



# JOINT LEARNING NETWORK

For Universal Health Coverage



## Provider Payment Reform and Information Technology Systems

### **A Chicken and Egg Question for National Health Coverage Programs**

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# Provider Payment Reform and Information Technology Systems: A Chicken and Egg Question for National Health Coverage Programs

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## AUTHORS' NOTE

Globally, many countries working towards universal health coverage are grappling with the selection of the appropriate provider payment mechanisms for their system. A key underlying factor of the success of that choice is the current state of national- and provider-level information and communication technology (ICT) systems, the interoperability of those systems, and the planned investment in those systems going forward. At the same time, reforms to payment approaches often drive improvements in ICT systems, as payment increasingly is linked to data. These two components of the overall health system are highly interrelated, creating a “chicken and egg” situation of where to begin on the path of reform.

The choice of provider payment methodology and some case studies reflecting implementation were thoroughly analyzed in the 2009 World Bank publication edited by John C. Langenbrunner, Cheryl Cashin, and Sheila O’Dougherty, titled *Designing and Implementing Health Care Provider Payment Systems*. That book’s chapter 5 (“Health Management Information Systems: Linking Purchasers and Providers” by Dennis J. Streveler and Sheila M. Sherlock) highlighted the corresponding

challenges of information technology (IT) systems and offered some generalizable lessons for countries. This paper continues where that chapter ended. Our goal is to address key implementation questions raised by countries on this journey,<sup>1</sup> and provide concrete data so that policymakers and IT professionals alike may understand the ramifications of the provider payment choice on the IT systems underpinning them.

Specifically, this paper:

- 1) Advances a conceptual framework for understanding the IT requirements of various payment methods, the choices, trade-offs, and implications of various options.
- 2) Provides evidence of the benefits of improved use of IT to support provider payment methods, drawing examples from countries that have taken steps in this regard.
- 3) Examines case studies from countries that have invested in IT to support reforms, exploring the key enablers, policy and technical processes followed, and benefits realized.
- 4) Reports on lessons learned from these countries and a set of practical next steps for better

incorporating investments in IT into reform plans.

The authors believe that program policy and design decisions must be driven by the interests of a country and its citizens, and that national-level policymakers are best placed to make those decisions. This paper does not judge or offer recommendation about the provider payment methodology adopted or the IT systems implemented. Our goal is simply to highlight areas where complexity and costs arise from these decisions and provide policymakers with more context about their choice before implementation.

Special thanks to Abu Dhabi, the Netherlands, the Philippines, South Korea, and Thailand for contributing their experiences to this paper. This paper was produced with the generous support of the Rockefeller Foundation as part of the Joint Learning Network (JLN) for Universal Health Coverage (UHC). The JLN for UHC is a network of policymakers and practitioners from low- and middle-income countries that learn from one another, jointly problem-solve, and collectively produce and use new knowledge, tools, and innovative approaches to accelerate country progress towards universal health coverage.

[1] The authors work with ten countries in Asia and Africa pursuing universal health coverage. Please see [www.jointlearningnetwork.org](http://www.jointlearningnetwork.org) for more information on the network and countries involved.

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## Introduction

**O**n a hot summer day in the capital of Jasmania,<sup>2</sup> the senior deputy to the Minister of Health (MOH) reflects about the progress achieved and challenges faced in establishing a social safety net in her country. Two years ago today, the Government passed a major law intended to guarantee health care coverage for all citizens. This vote was the subject of a protracted debate, including strong opposition from many in the medical profession who were concerned about how hospitals and doctors would be selected, paid, and evaluated. In order to pass the Parliament, the implementation details in the legislation were left vague and the MOH continued a fee-for-service, claims-based payment system since this was the prevalent provider payment method at the time of enactment. Increasingly however, the providers were unhappy with the government plan. Demand for services had tripled under the new law, which could potentially deliver higher revenue but had thus far only led to significant delays in payment of providers. Claims that previously were paid in 60-day cycles were now taking months to process as the unexpected volume from the pent-up patient demand had quickly overwhelmed the nascent enrollment and claims processing systems. Provider

and patient satisfaction was at an all-time low and the political leaders were increasingly nervous about a public backlash to the new scheme. The MOH believed that only a radical re-think of the provider payment mix and a more efficient IT system would fix the problem, but which one should they tackle first?

To better understand that question, a cross-ministry working group on provider payment had been meeting for over a year to discuss and recommend to key ministers (e.g., health, finance) what the new provider payment mix should be. The current proposal being considered was implementing a mix where capitation was used for primary and secondary care and claims-based payments were retained for tertiary care. The working group was composed of stakeholders from many parts of the government and civil society groups, including one representing medical providers and patient advocacy groups. Thus, the provider payment mix was the subject of much debate.

At the center of the debate were concerns over sustainability and cost control. How will the new provider payment model ensure quality care is provided to all while not bank-

*rupting the government or care providers? How can the IT system—which is already struggling to process claims—be adapted to accommodate a new provider payment method? Should the new IT system be built on the existing one or should a new system be procured, and what would that mean for the existing hospital IT systems? Should the MOH establish a separate national health insurance body to consolidate the existing schemes or just establish information standards to which all providers must comply?*

*While there are currently a handful of schemes and numerous private insurers in Jasmania, the legislation did not specify that these schemes be consolidated into a single program. The different schemes have different models for how they pay providers and concomitantly have different claim forms and data that they collect. Jasmania's flagship hospitals and other providers already think the current*

*system is too complex, complaining that they need multiple people dedicated to filling out and processing forms to account for different schemes.*

*Jasmania's providers want greater efficiencies but they are nervous about the impending changes. What will a new provider payment method mean for their financial viability, much less for their existing operations and information systems? The different payers are also nervous—what is their new role and what does this mean for their existing investments in information systems? The deputy minister has the difficult task of making sure that the new system is solvent, provides quality care, efficiently and accurately collects data and processes payment, and is a verifiable success for the political leaders. How do Jasmania's leaders make all this happen? Where do they start?*

This case study likely sounds familiar to health practitioners in low- and middle-income countries currently working to expand access to health services for their citizens through national health insurance or universal health coverage programs (e.g., Indonesia, Ghana, Kenya, and Malaysia). A stronger social safety net is a priority in many countries worldwide, with more than 30 countries in the past year alone indicating they are actively working to expand access to health care on the path to universal health coverage. Significant expansions of health coverage are often the result of complex political and legislative processes, but these processes vary in the extent to which they consider or stipulate

operational details regarding implementation and administration. Sometimes reforms manifest themselves in “big bang” coverage expansions such as in Taiwan, Thailand, and Ghana. In these instances, political mandates are laid out and the underlying systems must catch up with the political will. In other countries (e.g., Vietnam, Indonesia, and the Philippines), the result is a more gradual process of expanding existing coverage programs through incremental legislation. But no matter how reforms are legislated, the process of effectively expanding coverage, streamlining operations, and ensuring financial solvency takes years of tireless efforts.

Following enactment of reforms at the political level, one of the first and most important decisions facing implementers is the selection of the payment methods to compensate providers. This is a crucial choice as it is central to establishing the flow of funds; ensuring the appropriate services are provided; and creating incentives for efficient care delivery, access, and quality. The provider payment methods will often represent a significant change from more traditional budget-based or supply-side financing mechanisms. After initial selection, the provider payment methods will be the subject of an ongoing and iterative process of refinement based on feedback from

[2] Jasmania is a fictional country intended to serve as a case study. It was first referenced at the Joint Learning Network's Workshop on Expanding Coverage in Mombasa, Kenya, in June 2011. Read the full Jasmania case study on the Joint Learning Network's website at [www.jointlearningnetwork.org/resources/documents/jasmania-case-study](http://www.jointlearningnetwork.org/resources/documents/jasmania-case-study).

providers and patients as well as study by policymakers and implementers.

The availability and sophistication of ICT systems and their ability to talk to one another, known as “interoperability,” are key underlying factors in enabling successful implementation of the selected provider payment methods. The ability to register patients, treat and track patients using standardized coding, submit service utilization data (e.g., claims), and process payments quickly and easily no matter what insurance or hospital information system you are running often determines both the provider’s and patient’s level of satisfaction with the new system as a whole. Even more importantly, if implemented and used

properly, ICT systems and the data they contain can provide new insights and capabilities into quality of care and emerging health issues that enable ongoing refinements and enhancements to the health system down the road. An ICT strategy can also catalyze provider payment reforms and further policy objectives. It is important to create a policy that is not so complex it collapses early on, but one that allows for gradual increases in complexity over time in order to evolve with the ICT road map.

Provider payment methods and the ICT systems that support them represent the fabled “chicken and egg”—both are highly dependent upon and causally related to the other’s success,

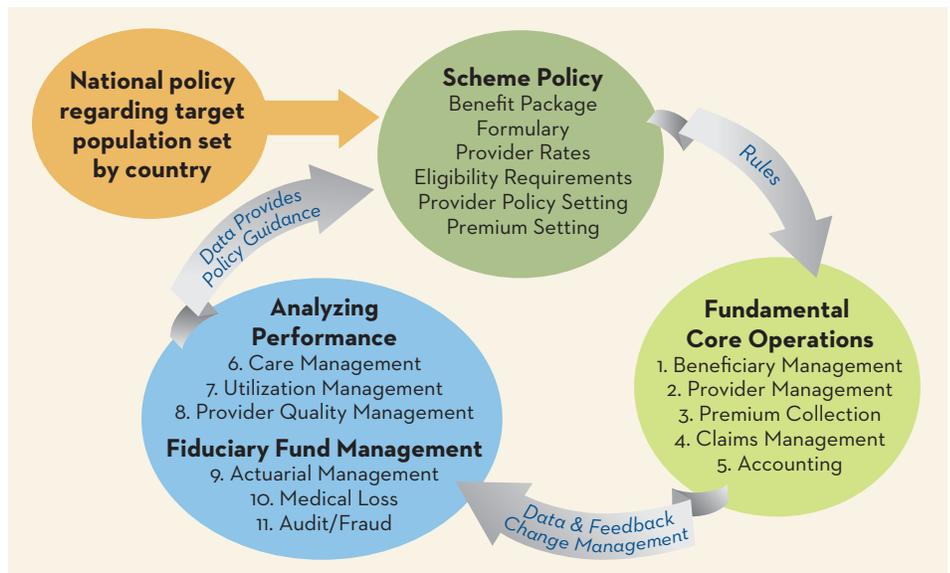
but often the interplay between the two is not sufficiently understood or considered in the reform’s design and implementation process.

