOVATION CASE STUDY

As noted above, early workshops with stakeholders in both Tanzania and Kenya foregrounded perceived relative neglect of issues of survivorship, dignity, and palliation within cancer care. The Kenyan researchers particularly noted the complaints by patients and carers about lack of access to, and high costs of, basic commodities such as colostomy bags: items that supported dignity and ability to work and socialise. Industrial interviewing confirmed that despite the strengths of the Kenyan industrial sector, none of these essential items were manufactured locally (Chapter 7). Surprised, even shocked, the research team subsequently identified improved local manufacturing of commodities as local priority issue for cancer care and selected it as a second scenario case topic.

The broad purpose of this local commodities manufacturing scenarios work was to provide the research team with an ambitious but evidence-grounded approach to collaboratively identifying cross-sectoral areas with innovation potential in the Kenyan context. The longer term intended use of this exploratory exercise was to be able to better engage health, industry, and policy stakeholders in more focussed discussion of such innovative health-industry possibilities in later project stages. A scenario-based methodology has strengths for this purpose, as scenarios can draw on current evidence for envisaging actions significantly different from status quo processes.

Stage 1: 'What?' Landscape Analysis

To develop a shared overview of the possible challenges faced in improving commodities access, a half-day workshop with the research team shared initial summary presentations and discussion of key findings from the primary research and earlier workshops. These discussions explored possible key issues and reflections on the extant evidence base about the wider 'landscape' of issues that should be considered. Importantly, this evidence base included primary analysis of the experience of patients experiencing social and psychological distress as a consequence of lacking prostheses, slings, colostomy bags, etc. (Chapter 3) and interviews with relevant industrialists (Chapter 7). The discussions concluded that at least two significant systemic challenges, both similarly encountered in the previous pain management scenario case, frame the future availability of cancer care commodities: first, an important gap between need and demand; and second, a lack of local production capability.

Stage 2: 'What If?' and 'So What?' Scenario Development

The next stage of work sought to elicit insights and possible ideas for disrupting the status quo. The team needed to find a way to draw on their valuable knowledge about the challenges currently faced, and yet not get constrained into describing what *is* currently experienced in access to cancer care commodities rather than what *could* be experienced instead. This type of ideation of possible, even preferred ideas for the future that contrast with experiences today can be challenging for researchers who are often judged on the 'realism' of their analysis. A typical practical challenge therefore encountered when participating in 'what if' discussions is that the pressures for 'realism' or 'realistic ideas' often silence hope for radically different and better futures, leading to subconscious suppression by participants of thoughts and ideas that have genuine potential for desired and disruptive innovation.

The moderator therefore performed a key role during the discussion of 'what if' ideas to explore potential future innovation areas. They supported this by continuously encouraging participants to imagine creative possibilities and offering reassurance that preferability rather than plausibility should be used as the criterion for appraisal of ideas. As a prompt to help participants engage with ideas of preference rather than plausibility, the moderator asked participants to draw on their emotive understanding of the challenges faced; that is, to articulate their hopes and visions, as well as their fears and reservations about the potential challenges faced in realising these imagined future cancer care commodities futures in Kenya.

Individuals often also benefit from private time for reflection to develop innovative ideas without concerns for appearing 'realistic' in the perceptions of others. A post-workshop questionnaire capturing hopes, fears,

visions for cancer commodities was therefore circulated to capture anonymous researchers' ideas and concerns. Respondents were encouraged to include any aspect they believed interesting, from a range of patient, policy, local and international perspectives. They took an average half an hour to complete the questionnaire with highly qualitative contributions. An illustrative example of a typical 'what if' imagination response was:

I see a scenario where the critical requirements [for commodities] are being sustainably met. These include an adequate supply of commodities and that they are accessible, affordable and safe to use. The sustainability is being driven by various technological, trade and industrial solutions which include local manufacturing of these commodities in established firms or reconverted firms dealing in plastics, presence of capital and technologies to foster context specific innovations for instance, skin colour matching breast prostheses.

The final responses resulted in a range of different innovation ideas embedded within participants' individual visioning scenarios, as follows.

