There are many definitions and concepts of Enterprise Architecture. To most people, the entire concept seems very complex and highly technical. In fact an Enterprise Architecture approach aims to do just the opposite, it looks to strip away much of the complexity and to view the organisation as much more than just the technology. An often used analogy for enterprise architecture is that of “urban planning”. We all understand the importance of urban planning, locating schools near residential areas rather than industrial areas, planning for efficient transportation and wise use of resources. Taking an Enterprise Architecture approach to planning for health care needs to look at all of the different components that make up health service delivery. They may be things like supply chain, primary health care, finance, and human resources. This is clearly more than just the technology, knowing all the components, and considering them in your planning will help to make sure things work together efficiently and effectively.

**What are the different components of an Enterprise Architecture?**

Although there are many different methods or ways to develop an Enterprise Architecture, they generally all have some common viewpoints. One of the most common methodologies for use in the Health Sector is TOGAF (The Open Group Architecture Framework) and this will be modified and adapted for use.

***Organisational*-** this is the high level domains/Governance/Resources which make up the enterprise (in this case the health system). Defining this is an essential first step and will help sort out the subsequent layers. This layer or viewpoint involves little or no technology. This may also be called the “enterprise viewpoint”

***Data-*** this layer identifies the data that is necessary to support each of the domain areas, it also provides rules or standards in how that data is defined and shared. This may also be referred to as the “Information viewpoint”

***Applications-*** this layer identifies specific applications that are used (or may be potentially used) to deliver services. This may be as basic as communication devices and as complex as a hospital information system. It is not necessary to know all the potential systems that could be used, but it is beneficial to at least have an inventory of what you currently do have. Much of this layer involves how those applications or functionality will need to communicate and share information with each other and how the user will interact with them.

***Technical-*** this layer identifies all of the actual hardware and technical infrastructure that will be needed to support the applications. Taking this into account in a holistic way may help reduce costs and simplify implementations by having them on similar (or the same) platforms.

Most of the initial discussion will concentrate on the organisational and data layers of the Enterprise Architecture.

**What are the benefits of this approach?**

Taking into consideration all the components that make up your health system allows you to identify how they interact, what information they need to exchange and ultimately, how they might exchange that information. This allows you to build the components that are your current priority, and still be prepared to add on the next pieces when they become a priority. If work is being considered in the future, you will already know the “rules” those systems, data or processes will need to conform to. This will help make any of those connection points (to the other components) much simpler. This preplanning allows for a great deal of agility in designing and implementing future systems, and even in extending some of the systems you have already. It allows you to share information between domains or components, and to be sure that they are defined in the same way.

**Is it only about the IT systems?**

Although one of the biggest benefits will come to the IT systems that help support your health system, it is about much more than technology. It is important to understand how data is shared between domains (for example, between primary care services and finance/insurance), how resources are shared and how everything is intended to function *together as an enterprise.* Your enterprise architecture ensures that some key pieces of data (for example diagnosis) means the same thing in your clinical record, as it does in the financial record as it does in the national reports or district reports for disease surveillance.

**What is involved in developing an Enterprise Architecture?**

The good news is, most enterprises already have done much of this work- at least at the high level (organizational architecture layer described above). Using this approach helps you organise your overall planning more easily, identify where you may have gaps, and gives you a way to address them. The first step would be to decide what each of the domain areas are that make up health care. You likely have some natural “groups” already and you may certainly use them. It is very helpful at this stage to get an idea of what other countries have done – just to make sure you have not left anything out. Health care is more similar across countries than dissimilar, so building upon what others have already done makes sense and is much more efficient. For example, one way to divide health care into domains has been discussed by several expert groups [1]and looks like this:

|  |  |
| --- | --- |
| **Domain** | **Examples** |
| Facility Based Services | Classification of procedures  Notification of reportable diseases  Disease outbreak detection and reporting  Patient care record |
| Community Based Services | Registration of death  Registration of birth  Migration (In and Out)  Demographic Surveillance System  Disease outbreak detection and reporting |
| Diagnostic Services | Lab  Notification of reportable diseases  Classification of disease  Radiology |
| Supply Chain | Stock monitoring  Demand forecasting  Distribution and logistics management |
| Human Resources in Health | Recruitment, credentialing, hiring of health workers  Monitoring deployed workforce |
| Environmental Services | Water quality and access mapping  Sanitation resources and access |

|  |  |
| --- | --- |
| Management & Planning | Aggregation of routine data  Linking of routine and population data  Budget & expenditure reporting  Analysis and representation of data  Disease outbreak detection and reporting  MDG and M&E reporting[[1]](#endnote-1)[[2]](#footnote-1)2 |
| Finance Resources for Health | Patient fee for service collection  Health insurance enrolment  Health services insurance settlement  National and sub-national budgeting |
| Knowledge and Information Resources | Access protocols for care delivery  Access to research and authoritative source materials  Delivery of skills development courseware |
| Infrastructure Resources | Physical assets inventory  Physical asset maintenance management |

This list may or may not resemble your current health system domains. Countries each have different areas of focus and levels of maturity in each area. In fact, that is why taking note of, and planning for your enterprise architecture is so important; it makes you plan for some basic dependencies before you need them. In the future when that area is in focus, you will be ready and will not need to alter the existing domains to `fit it in`. For example, you may not yet have a patient record in community health centers and this may not be planned for the immediate future. Despite this, you would be able to identify the data elements that are required based on the requirements of other domain areas. If your financial system is fee for service- it is reasonable to plan for the primary care system to use the same procedure codes as the financial system, as well as to identify the provider and the patient in the same way. Even for the data elements not in use, the requirements will be there for when it becomes necessary. This can be done for the data (for example using a standard like ICD10) as well as the way that data is communicated (for example using an HL7 message). These components are generally referred to as interoperability profiles. They identify what information needs to be shared between domains, and how it will be shared.

Although there are some technical details to adopting an enterprise architecture approach, they are typically just the details. Working through your EA in a systematic way will help improve both the current planning as well as planning for future enhancements you have yet to focus on.

**Suggested next steps:**

1. Gather relevant documents: Health Strategic plan, IT strategic plan, Government IT strategic plan, roadmap or implementation plan, IT vision and requirements, org chart for MoH, MoH medium term plan (PESS)
2. Identify the baseline architecture or current state- this includes:
   1. An inventory of current systems
   2. The general business domains and what is included in each (the scope and organisation)
   3. This can be done by taking the current example and mapping what Moz MoH does. See Appendix A for example
3. A current high level state of the health system- identify challenges- such as lack of electricity, key indicators etc This may include comments about the country as a whole- cell phone coverage, income, access to clean water or electricity, literacy level etc
4. We then need to validate the business domains with 1) the business owners (such as the dept responsible for hospitals, and the one responsible for finance/insurance etc) and also 2) the key partners and stakeholders (maybe program leads) to verify what they do “fits” in somewhere and the domains make sense. See Appendix B for schedule of consultations.
5. Do a rough mapping of data that is shared between domain areas, this information can then be validated with the stakeholders during consultations. This will form the basis for the initial interoperability profiles.
6. Based on the strategic plans and other documents, we can identify the areas of priority- these will also need to be validated with the MoH.
7. We need to sketch out the technical architecture- this will depend on the domains and what information is shared between them, as well as the technical capabilities etc. See Appendix C for example.
8. Once the priority areas area identified and the baseline architecture is done, a plan can be developed for further elaboration and implementation of the priority areas.

1. Stansfield, S., et al., *The Case for a National Health Information System Architecture; a Missing Link to Guiding National Development and Implementation.* making: the ehealth> connection\*”, Bellagio, Italy, 2008.

1. [↑](#endnote-ref-1)
2. 2 [↑](#footnote-ref-1)