The goal of this paper is to provide a reference point for decision-makers considering either provider payment or ICT reforms for their universal health coverage programs. The following pages highlight the causal relationships between payment methods and ICT systems, provide a framework for understanding the requirements and trade-offs of different choices, and share examples from countries where payment methods and technology systems—the chicken and the egg—have in fact evolved together. ■



# Do ICT requirements and capabilities vary based on the provider payment method desired?

**A** national health insurance framework, as depicted in Figure 1, captures the core inputs (i.e., national policy and scheme policy) and business processes that drive all national health insurance systems, regardless of their provider payment mechanism. In most cases, the design and implementation of a national health insurance program starts in the top left and moves clockwise, (1) first setting broad policy objectives, (2) then specific operating and scheme policies, and (3) only then establishing the detailed core health insurance operations, (4) and creating systems and methods for analyzing performance. Numbers 1-11 represent the core high-level business



**Figure 1: A conceptual design, or framework, for a national health insurance system that was developed with the input of a diverse group of global health insurance experts in January 2011<sup>3</sup>**

[3] A group of 23 global health insurance experts from organizations including the Bill & Melinda Gates Foundation, Eureko, HP Enterprise Solutions, National Health Insurance Fund, National Health Security Office (Thailand), PATH, PharmAccess Foundation, Public Health Informatics Institute, Results for Development, Rockefeller Foundation, Vektis, and World Health Organization gathered in Amsterdam for this meeting.

processes—referred to as process groups—that are most likely to be automated first in an insurance system. Each of these process groups are made up of multiple underlying business processes that have been detailed into task flows and information system requirements by members of the Joint Learning Network.<sup>4</sup>

From both a provider payment and IT perspective, the establishment and management of the core health insurance operations are critical for the success of the program. These will also likely constitute the most significant ICT investments made by the country at both the national and facility level.

For provider payment, the core health insurance operations are where money changes hands on a daily basis, determining solvency. For IT, the needs of the core health insurance operations should determine the functional requirements and resulting information system: what data must be processed and made available in real time or near real time across often disparate systems, and what is the overall volume of data the system must be equipped to handle?

Figure 2 captures the most basic data and data interchange requirements of four archetypal provider payment methods. Dollar signs (\$) represent flows of funds between parties, and stacks of paper (📄) represent the provider billing function or other source of information on which payments are calculated. These two

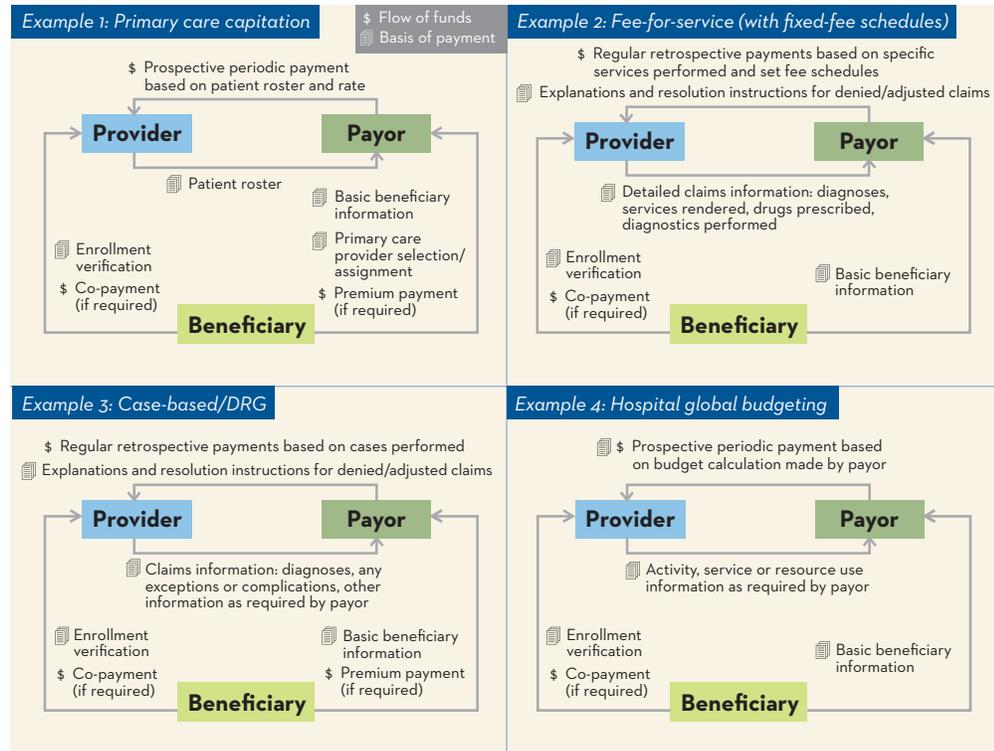


Figure 2: Varying information requirements of provider payment methods

facets are at the core of the national health insurance framework described above.

In a hypothetical, simplified capitation method, the patient roster of a provider is the sole piece of information that determines the payment amount from the purchaser. At the other extreme, even the most simple fee-for-service method requires detailed, claim-level information on services rendered and materials used, equating to substantially more data entry, storage, interchange, and processing requirements at both the provider and payer level. This is not to say that a capitation method is always simpler to administer. In fact, a well-functioning system based on the capitation method would ideally capture much of the same informa-

tion as a fee-for-service system for monitoring, managing, and informing future changes to payment rates, benefits packages, or other aspects of program policy and design. Similarly, while a global budget method may be as simple as paying a prospective lump sum to providers determined solely by the financing agency, all of the same detailed information would be needed to fully inform payment levels and program policies.

The upstream policy and design decisions are inextricably linked to the choice of the information systems required to run the core health insurance operations. Several initial questions can be helpful in determining a design's impact on the requirements of the core operations. These questions correspond to the payment system

[4] Members of the JLN include India, Indonesia, Ghana, Kenya, Malaysia, Mali, Nigeria, the Philippines, Thailand, and Vietnam. Members have worked with the JLN IT track support partners to detail out common system requirements for enrollment, eligibility, pre-authorization, claims processing, and payment collections. These tools can be accessed by all interested parties at [www.jointlearningnetwork.org/content/tools](http://www.jointlearningnetwork.org/content/tools).

functions detailed for each common payment method in Appendix 1 and described further in the next section.

- **How are base payment rates determined?** All payment methods that rely on fixed, prospectively-determined payment rates must have data available and a process in place to set and continually revise those rates. While a simple global budget method may use only basic provider volumes to set an overall payment level, a fee-for-service method would require more detailed calculations and negotiations for each service or product paid by the scheme.
- **What adjustments are applied to the base rates?** Also in the realm of scheme policy is the function of determining and then calculating which adjustments will be made to the base rates to account for justifiable differences in the cost of delivering services, such as characteristics of the population, provider, or individual patient. The simplest capitation method may not make any adjustments to the base per capita payment rate, but a more sophisticated version could adjust for the age and sex structure of the provider's patient population, prevalence of chronic diseases, or relative cost structure of the geographic area served (i.e., rural vs. urban).
- **How, if at all, are patients registered with providers?** The first provider payment-related function within the core health insurance operations is the function of assigning and registering patients to

specific providers. Global budget and capitation methods each rely on an overall number of patients registered to a given provider to calculate the final payment. For fee-for-service or case-based methods, on the other hand, it is necessary for payment to have a defined patient roster per provider.

- **How, if at all, do providers bill for services?** The provider billing function may arguably have the greatest impact on the administrative and IT requirements of a scheme. A fee-for-service method will create large numbers of claims that must be individually reviewed and adjudicated—a daunting, time-consuming task without appropriate IT systems such as electronic claims in place. A case-based method will produce fewer but likely higher-value and more-complex claims requiring more rigorous adjudication. Conversely, capitation and global budget methods effectively do not require a separate provider billing function, though programs using these payment methods can (and should) still have provider reporting requirements for monitoring and evaluation purposes.
- **How is the final payment calculated?** The data required to calculate final payment amounts also varies along these same lines. For the global budget and capitation methods (which typically provide prospective payments to providers for services in a given period) no additional information is required. But in fee-for-service or case-based (retrospective payment) methods,

the outcome of the review process of claims data will determine the final payment calculation, as well as whether any payment caps in the system have been reached.

- **How are providers monitored?** Provider monitoring is not a core insurance function, but is a critical aspect of the ongoing monitoring and evaluation of scheme and provider performance. While any health insurance program can set and mandate provider reporting requirements at its discretion, it is worth noting that the core health insurance operations are an essential source of information for determining quality of care, identifying fraud, and ultimately analyzing disease trends that may affect the long-term solvency of any program. Claims-based systems by definition require the reporting of detailed utilization to the purchaser which can in turn be used for monitoring; other payment methods will require more independent reporting requirements to enable monitoring.

In combination, the answers to these questions will have a dramatic impact on the IT and administrative requirements and capabilities of a health coverage program. However, this does not imply that any one provider payment method is always the simplest and, therefore, the best choice. As the next section discusses, each payment method can also vary in complexity, creating greater flexibility and also opening up the possibility of ongoing refinement and increasing sophistication over time. ■



## Can sophistication increase as capabilities grow?

Just as different payment methods vary widely in their information requirements, any particular payment method can vary widely in the complexity of its design and implementation. Figure 3 demonstrates how each of the common payment methods can vary in complexity. This starts with policy design and flows through the entire core health insurance operations described above. Greater detail on data requirements at each stage of sophistication can be found in Appendix 1. A capitation method—at its most basic level—only requires an enrollment system with a primary care rostering function to assign enrollees to primary care providers, and some basic population tracking to monitor patient movement among the providers. Even to establish a payment rate, the simplest

capitation method would require little more than a top-down analysis of the total budget available and the total population registered to each provider.

But as the information and technology capabilities of a national health insurance program increase, so too can the sophistication of its provider payment mechanisms. For capitation, this could start with employing population- or facility-level adjustment factors for rate setting. A still more complex method could employ individual, patient-level adjustments such as chronic disease status.

Jumping to the most robust provider payment method all at once may be impractical, and it would also quite likely miss the point of provider

payment reform. Changing the incentive structures and relationships between actors in the system—in some ways the central purpose of payment reform—may not require the most complex and robust system right away. In fact, simplicity can be key to transparency and gaining buy-in from providers and other stakeholders, while not overburdening the information systems.