In a future with improved local manufacturing of cancer care commodities in Kenya:

- There are breast prostheses, colostomy bags, catheters, and other essential commodities available and affordable for those who need them, in appropriate sizes and colours.
- The sources of cancer care commodities for patients, carers and survivors include health facilities and local chemists or pharmacies, and can be bought with cash or insurance, just like medicine.
- Affordability is supported by lower prices and inclusion in the National Health Insurance fund (NHIF).
- Health workers are aware of the needs and requirements for prostheses and other requirements and able to supply in health facilities; patients and carers are made aware early of what they will need and involved in specifying what they need.
- Local industry is aware of and responsive to needs and potential demand, able to custom-make items and developing regional exports.
- Government has a role in sharing market information, procurement of the commodities and incentivising local manufacturers to respond.

Stage 3: 'Now What?' Future Insights for Industry-Health Linkages

The final scenario use stage engaged stakeholders in identifying areas of interest for further work to support commodities manufacturing innovation. A final half-day workshop convened participants from relevant

ministries, representative bodies and industry experts in discussion of key sectoral and cross-sectoral issues.

The discussion needed a way to access the ideas generated by the team's preceding landscape and 'what if' analyses. It would not have been appropriate at this stage, however, to present the research team's analysis of possible future innovations as a single, coherent account of sequenced events. A visual 'rich picture' technique was therefore used to summarise some of the distinctive ideas into a single future scenario, as presented in Fig. 13.4. This rich picture scenario visualisation intentionally avoids the implication of a necessary structure or order of ideas, nor specifies particular causal pathways to achieve identified innovations and outcomes. This approach to presenting future scenarios has strengths in being able to quickly make visible key ideas, while leaving space and opportunity for new participants to explore their own ideas for what might happen. A weakness of this approach is that the single visual scenario representation did not relay all of ideas and insights previously shared by the research team in the workshop. These had to be shared verbally and revisited instead.

Following discussion and clarifications of underpinning assumptions, the group aimed to identify tangible areas for follow-up action. The discussions had highlighted multiple cross-cutting linkages across health and

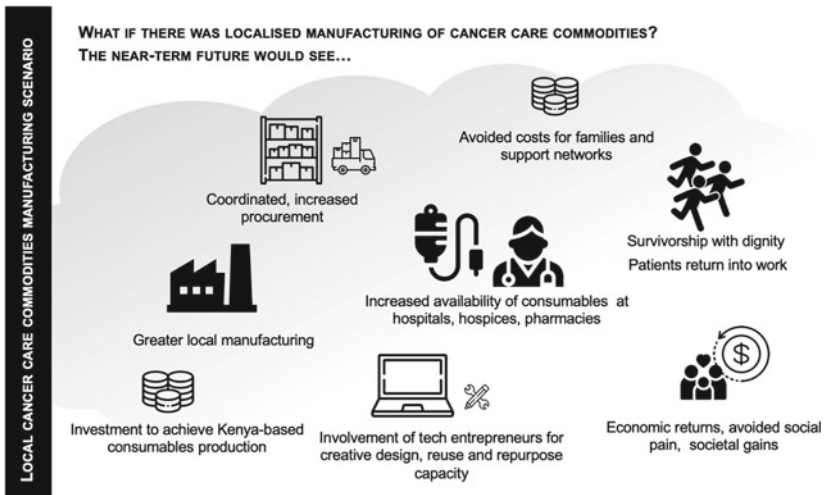


Fig. 13.4 A future scenario for local manufacturing of cancer care commodities in Kenya

Table 13.3 Key sectoral and cross-sectoral issues for localised production of commodities

<i>Key user</i>	<i>Questions to guide further work</i>
Industry	<p>Are manufacturers prepared to supply initially small markets?</p> <p>How can local industrialists access capital for the required infrastructure and technology to manufacture cancer care commodities?</p> <p>What infrastructure investment is needed to produce locally acceptable colostomy bags and breast prosthesis?</p> <p>Are local materials available?</p> <p>How can industry be given confidence that products will be bought?</p> <p>Why is there an industry perception of low demand for consumables?</p>
Health	<p>What data can health workers share to help understand and quantify the need representing potential commodities market size?</p> <p>What patients have similar needs for these commodities outside of cancer?</p> <p>How can health professionals feasibly participate in research and development to develop products that suit patient needs?</p> <p>How can we shift the mindset from commodity import to local manufacturing?</p> <p>How can we ensure that greater availability results in greater access?</p>
Patients	<p>How can patients and carers be included in commodity development?</p> <p>What are the needs to inform product design?</p> <p>What would be the impact overall of earlier diagnosis on patient demand?</p>
Policy	<p>What evidence is needed to increase political confidence and support for localised commodity manufacturing?</p> <p>How can affordability of locally manufactured commodities be achieved?</p>

industry ranging from procurement, to training, to pricing mechanisms, to data needs for a better understanding of the market size for cancer care commodities. In the working context of preceding discussions of multiple, cross-cutting issues, the group of participating health, industry and policy leaders repeatedly used references to the visual scenario sketch to identify mutual areas of interest, as well as key sectoral and cross-sectoral issues they believed in the need for further work to support innovation for more localised production of commodities. These are summarised in Table 13.3.