Beyond the specifics of the design, another factor in charting a course to success is in the scope of the rollout. Does every hospital, including those in the most remote areas, need to be on the same electronic system all at once? Likely not. In many contexts, a handful of large hospitals in metropolitan areas generate a majority of the claims across

Level of Sophistication	Global budget	Capitation	Fee-for-service	Case-based (e.g. DRG)
<b>BASIC</b>	<ul style="list-style-type: none"> <li>Health provider budget based on simple parameters (e.g. historical budget or projected volume)</li> </ul>	<ul style="list-style-type: none"> <li>Providers are paid one single rate for each enrolled individual. Enrollment is by assignment rather than free choice.</li> </ul>	<ul style="list-style-type: none"> <li>Providers are paid a fixed price per service delivered with or without a cap. Limited number of broad categories of services.</li> </ul>	<ul style="list-style-type: none"> <li>Providers are paid a fixed price per discharge with or without a cap.</li> </ul>
<b>INTERMEDIATE</b>	<ul style="list-style-type: none"> <li>Health provider budget based on simple parameters (e.g. historical budget or projected volume) with department-level case-mix adjustment</li> </ul>	<ul style="list-style-type: none"> <li>Providers are paid one single rate for each enrolled individual adjusted by age and sex. Enrollment is by assignment rather than free choice.</li> </ul>	<ul style="list-style-type: none"> <li>Providers are paid a fixed price per service delivered with or without a cap. Large number of more narrow categories of services.</li> </ul>	<ul style="list-style-type: none"> <li>Providers are paid a fixed price per discharge from each department with or without a cap.</li> </ul>
<b>HIGH</b>	<ul style="list-style-type: none"> <li>Health provider budget based on simple parameters (e.g. historical budget or projected volume) with patient-level case-mix adjustment</li> </ul>	<ul style="list-style-type: none"> <li>Providers are paid one single rate for each enrolled individual adjusted by age and sex; geography; chronic disease status. Enrollment is by free choice.</li> </ul>	<ul style="list-style-type: none"> <li>Providers are paid a fixed price per service delivered based on a relative value scale, with or without a cap.</li> </ul>	<ul style="list-style-type: none"> <li>Providers are paid a fixed price per discharge in each diagnosis category with or without a cap. Additional requirements may include adjustments for health facility type and outlier payments.</li> </ul>

**Figure 3: Overview of data and IT needs for common provider payment methods at different levels of sophistication**

the entire country. These hospitals may also have larger IT budgets and greater capacity for IT deployment. The greatest return on investment, in that case, may be to start with the largest and most accessible hospitals to prove the concept of automation, allowing the rest to follow suit over a period of time using a series of incentives and penalties while the nation establishes a national health data dictionary<sup>5</sup>.

The decreased administrative burden of automating the largest providers could significantly reduce the burden associated with processing manual claims and other data from the remaining providers initially.

A final challenge arises when one provider type is paid by different methods from different purchasers. Many systems that we see in OECD countries

are capitation or fee for service with a pay for performance component which almost always requires additional data reporting outside of the main system. Employing different payment methods for different provider types, however, such as capitation for primary care and case-based payment for secondary care, may be more palatable to providers and more straightforward to IT practitioners. ■

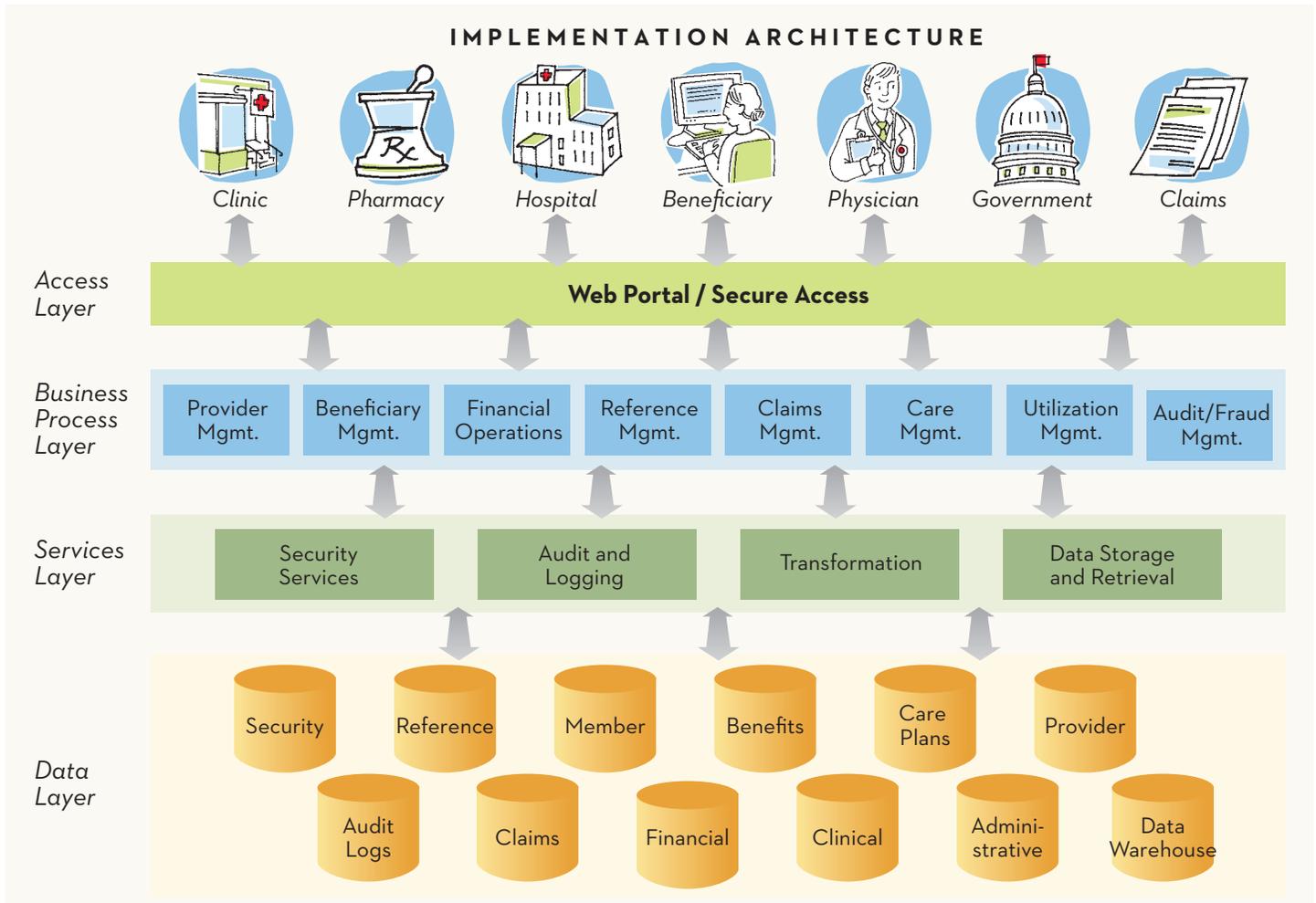
[5] A national health data dictionary is an agreed upon reference of standardised, accepted terms and protocols used for data collection in Health. Agreeing on a national health data dictionary enables both providers and payers to develop more harmonized systems. The Joint Learning Network published a set of papers on establishing a national health data dictionary in 2010. Please see series at <http://www.jointlearningnetwork.org/sites/jlnstage.affinitybridge.com/files/HealthDataDictionarySeries.pdf>



## How to prioritize ICT development?

As highlighted above, there are similar core questions about the state of the existing ICT systems that a country may want to consider. It is exceedingly rare that a nation has no existing infrastructure, whether at the hospital or national level, that they plan to maintain. Thus, understanding the national position on the following at the outset of reforms can prove helpful.

- **Do existing systems (i.e., hospital or purchaser) share a unique personal identifier for the population?** Is that system commonly accessible to all? A robust and vital civil registration system for a nation is generally established at the national level and is separate from the MOH. Is there a robust model in place or existing identification infrastructure (e.g., smart cards, databases) that the health system can leverage?
- **Are there existing national facility/provider registration databases?** In many countries, the new insurance organization may be set up external to the MOH. Thus, employees may not know much about existing national databases that have been developed by the MOH.
- **Has the nation established security protocols around the electronic exchange of data?** Globally, the discussion of “big data” is topical now with debates over what information an organization or country can and should be able to access. The two kinds of information that are most sensitive pertain to personally identifiable and financial data—both of which will be exchanged in an insurance information system. Clear guidance on these topics—what can and cannot be shared—can significantly affect development time or implementation issues around the ensuing ICT systems.
- **What legacy ICT systems will remain after reform, and what financial support will be provided for training on new systems?** This question strikes at the heart of the question of interoperability. While fundamentally a policy question, is there a national insurer or many insurers in the new system? Is there one giant insurer with one ICT system or will insurers simply have to make their ICT systems “talk” to one another? Similarly, large hospitals and facilities have generally invested in existing systems and are highly reluctant to change ICT systems without significant support and training. Will part of the health insurance reform enable additional support for ICT rollout?



**Figure 4: Conceptual National Health Insurance Architecture**

Now that we have discussed at length the critical questions around existing and planned provider payment data and information requirements, we must now consider how these requirements map to specific components of the IT architecture of a national health insurance scheme. With this in mind, Figure 4 sets forth a conceptual architecture of a full-featured national health insurance information system developed for the JLN by Mr. Paul Stepney, Systems

Architect. It contains the full suite of functions, processes, and databases that could be used within the core health insurance operations almost regardless of the specific provider payment methodology being used.

While it is easy to become overwhelmed by the system described in Figure 4, it is exceedingly rare that any information system, much less one as complex as a national health insurance information system, is deployed all

at once. Rather, a process of feature prioritization and trade-offs will be made with incremental change that should mirror the evolution of provider payment strategies and national priorities. Think of this as a “crawl, walk, run” strategy to laying the future foundation of a national health ICT system.

- 1. Member, provider and facility registries:** The first foundational elements are the ability to cleanly identify a person, a qualified health

*When groups come together to agree on standards, it can be tempting to agree to collect all data, and the number and complexity of the data elements only increases.*

care provider and the location where he/she is treated or provided treatment. Each nation must agree at the beginning of the policy process on how you will identify persons and establish one centralized database that can be shared. Ideally, this will be an existing data source (e.g., national civil registration system) that a country can tap into, but if not, the country should plan for a future where a national identification database may be established that is expected across multiple social protection programs. The authors would recommend looking at the “Explaining International ID Programs report” that can be found on the JLN website ([www.jointlearningnetwork.org](http://www.jointlearningnetwork.org)) for more information, as well as case studies published by the National Health Security Office of Thailand on their groundbreaking work in this area.

In addition to unique identifiers for persons, each provider (both person and facility) at all levels of the health system should have a unique identifier stored in separate databases. It is essential that pharmacies and laboratories are also included in this registration process to ensure accurate information and cost capture is possible.

## **2. Health Data**

**Dictionary:** Agree on the core data elements that will be collected at the outset, ideally across all insurance schemes if there is more than one and across all

stakeholders. This is a first step in enabling disparate systems to “talk” to each other or be interoperable. A number of countries (e.g., Australia, Abu Dhabi) have found value in creating a health data dictionary (HDD) to be the repository for data element definitions. While this can be a daunting task to get consensus across stakeholders on common definitions for terms, skipping it causes more problems later. The reality is that most countries have existing, fragmented health insurance and hospital information systems.

These information system components in most countries were designed to solve a specific problem but generally were not designed to communicate with each other. Across insurance schemes and between health care facilities, this lack of a common “language” complicates the exchange of information about patients, diagnoses, payments, and other data needed to provide quality care and facilitate transactions in the health sector. Pharmacies, private providers,

community health centers, hospitals, and purchasers often have their own separate codes, protocols, standards, and technologies that prevent data sharing. This poses a serious challenge, leading to payment delays, increased transaction costs, inefficient use of resources, and the potential for inequitable treatment and fraud. Addressing this harmonization up front eases the process of provider payment reform and ICT development immeasurably.

**3. Minimum data set:** The process of establishing a health data dictionary, having public consultations, dissemination and training for both purchasers and providers can take some time. The authors recognize that capturing all data robustly is often challenging and therefore recommend that there is an agreed upon minimum data set that derives from the data dictionary. This is particularly important in claims based system where a standard discharge abstract will be needed to code each claim. The model from Australia’s hospitals is provided below:

- Principal diagnosis
- Additional diagnosis (complications and co-morbidities), up to 10
- Significant procedures
- Patient age
- Separation status
- Sex
- Length of stay (LOS)

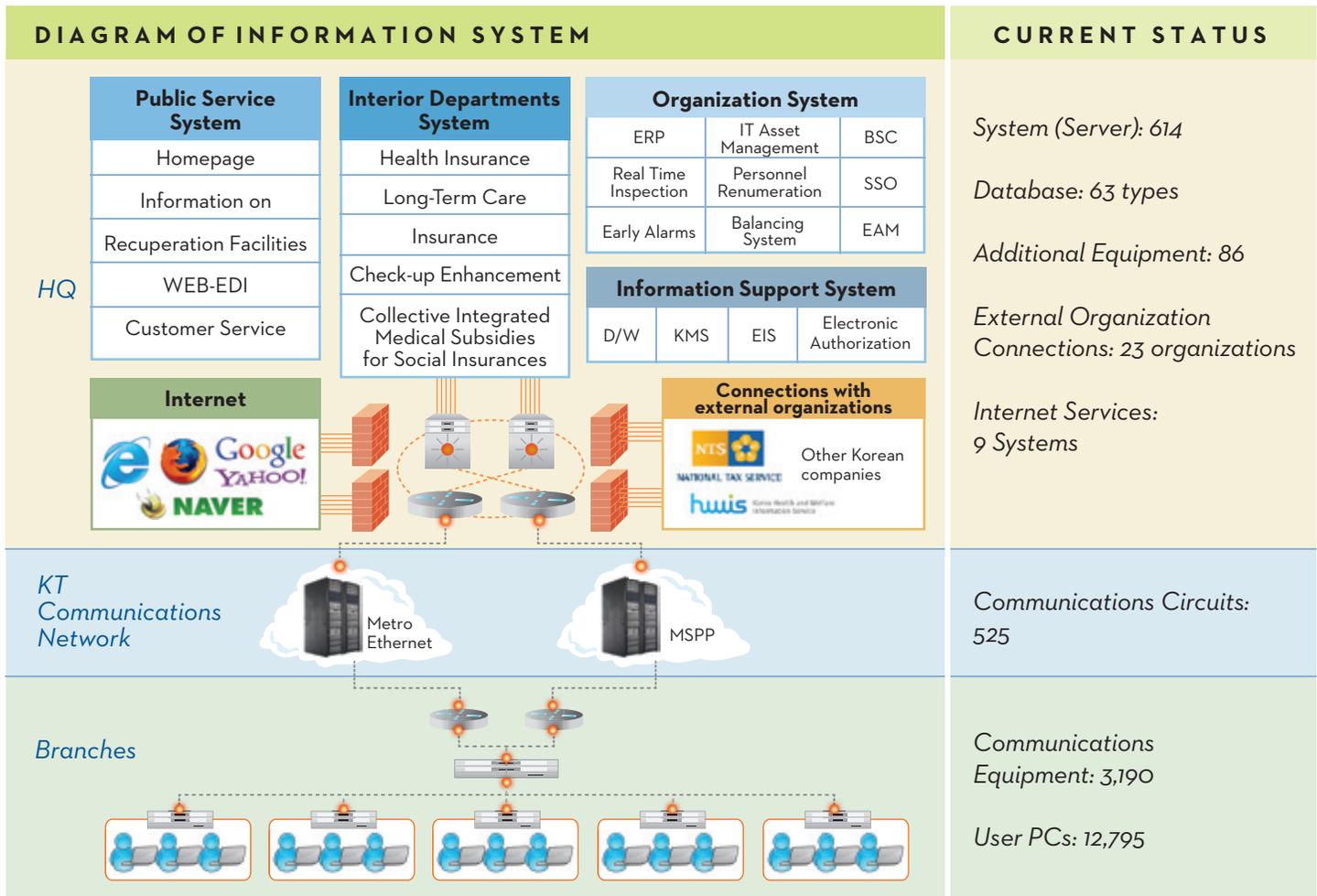


Figure 5: South Korea's National Health Insurance Data Corporation Data Center

- Newborn's admission weight
- Length of mechanical ventilation
- Same day status
- Mental health legal status

**4. Standard coding:** Closely related to interoperability and an essential part of a minimum data sets is an agreement on what diagnostic coding (e.g., ICD 9, ICD 10) will be used across provider systems. Deciding up front what standard provider, diagnosis, procedure, and pharmaceutical coding will be used

is critical to ensuring operational interoperability. These choices should be made with a view to "upgrades" over time. Today, many countries choose to adapt existing standards to simplify schemes. While this is a viable choice, it does deeply impact the ability to derive value from new improvements in standards or software made either by other countries or at the global level.

**5. Privacy and security protocols:** Agree, apply, and make transparent,

consistent, and robust privacy and security protocols across all providers and purchasers. Privacy is essentially what is to be protected (e.g., personally identifiable information), and "security" is how it is protected (e.g., firewalls, encryption), so we separate the two although they are intertwined. This is a critical foundational pillar because usage of health services relies fundamentally on trust between patients and providers, particularly in storage of data around sensitive topics (e.g., HIV-positive status). This is compli-

cated in nations where the provider may also be the government, where there may not be a high degree of trust in official institutions by the population, and where there may not be established security and privacy standards that implementers can draw upon.

While addressing the above, it should be stressed that all parties should continue to think of the “crawl, walk, run” mantra. When groups come together to agree on standards, it can be tempting to agree to collect all data, and the number and complexity of the data elements only increases. In our experience, countries that attempt to develop an information system at the beginning that can do everything at once often get bogged down under a never-ending implementation without

seeing incremental gains. This is why step 3 of establishing a minimum data set is so critical. The authors recommend looking to the examples of countries where a far more pragmatic and evolutionary plan has been implemented.

South Korea’s national migration to a comprehensive enterprise architecture provides an excellent example for countries to consider and illustrates the evolutionary nature of building such large-scale systems. The National Health Insurance Data Corporation Data Center established its first integrated system in October 1998 and combined medical insurance management and 140 company insurance associations in a second integrated system in July 2000. This operated for six years and was re-architected in Octo-

ber 2006 as a centralized, integrated system. Since that time, the system has been extended to accommodate a joint disaster recovery system (in 2007), long-term care insurance (in 2008), and four additional social insurance schemes. The resulting system is depicted in Figure 5 (on previous page).

A country’s provider payment mix will strongly determine which feature prioritizations are enabled first in this enterprise architecture, and prioritization is important because few information systems are built overnight. The key is to pick the right features to develop first that will enable core functionality and then incrementally expand as budget and personnel allow. ■



## What does the future look like?

**N**ow that we have explored the potential evolution of both the provider payment methods and the information technology systems in a national health insurance program, it is important to once again underscore the interrelationships between these two important functions. Throughout this analysis, we have sought to identify and highlight case examples from countries that have effectively used provider payment reforms to drive investments in information technology, or vice versa. In fact, a scheme's provider payment capabilities and IT capabilities can coevolve and mutually reinforce one another.

In many cases, provider payment reform objectives have catalyzed and helped justify IT investments. The move from budget-based payment methods to output-based payments often highlights the need for greater automation

and processing capacity to reduce the time it takes to pay the provider. Moving from a standard fee-for-service method to a case-based method can also require investments in information systems that strengthen the adjudication capabilities for higher-value, more complex claims. Just as in the opening case study from the fictional country of Jasmania, the urgent priorities of provider payment reform often lead to discussions on required investments in IT.