Reflections on Practice

This Kenya case of scenario use was a first attempt at using scenarios to engage partners in identification and prioritisation of innovation ideas. Despite serious logistical pandemic limitations on mechanisms for team

exchange of evidence and discussion, the team's experiences illustrate how scenarios can be used to shift research focus from probabilities premised in an understanding of the status quo, towards possibilities of novel future innovations. The case study further demonstrates the utility of scenario development in providing a tool for transparently identify what knowledge uncertainties are of mutual interest between diverse stakeholder groups for further work and investigation. As an outcome of this scenario work, local production of commodities was included in a policy brief on opportunities for strengthening Kenyan cancer care (Manduku et al., 2022) Furthermore, the exercise provided a space within a broader research process to take time to imagine positive change, and to develop empathy with future health and innovation stakeholders. The researchers reported benefits in clarifying areas that future work could build on, and also a hopeful experience in increasing motivation for targeting research outputs towards related policy issues in the near-term.

THE STRENGTHS OF SCENARIOS FOR CROSS-SECTORAL INNOVATION SUPPORT

Drawing on the experiences in developing the above scenarios, we reflect here on the distinctive strengths of scenario tools when looking to better support linkages between health, industry, and policy for cancer care innovation in Africa.

A Whole System View

First, those working to understand and strengthen mutual linkages between health, industry and policy need to consider the needs and experiences of a wide range of groups, including patients and carers. A holistic view that transcends historical, sectoral, and professional boundaries is needed. Often the methods and tools we use to analyse issues employ a particular and typically partial perspective that focuses on specific processes or incomplete consideration of system developments.

Scenarios tools are open and flexible in terms of the sectors, processes or types of outcomes considered. Their what-if explorations can cut across systems, as they do not follow domain-specific events but look instead to describe and explain how event sequences might unfold—even where these involve causal linkages across domains. We note that even with scenarios and other systems-based methods absolute comprehensiveness

remains lacking. No methodology can ever definitively cover all potential dimensions and details of a system. The strength of systems-based scenarios, however, is that they explicitly support a multi-dimensional and whole systems view of issues as faced by stakeholders.

Synthesis Across Sectors and Professions

In a multi-stakeholder context, a whole systems view needs to bring together diverse contributions. The process combining diverse evidence contributions to generate additional learning from these evidence inputs is known as synthesis. Various practical challenges faced in achieving synthesis arise from standard data and research practices. Groups across different sectors often collect and store evidence using different data types and formats. Some professionals may use spreadsheets of projected demand levels, while others have lived experience in working with patients, and other have tacit knowledge of comparative strengths and weaknesses of different manufacturing machinery. Each of these evidence types useful for systemic innovation learning uses different norms, assumptions and logics, also known as epistemological boundaries.

Scenarios provide those working in cross-linkage cancer innovation with tools that can rapidly establish a common reference frame for synthesising diverse quantitative, qualitative, social, economic, political knowledges across groups. Using visions of the future, as in the Kenyan local commodities case, scenarios can draw out the connection of one profession's issue to another profession's interests (Gregório et al., 2014). Scenarios thereby often combine and synthesise qualitative, quantitative evidence and transcend disciplinary and epistemological boundaries (Ramirez & Wilkinson, 2016).

Usefulness in Research and Evidence

One pitfall often encountered by research and knowledge synthesis efforts aiming to support innovation is a lack of evidence that is action-oriented. That is, while the rigour and quality of research outputs are high, they can find themselves more heavily weighted towards descriptions of, for example, the state of access to drugs, and interpretative evidence about implications for care, rather than propositional and reflective evidence needed for action by policymakers, industry leaders, and healthcare

leaders. This has sometimes been described as the gap between ‘research about practice’ and ‘research for practice’ (Rein & Schön, 2013).