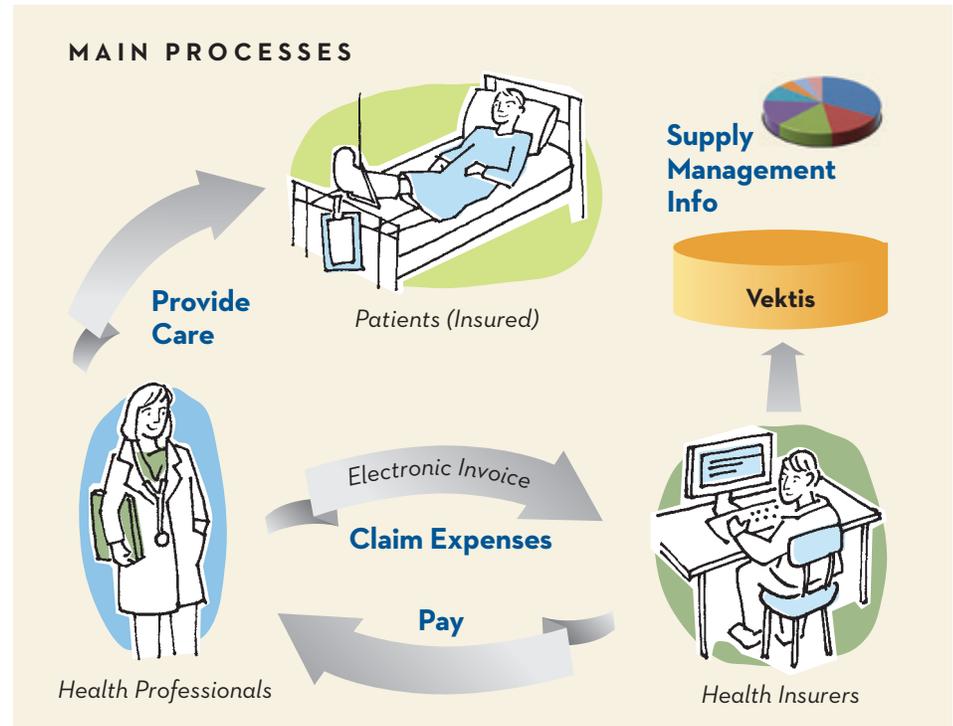
Perhaps less obvious but equally important is the potential for proactive investments in IT to enable future refinements and improvements to a scheme's provider payment methods. Increasing a scheme's data collection and processing capabilities beyond what is needed to manage the day-to-day health insurance operations creates opportunities for both the

monitoring and evaluation of current payment methods as well as the policymaking processes that may inform changes to these methods down the road. For instance, tying diagnosis codes to fee-for-service claims can facilitate the calculations required to move from simple fee-for-service to a case-based payment method. Collecting detailed patient information on chronic diseases or co-morbidities can enable more nuanced adjustments to the base payment rates in a capitation method. State-of-the-art IT systems can enable a process of experimentation and piloting that can lead to the adoption of more robust provider payment methods over time.

Four countries—the Netherlands, the United Arab Emirates, the Philippines, and South Korea—illustrate the power of technology to transform policy discussions and help shape provider

payment discussions using data from the IT system.

The Netherlands has been on a 25-year journey to harmonize standards across all purchasers and providers. While the software used varies greatly by stakeholder (i.e., insurer, hospital), the standards are the same and have included e-claims validation rules since 2009. Providers and purchasers intersect through a central claims-routing hub. The information that flows through this system is used by the national government, by private insurers, and



**Figure 6: E-claims in the Netherlands**  
Available at: [www.jointlearningnetwork.org/content/jointlearningfund](http://www.jointlearningnetwork.org/content/jointlearningfund)

## Box 1: The Netherlands—Standardizing data exchange in a pluralistic health system

More information on Vektis and the Netherlands health system can be found at [www.vektis.nl](http://www.vektis.nl)

The health system of the Netherlands is pluralistic and largely private-sector driven, with 30 insurance companies and over 55,000 health professionals. As of 2011, 48.2 billion Euros flowed through the health care system annually in the form of over 100 million individual claims. As such, data exchange and aggregation in the health care system has been a major challenge historically. To address these issues, the Netherlands embarked on a journey to harmonize standards, automate various claims processing and support processes, and capitalize on the strategic and operational benefits of data exchange and aggregation.

The Netherlands' process of standards harmonization began in 1985 with the first effort to develop standards for exchange of claims information between providers and insurers in the curative segments of the health sector. Beginning in 2000, standards were developed for the

exchange of claims information relating to long-term care and disease management. These standards were further updated in 2009 to include e-claims validation and have been continually updated to address changes in legislation and the evolution of functional requirements over time. Today, claims data across insurance companies and providers is collected in a central data warehouse where it can be accessed and analyzed by government/research organizations and the insurers.

Standardization and consolidation of data and information flows in the Netherlands have led to both operational and strategic benefits. Operationally, standardization and electronic processing has vastly reduced the administrative burden on the system, resulting in an estimated savings of 400-600 million Euros annually; reduced administrative mistakes; and shortened claims processing and payment times across the spectrum of health insurance providers. Strategically, it has enabled analyses of public health and health care consumption patterns (volumes, costs, and quality) that have informed policy and strategy as well as allowed for more rigorous performance evaluation. This helps save an estimated 1.5 billion Euros annually.

by health care providers to aggregate and extract common usage patterns that help determine new needs, or areas where fraud may be prevalent. This rich data in turn yields significant cost savings for the government, with over 1.5 billion Euros saved per annum through rationalized purchasing and planning. This is in addition to the 400–600 million Euros saved on administrative costs, annually. The standards development organization “Vektis,” a joint venture between the (private) insurance companies, is responsible for

maintaining the national health data warehouse.

The experience in Abu Dhabi shares many parallels with the experience in the Netherlands in terms of structure but is an interesting contrast in terms of velocity of systems development due to strong government will, adequate funding, and a lack of central legacy IT infrastructure (although there had been significant investment in provider and purchaser IT systems which needed to be built upon rather

than replaced to ensure support). The government of Abu Dhabi decided that they were going to implement a fully operational national health insurance system and between 2006 and 2008 developed and established a system that covered primary, secondary and tertiary care (plus pharmacy) based on the online processing of a range of administrative “transactions” (currently six: claims, remittance, authentication, eligibility, authorization, and prescriptions). Critically, the Abu Dhabi transactions include more than 50 data points,

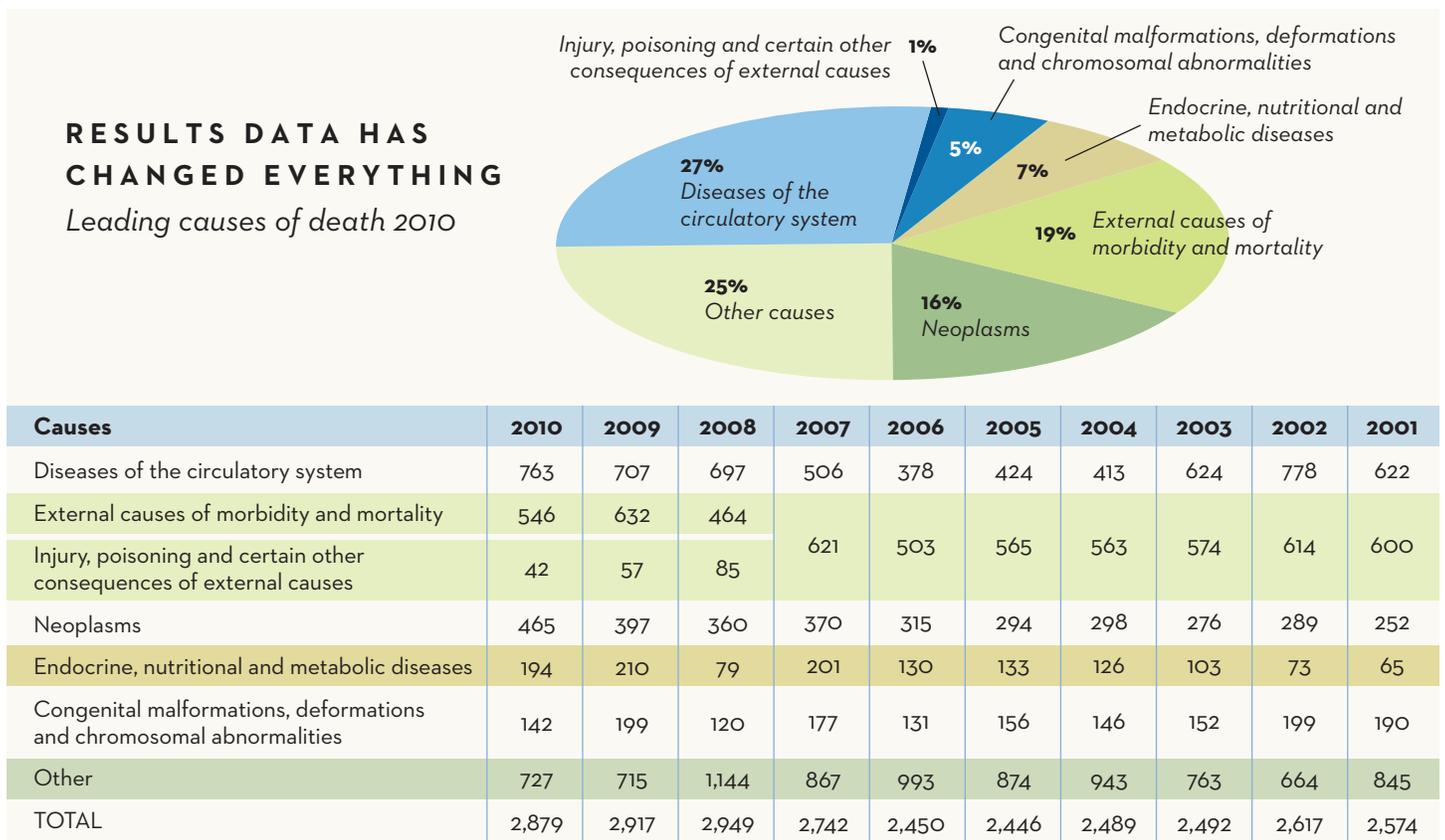
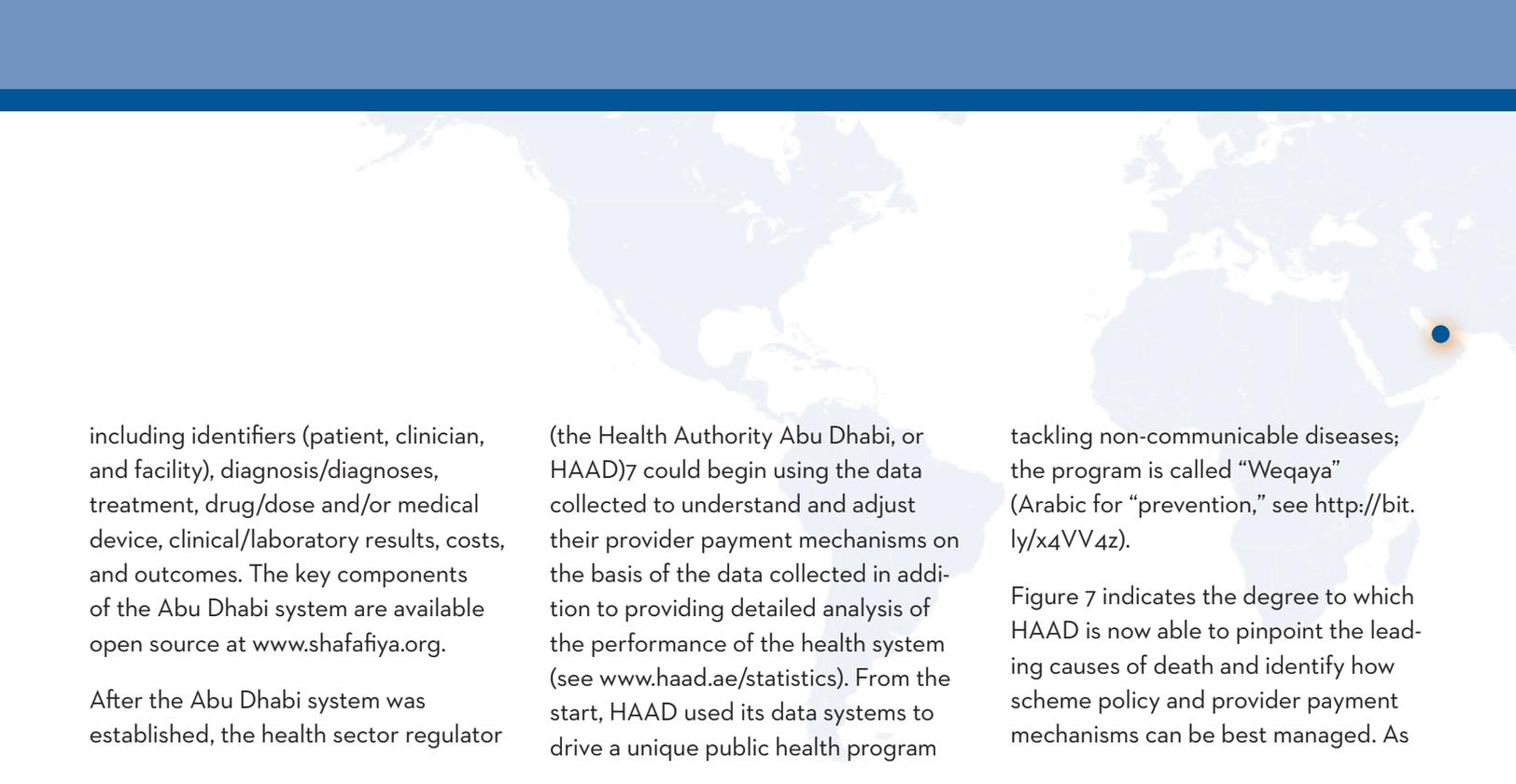


Figure 7: Abu Dhabi—Leveraging data in a new health insurance program to drive rapid improvement in provider payment, quality, and outcomes



including identifiers (patient, clinician, and facility), diagnosis/diagnoses, treatment, drug/dose and/or medical device, clinical/laboratory results, costs, and outcomes. The key components of the Abu Dhabi system are available open source at [www.shafafiya.org](http://www.shafafiya.org).

After the Abu Dhabi system was established, the health sector regulator

(the Health Authority Abu Dhabi, or HAAD)<sup>7</sup> could begin using the data collected to understand and adjust their provider payment mechanisms on the basis of the data collected in addition to providing detailed analysis of the performance of the health system (see [www.haad.ae/statistics](http://www.haad.ae/statistics)). From the start, HAAD used its data systems to drive a unique public health program

tackling non-communicable diseases; the program is called “Weqaya” (Arabic for “prevention,” see <http://bit.ly/x4VV4z>).

Figure 7 indicates the degree to which HAAD is now able to pinpoint the leading causes of death and identify how scheme policy and provider payment mechanisms can be best managed. As

## Box 2: Abu Dhabi—Leveraging data in a new health insurance program to drive rapid improvement in provider payment, quality, and outcomes

More information on HAAD and the Abu Dhabi health system can be found at [www.haad.ae](http://www.haad.ae) and [www.shafafiya.org](http://www.shafafiya.org)

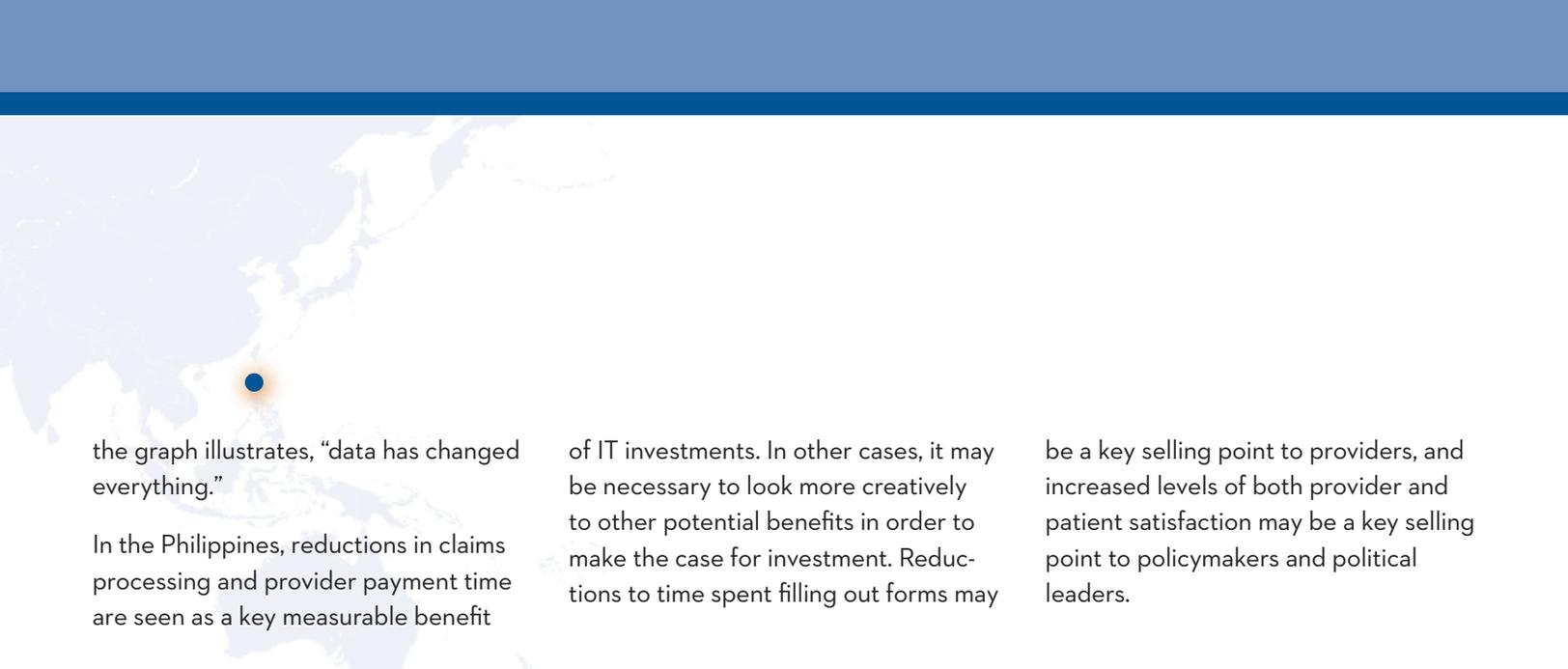
In 2006, the Emirate of Abu Dhabi made the decision to restructure its traditionally public-sector-driven health care delivery system into a comprehensive health insurance model in which contributions would be split between employers and the government. With adequate financial resources and a manageable population size, the government of Abu Dhabi had decided the reform would be necessary to achieve improved quality and outcomes that were in line with spending levels. In 2007, Abu Dhabi also decided to restructure the General Authority for Health Services—which managed public health care facilities—separating the regulatory and policymaking functions from the management of the facilities.

Abu Dhabi realized the importance of data in both operationalizing the new system and in creating the knowledge, incentives, and transparency that would be required to ultimately improve quality and outcomes. Claims are now processed electronically through a robust, reliable, and fully standardized web-based system. The full data standards and architecture are open source and available online ([www.shafafiya.org](http://www.shafafiya.org)). Aggregated claims data is made available through a web service to various government agencies,

researchers, and statistical analysis groups (through a Data Standards Panel). The Data Standards Panel actively manages the ongoing evolution of the data standards to optimize the quality and utility of data, as well as the development of new use cases (e.g., ePrescribing was launched in 2012).

In addition to operational efficiency associated with electronic claims processing and data interchange, the information technology capabilities of the new system have uncovered a myriad of strategic insights related to health care cost, quality, and outcomes. Data availability and electronic processing capabilities have enabled Abu Dhabi to introduce Pay for Quality and Pay for Health schemes to incentivize provider performance and to identify and address public health concerns such as the increasing prevalence of non-communicable disease (through a novel program called “Weqaya,” see <http://bit.ly/x4VV4z>).

In all cases, it is essential to put in place a framework for articulating and measuring the benefits of both provider payment reform and IT investment on a continuum. Each investment in IT needs to be clearly articulated in the return that it will have on enabling better service provision to the population, delivering services at a lower cost, or both.



the graph illustrates, “data has changed everything.”

In the Philippines, reductions in claims processing and provider payment time are seen as a key measurable benefit

of IT investments. In other cases, it may be necessary to look more creatively to other potential benefits in order to make the case for investment. Reductions to time spent filling out forms may

be a key selling point to providers, and increased levels of both provider and patient satisfaction may be a key selling point to policymakers and political leaders.

### Box 3: PhilHealth – Leveraging ICT investments to achieve both operational and policy objectives

More information on PhilHealth and the Philippines health system can be found at [www.jointlearningnetwork.org/content/philippines](http://www.jointlearningnetwork.org/content/philippines)

Since its inception in 1995, PhilHealth has been successful at enrolling a large percentage of the Filipino population but has struggled to reduce out-of-pocket expenditures and achieve the policy objective of universal coverage. Historically, PhilHealth’s ICT systems have been challenged by the decentralized administration of the scheme, a geographically dispersed population, and varied ICT capabilities of providers. PhilHealth has relied primarily on a fee-for-service payment system, and the ability of providers to bill patients for costs not covered by PhilHealth (i.e., “balance bill”) is one reason for continued high out-of-pocket spending. Manual eligibility checking processes led to underutilization of the PhilHealth benefits, and manual claims processing often meant a 90-day turnaround time for claims adjudication and payment.