Scenarios anticipate futures needs, issues, as well as potential opportunities, risks, mechanisms for change and the consequences of action. Wright et al. (2009) emphasise that through understanding the connections, causal processes and logical sequences which determine how events may unfold to create different futures, scenarios challenge conventional thinking and improve current organisational decision-making. They are also able to explore ideas that are radically different from the status quo, which is essential for exploring innovation options. Innovation needs exploration of the possible, more so than the probable. In exploring ‘what-if’ questions, scenarios challenge conventional thinking, and subsequently reframe perspectives of what can be achieved. Scenario techniques can within a single methodology translate speculative, propositional analysis into actionable evidence for decision-making.

Uncertainty and the Absence of Empirical Data

Innovative action and change can potentially incur high costs, and multiple risks. A typical precondition for investment and support for change in healthcare or industrial production is the availability of evidence charting what is possible and likely. In a context where prediction is impossible, scenarios explore potential significance and impacts of innovative future measures without bearing actual risk. Unlike many other methods familiar to medical researchers, economists, social researchers, and others working in health and industry, the validity and usefulness of scenario analysis is not dependent on observation or comparison with real-world events.

Inclusive and Accessible Tools

A final strength of scenarios is the wide accessibility of their narrative-based approach to developing collective visioning and exploring future pathways. Effective engagement and synthesis tools are those that capture the experiences and contributions of diverse stakeholders. A collaboratively developed, shared evidence base is essential to inform mutually supportive action across different stakeholder groups (Innes & Booher, 2010). Through their basis of ‘what-if’ questions, they can involve a wide range of stakeholders through story-telling, even potentially stakeholder

groups who were not directly involved in the scenario building activities themselves.

In terms of their set up, scenarios can be developed and used, as shown here, without computer models, mathematical formula, or complicated setups. They can use flexibly visuals, objects and even enactment to help participants share and engage with each other's contributions. They are adaptable to the typically time-pressurised and resource-constrained context of health innovation work, and can be used with minimal set up, yet while still contributing insights within short time frames, with reusable outputs for different evidence collection and dissemination activities.

USING SCENARIOS TO BUILD CROSS-SECTOR INNOVATION CAPABILITY

For those readers wanting to make use of scenario tools in the context of their own mutual linkage policy problem, but potentially with little existing experience with them, we conclude with five principles for using scenarios when building cross-cutting innovation capability. These principles combine extant recommendations from wider scenario theories and practices, as well as lessons learned in using scenarios to support innovation for cancer care in Africa.

1. **Dispel the idea of a 'right' way to use scenarios.** Purpose determines whether scenarios are used to vision, anticipate future outcomes, or learn for action. The scope, duration, inputs, methods, and output formats of scenario use can all be adapted to a user's needs and constraints.
2. **Derive validity from usefulness, not accuracy.** No scenario can accurately predict the future. Prioritise provision of time and space for achieving the value and validity that come out of discussions about, and learning from, coherent future 'what-if' narratives.
3. **Discuss different future scenarios to uncover mutual linkages.** Encourage discussion of a wide range of future outcomes, events, and actions between diverse stakeholders to reveal critical linkages between parts of the health innovation system.

4. **Include diverse stakeholders with mixed tools.** Use a range of visual, numeric, descriptive, or other tools to facilitate scenario discussions. People differentially find it easier or harder to synthesise information as well as contribute their ideas using visual, written, or oral modes of engagement.
5. **Explore what could be possible, beyond what might be probable.** Innovation capability is strengthened by learning from ideas and insights that go beyond what is already well-known or widely practised. Improbable future scenarios are likely to reveal influential yet uncertain assumptions framing the current understanding of mechanisms of change—and the real-world opportunities and constraints that shape their future outcomes.

NOTES

1. A popular method for such top-down, deductive scenario construction generates a '2 × 2' matrix that combines opposing future levels of two uncertain key variables leading to four resultant scenarios. This approach was made popular by the early scenario planning work of Royal/Dutch Shell in the energy sector in the 1970s (see Schwarz, 2012).
2. There are several variants of 'systems mapping', such as 'cognitive mapping', 'issue mapping', 'causal loop diagramming'. Crucially, they all make explicit mental models of critical issues shaping the behaviour of a systems of interest, and relationships of influence between these issues. Readers interested in further detail of the systems mapping for the ICCA project can access the whole map and details of process on visiting <https://www.ucl.ac.uk/steapp/research/21st-century-decision-making/icca-innovation-cancer-care-africa>. For a recent overview of some common systems mapping methods see Barbrook-Johnson and Penn (2022).

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