PhilHealth sought to develop an ICT strategy to address operational objectives of increased administrative efficiency and decreased claims processing time, as well as policy objectives of improved benefits administration—in the form of reduced balance billing and increased utilization of PhilHealth benefits—and increased transparency between PhilHealth, providers, and the public. PhilHealth’s strategy needed to bear in mind the constraints of low provider ICT capabilities and resistance to changes to the provider payment mechanisms.

*PhilHealth developed a 3-stage e-claims deployment strategy, where stage 1 is simple online member eligibility checking, stage 2 is electronic claims submission, and stage 3 is online claims status and results checking. After introducing the first stage in 2010, however, PhilHealth saw claim submissions increase dramatically, exacerbating*

*operational challenges and underscoring the need for electronic claims submission and processing. With stage 2, PhilHealth has decided to marry its operational and policy objectives, using the move toward electronic claims to drive provider payment reforms by moving from fee-for-service to case-based payment with prospectively set rates and curtailing the practice of balance billing by providers. PhilHealth leveraged the electronic claims rollout to drive these provider payment reforms by promising providers increased claims processing efficiency (turnaround in 30 days rather than 90) and reduced administrative burden of claims submission (50% less data entry time) to encourage their participation.*

*In short, PhilHealth has used its ICT strategy to catalyze provider payment reforms and further the policy objectives of the scheme. Future plans involve moving toward a global budget payment methodology, but this will be made contingent upon providers first adopting the electronic claims system. Many open questions remain for PhilHealth’s ICT strategy, including the limited capacity of providers to implement ICT improvements. To address this issue, PhilHealth is in the process of accrediting third-party IT vendors to develop and deploy solutions for providers that are interoperable with PhilHealth’s core eligibility and claims databases. PhilHealth seeks to get 50% of claims online by 2013.*

South Korea is another good example where provider payment policy and ICT advancements have coevolved over time, each influencing and supporting the other. Figure 8 depicts South Korea's public health insurance system. The Ministry of Health and Welfare oversees the national health

insurance system and two other institutions. The National Health Insurance Corporation (NHIC) serves as the insurer, and the Health Insurance Review & Assessment Service (HIRA) conducts reviews and assessment of medical fees. ■

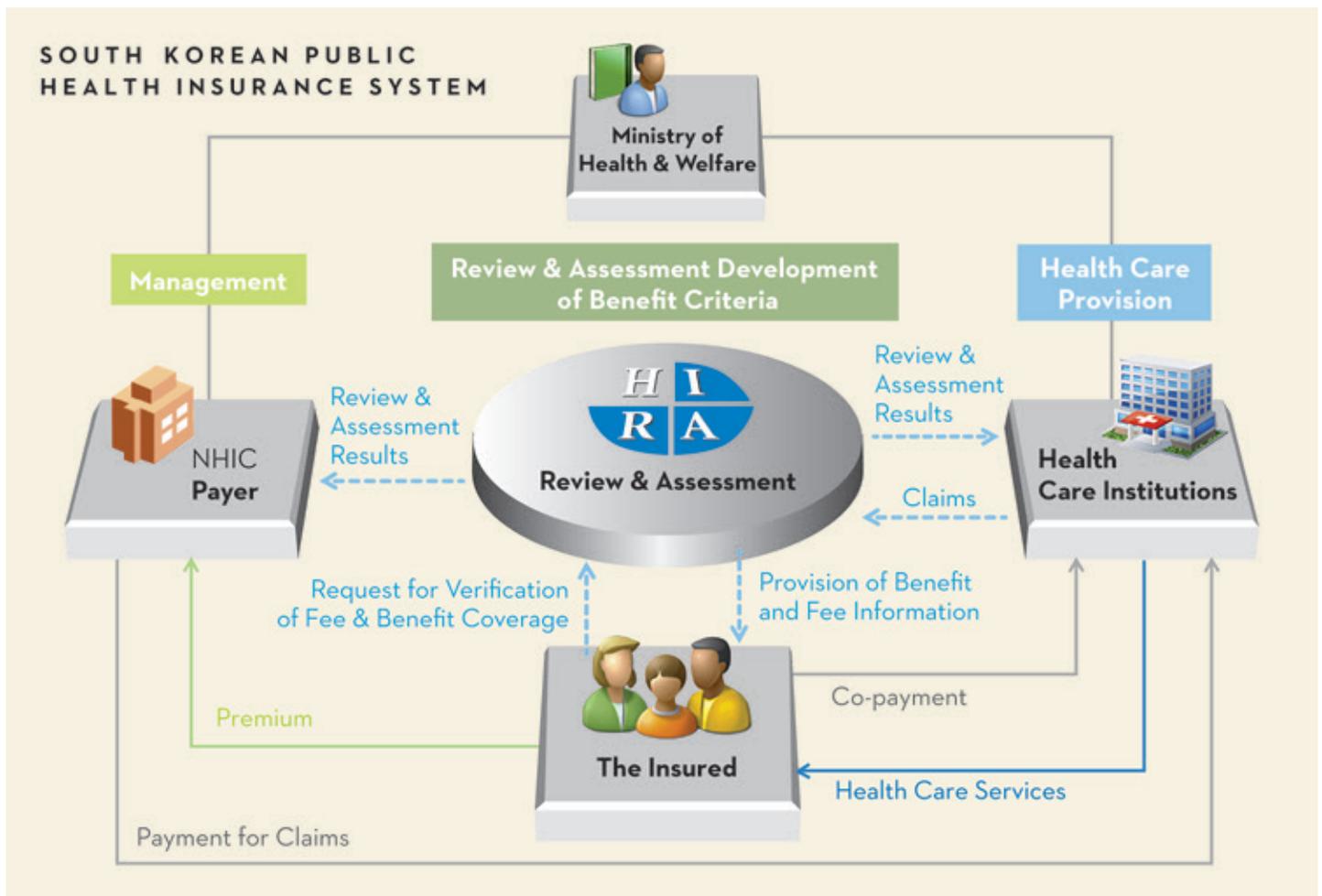


Figure 8: South Korea's Public Health Insurance System comprised of two primary institutions, the Health Insurance Review and Assessment Service (HIRA) and the National Health Insurance Corporation (NHIC)

## Box 4: South Korea—Standardizing data exchange in an electronic billing system

South Korea achieved 99% electronic claims with the strong leadership of an independent review organization and the high level of standardized information among medical organizations.

More information on HIRA and the Korea health system can be found at [www.hira.or.kr/eng/](http://www.hira.or.kr/eng/)

South Korea's first health insurance law was formed in 1963. The law has since been revised many times, but by gradually providing coverage expansion, South Korea has underwritten secure financing support for the market which is predominately occupied by private health care providers. With the National Health Insurance Act of 1999, the South Korean government reformed the public health insurance system from being managed by multiple insurers to a single insurer. This act also established the Health Insurance Review & Assessment Service (HIRA) and the National Health Insurance Corporation (NHIC) which set the stage for a paradigm shift in health insurance by switching over the quality assessment role to HIRA, which has enhanced the quality of national health services by conducting assessments for the insurers, the health service providers, and the medical consumers in a neutral and objective position.

Fee-for-service in South Korea traditionally uses the approach of scoring the individual treatment service and multiplies the unit price per score. Given that fee-for-service payment is based on the number of visits and treatments, it may cause overtreatment. In order to reduce unnecessary services, the Diagnosis Related Group (DRG) system was introduced in 2002 and implemented for the specific disease groups where high overtreatment occurred. DRG's were initially limited to seven diagnostic groups and paid a certain amount in accordance with the predefined diagnosis in order to minimize overtreatment and the increasing private expenditure on health.

As a result of HIRA's IT and data collection capabilities, HIRA can use its administrative information to calculate a broad series of quality of care indicators. This information

is used to provide feedback on the performances to health care providers and the government and is also published for the general public.

In the insurance system, combining a large number of insurers made the simplification of administrative procedures easier, and placing the separate specialized assessment agency with high leadership made the ongoing reforms possible. A single insurer scheme generally streamlines the management and operations effectively and has helped enable advanced management techniques, such as the introduction of an electronic claims assessment payment system (EDI, Portal).

South Korea's computerized claiming service and the high utilization of assessments became available with the government's proactive investment in the ICT sector through the 1990s and early 2000. South Korea facilitated a resident registration numbering system, plus the rapidly spreading Internet and the public information exchange encouragement made various kinds of information available for health services, including residency information, drug information, and medical institution information. Collecting various kinds of information also became available with the rapid computerization of medical institutions.

The quality of information has been improved by establishing South Korean standards or adopting other global standards for service classification codes, payment/nonpayment drug codes, and terminology and information exchange standards. Through this activity, the effort to effectively manage and improve national medical quality is ongoing by performing more accurate and efficient information analysis and reflecting this to the policy.



## Practical steps forward

While the preceding frameworks and case examples can serve as a starting point for considering the relationship between provider payment and information technology, we recognize that each country will chart its own course based on its political, policy, and operational realities. Nevertheless, the following practical steps forward have been distilled from country experiences, including those documented throughout this analysis:

- **Enlist a strong political champion(s) before you start:** While the choice of the provider payment method and supporting information systems is guided by careful analysis and technical considerations, successful implementation of either is inherently dependent upon strong political support. Each systems implementer interviewed for this

paper cited the degree to which strong political leadership providing them with a clear mandate was an essential precondition for their work.

- **Understand the functional requirements first:** Not all new payment methods within a national health insurance program will be fully automated from the outset. The natural lead time required to develop and deploy ICT systems can in fact be beneficial if it enables scheme administrators to more fully develop the business processes and functional requirements. Thailand noted that the two years that elapsed after the launch of its universal coverage scheme, but before an IT vendor could be selected, were critical to fully developing their country-specific business processes and functions. If the business

processes are not fully developed, any ICT investment is likely to fall short of expectations. Examples of country-specific business processes can be found at [www.jointlearningnetwork.org/](http://www.jointlearningnetwork.org/). In addition to these country-specific requirements and task flow diagrams, JLN members have developed common business processes and requirements that any country may use as a starting point to develop their country-specific requirements. These artifacts can be accessed at [www.jointlearningnetwork.org/content/tools](http://www.jointlearningnetwork.org/content/tools)

- **Speak the same language:** Data standards are needed to ensure all actors in a health insurance scheme speak the same language. Standards captured in a HDD or standardized data exchange protocols enable integration and interoperability even

when not all systems are created by the same vendors, developed at the same time, or hosted in the same location.

- **Develop a crawl, walk, run approach:** Many national health insurance schemes have attempted the “big bang approach,” trying to do everything at once in developing their ICT systems. Some have been successful with this approach, but it is very risky and many more have failed. While a coherent strategy and comprehensive vision of the end state is important, defining and executing the immediate first steps along the path to implementation of your provider payment mix are even more important. Automating the most important functions will create traction for further systems development down the road and help build support for the future ICT investments that will be required. Focusing on enabling provider payment and claims processing is one possible starting point, as these

are central functions of the core health insurance operations and are often key political pain points when they do not work well.

- **Tie operational objectives to policy objectives:** Several countries have found success in tying operational objectives around automation and administrative efficiency to broader policy objectives. The Philippines has used the government’s policy objectives to improve benefits administration and expand coverage to justify ICT investments, while using the promise of operational improvements to get providers on board. Crafting a coherent strategy tied to both operational and policy objectives can create a virtuous circle leading to improvements of both.

*Defining and executing the immediate first steps along the path to implementation of your provider payment mix are even more important.*

- **Establish a framework for measuring the benefits:** Like any major reform initiative, ICT investments and provider payment reforms must be tied to specific, measurable benefits wherever possible, such as in the case of the Netherlands and Abu Dhabi. While measuring benefits and attributing them directly to specific initiatives can be difficult, a simple framework for measuring benefits can lend credibility to the effort. In Thailand, a results framework for ICT has ensured that the ICT budget is maintained year after year. With a strong framework for describing and measuring the benefits of ICT investments, ICT can begin to look less like a cost center and more like an area of strategic importance for investment, critical to running a national health insurance program. ■



## Conclusion

While much of this paper has focused on the step-by-step process and incremental nature of both reform of provider payment systems and investment in IT, establishing a collaborative, clear, long-term vision for the end state is also critical. **Human interoperability is a key step to technical interoperability.** The time it takes to properly develop both short- and long-term plans will be time well spent. The conundrum faced by most countries studied is that the groups and experts making the decisions on scheme policy—factors that critically affect downstream system interoperability—are rarely the same persons who have made ICT investments critical to ensuring the efficiency of the core health insurance operations.

Furthermore, the groups and experts (i.e., for IT and provider payment) rarely know one another, much less interact frequently. They typically do not speak the same technical language. Thus, critical implementation decisions are made in a top-down manner without

suitable “bottom-up” input. It should be stressed that ICT investments are simply tools in a country’s social protection arsenal. In order to be effective, they need to be understood, prioritized, and aligned where necessary. This requires that people making decisions about policy and core operations collaborate, as ICT interoperability first begins with human interoperability.

While this end state will vary substantially based on provider payment methods, other policy choices, and other aspects of country-specific context, we do know a few things about what this end state will look like. First, we know that a robust and comprehensive set of information systems will collect all of the information and perform all of the necessary functions of the core health insurance operations. Second, we know that this information system and the processing capacity it provides will play a significant role in both analyzing performance and informing the decision-making process for future policy revisions. Virtually all information

collected by a system, even that which is not essential for the daily operations of the scheme and its provider payment methods, can be useful to monitoring, management, and/or ongoing policymaking processes. Therefore, the aspirational target of a health insurance information system is highly detailed, disaggregated data, collected through applications and processes that meet the needs of the end-users.

Nevertheless, “big bang” approaches to investing in IT too often fail to gain traction due to political, financial, or technical constraints. Therefore, targeted, incremental investments designed to address the most pressing constraints and enable high priority reforms (with a framework for quantifying the resulting benefits) may be the most viable path forward. This approach need not be viewed as a second-best solution, as it may be the approach that best reflects the gradual and highly iterative process of expanding health coverage through national health insurance programs. ■



# Appendix

# Appendix

## Data needs for common provider payment systems at different levels of sophistication

### BASIC LEVEL

- Routine aggregate data that is typically readily available
- Routine data that may require an additional degree of disaggregation (e.g., service utilization data)
- Data that may not be routinely available (e.g., disaggregated enrollment database, patient-level utilization data or provider-level cost data)

Level of Sophistication	Payment method function	PAYMENT SYSTEM			
		Global budget	Capitation	Fee-for-service	Case-based payment (e.g. DRG)
<i>Description</i>		Health provider budget based on simple parameters (e.g., historical budget or projected volume)	Providers are paid one single rate for each enrolled individual. Enrollment is by assignment rather than free choice.	Providers are paid a fixed price per service delivered with or without a cap. Limited number of broad categories of services.	Providers are paid a fixed price per discharge with or without a cap
<b>BASIC</b>	<i>Data Requirements</i>				
	<i>Payment-rate setting</i>	Historical budget or volume of services	Total amount of funds available for capitation  Total number of individuals covered by capitation	Costs or negotiated fees for the list of covered services	Total amount of funds available for case-based payment  Total number of historical discharges
	<i>Adjustments</i>	None	None	None	None
	<i>Patient registration</i>	Catchment area	Existing provider registers or catchment area	None	None
	<i>Provider billing</i>	None	None	Itemized list of services delivered during the billing period	Total number of actual discharges
	<i>Final payment calculation</i>	None	None	Calculation of aggregate volume [x] price for each service for each provider  If cap: notification when provider approaches/ exceeds cap	Calculation of aggregate volume [x] price for each provider  If cap: notification when provider approaches/ exceeds cap
<i>Provider monitoring</i>	Performance indicators of choice (e.g., average length of hospital stay)	Performance indicators of choice (e.g., hospitalization rate for primary care-sensitive conditions; referral rate)	Performance indicators of choice (e.g., appropriate chronic disease management)	Performance indicators of choice (e.g., 30-day readmission rate)	

 Routine aggregate data that is typically readily available

 Routine data that may require an additional degree of disaggregation (e.g., service utilization data)

 Data that may not be routinely available (e.g., disaggregated enrollment data-base, patient-level utilization data or provider-level cost data)

## INTERMEDIATE LEVEL

Level of Sophistication	Payment method function	PAYMENT SYSTEM			
		Global budget	Capitation	Fee-for-service	Case-based payment (e.g. DRG)
<i>Description</i>		Health provider budget based on simple parameters (e.g., historical budget or projected volume) with department-level case-mix adjustment	Providers are paid one single rate for each enrolled individual adjusted by age and sex  Enrollment is by assignment or by free choice	Providers are paid a fixed price per service delivered with or without a cap. Larger number of more narrow categories of services.	Providers are paid a fixed price per discharge from each department with or without a cap
<b>INTERMEDIATE</b>	<i>Data Requirements</i>				
	<i>Payment-rate setting</i>	Historical budget or volume of services	Total amount of funds available for capitation  Total number of individuals covered by capitation	Costs or negotiated fees for the list of covered services	Total amount of funds available for case-based payment  Total number of historical discharges by department  Historical average length of stay (ALOS) by department
	<i>Adjustments</i>	Number of visits or discharges by department ALOS by department	Service utilization by age and sex group	None	None
	<i>Patient registration</i>	Catchment area	Provider register of enrolled individuals or catchment area  Age and sex recorded for each individual  Births, deaths and migrations  Open enrollment only: enrollment register (including age and sex)	None	None
	<i>Provider billing</i>	None	None	Itemized list of services delivered during the billing period	Total number of actual discharges by department
	<i>Final payment calculation</i>	None	None	Calculation of aggregate volume [x] price for each service for each provider  If cap: notification when provider approaches/ exceeds cap	Calculation of aggregate volume [x] price for each department for each provider  If cap: notification when provider approaches/ exceeds cap
	<i>Provider monitoring</i>	Performance indicators of choice (e.g., average length of hospital stay)	Performance indicators of choice (e.g., hospitalization rate for primary-care sensitive conditions; referral rate)	Performance indicators of choice (e.g., appropriate chronic disease management)	Performance indicators of choice (e.g., 30-day readmission rate)

 Routine aggregate data that is typically readily available

 Routine data that may require an additional degree of disaggregation (e.g., service utilization data)

 Data that may not be routinely available (e.g., disaggregated enrollment data-base, patient-level utilization data or provider-level cost data)

## HIGH LEVEL

Level of Sophistication	Payment method function	PAYMENT SYSTEM			
		Global budget	Capitation	Fee-for-service	Case-based payment (e.g. DRG)
<i>Description</i>		Health provider budget based on simple parameters (e.g., historical budget or projected volume) with patient-level case-mix adjustment	Providers are paid one single rate for each enrolled individual adjusted by age and sex, geography, chronic disease status  Enrollment is by free choice	Providers are paid a fixed price per service delivered based on a relative value scale, with or without a cap	Providers are paid a fixed price per discharge in each diagnosis category with or without a cap. Additional refinements may include adjustments for health facility type and outlier payments.
HIGH	<i>Data Requirements</i>				
	<i>Payment-rate setting</i>	Historical budget or volume of services	Total amount of funds available for capitation  Total number of individuals covered by capitation	Relative costs for each service to construct relative value scale  Total amount of funds available in the system to construct base rate	Total amount of funds available for case-based payment  Patient-level data to calculate: • Total number of historical discharges by diagnosis group • Historical ALOS by diagnosis group
	<i>Adjustments</i>	Patient-level service utilization or discharge data to calculate: • Number of visits or discharges by diagnosis and other patient characteristics • ALOS by diagnosis and patient characteristics	Service utilization by age and sex group  Service utilization by chronic disease status  Cost structure by geographic area	None	Cost structure by provider type (e.g., teaching hospitals, public/private)
	<i>Patient registration</i>	Catchment area	Provider register of enrolled individuals Age and sex recorded for each individual Chronic disease status recorded for each individual Births, deaths and migrations	None	None
	<i>Provider billing</i>	None	None	Itemized list of services delivered during the billing period	Patient-level data to calculate total number of actual discharges by diagnosis group
	<i>Final payment calculation</i>	None	None	Calculation of aggregate volume [x] price for each service for each provider  If cap: notification when provider approaches/exceeds cap	Grouping algorithm to calculate aggregate volume [x] price for each diagnosis group for each provider Algorithm to detect/price outliers If cap: notification when provider approaches/exceeds cap
	<i>Provider monitoring</i>	Performance indicators of choice (e.g., average length of hospital stay)	Performance indicators of choice (e.g., hospitalization rate for primary care-sensitive conditions; referral rate)	Performance indicators of choice (e.g., appropriate chronic disease management)	Performance indicators of choice (e.g., 30-day readmission rate)





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