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DATA FOR  
HEALTH INITIATIVE

# CRVS INNOVATIONS

Process mapping to  
strengthen CRVS systems

CRVS Development Series  
October 2017



## About this series

### Target audience

Government policy-makers, in-country CRVS staff, CRVS partners, medical professionals and teaching institutions, health-related ethicists and legal experts, academic institutions.

### Description

Concise and easily accessible, the *CRVS Development Series* forms a lasting archive of synthesised evidence on topics related to CRVS systems and data strengthening. The content of this series is based on a combination of international standards and guidelines, Bloomberg Philanthropies Data for Health Initiative technical knowledge, country (and comparative country) experience, and the scientific literature. The series is intended to stimulate debate and ideas for in-country CRVS policy, planning, and capacity-building, and promote the adoption of best practice to strengthen CRVS systems world-wide.

**Other products available from the Civil Registration and Vital Statistics Improvement Group, Bloomberg Philanthropies Data for Health Initiative:**

### Resources and Tools

Capacity-building *Resources and Tools* are designed to assist countries improve their systems and to influence and align CRVS practice with established international or best practice standards. These resources, which are used extensively in Bloomberg Philanthropies Data for Health Initiative training courses, aim to both change practice and ensure countries benefit from such changes, by developing critical CRVS capacity among technical officers and ministries.

### CRVS Technical Outcome Series

The series focuses on filling a range of scientific knowledge gaps by offering new tools, methods, findings and approaches for CRVS systems and data improvement. The series has a strong empirical focus, reporting on works in progress, particularly for large or complex technical initiatives, and on specific components of projects that may be of more immediate relevance to stakeholders.

### CRVS Country Stories

*CRVS Country Stories* describe the capacity-building experiences and successes of strengthening CRVS systems in partner countries. The series describes the state of CRVS systems improvement in partner countries and lessons learnt, and provides a baseline for comparison over time and between countries.

### CRVS Roadmaps for Action

*CRVS Roadmaps for Action* present a succinct overview of the wide spectrum of common issues and challenges in CRVS systems. The Roadmap series provides a suggested way forward for countries. This series is intended to inform health system dialogue in countries and between countries and a range of development partners.

### Author details

Don de Savigny, Daniel Cobos Muñoz, Swiss Tropical and Public Health Institute

### Acknowledgements

Claire E. Brolan, University of Melbourne



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## Abbreviations

BD4H	Bloomberg Philanthropies Data for Health Initiative
COD	cause of death
CRVS	civil registration and vital statistics
EA	enterprise architecture
LMICs	low and middle-income countries
UN	United Nations
WHO	World Health Organization



## Purpose of this paper

This *CRVS Development Series* paper explains what enterprise architecture (EA) is and its business process mapping methodology, and why process mapping is an extremely useful tool to understand civil registration and vital statistics (CRVS) systems and strengthen their design. This paper will further set out the four phases country teams need to engage in to process map a country's CRVS system(s), which includes all major CRVS systems processes.

### Key points

- Civil registration involves the legal notification and recording of individual vital events, including births and deaths, by government. Vital statistics are then generated by countries from aggregated birth and death registration data. These data are crucial for population health policy and planning purposes.
- CRVS systems share a common purpose but differ in each country in terms of their organisation, implementation, processes, scale, partners and capacities. CRVS systems are frequently highly complex and span government.
- Almost all CRVS systems in low and middle-income countries (LMICs) are failing to achieve adequate levels of completeness and quality despite government attempts to overcome CRVS systems flaws.
- The tools of EA can help countries and their technical partners assess whether CRVS systems goals and objectives are aligned with current country operations – as well as explore what a country's desired CRVS system might look like.
- Process maps can meaningfully capture the complexity in CRVS systems (including systems bottlenecks), as well as identify these systems' many stakeholders.
- Process mapping exercises examine CRVS systems processes, including management processes, support processes and the four core processes, which are
  - processes for declaration, notification and registration of birth in the community
  - processes for declaration, notification and registration of birth in a health facility
  - processes for declaration, notification and registration of deaths in the community
  - processes for declaration, notification and registration of deaths in a health facility.
- The process mapping and modelling exercise, for each of the above, should occur in four phases
  1. preparation for the process mapping exercise
  2. description of the current processes
  3. analysis of the current processes
  4. improved processes.
- Often, CRVS processes must be re-engineered to fulfil the objectives of the system, to improve efficiency and to provide better services to users.
- The cycle of describing and analysing the current processes, and proposing a future design, is an approach that must be implemented routinely in complex systems such as CRVS systems.



## Process mapping for civil registration and vital statistics systems strengthening

### Summary of content

**What are civil registration and vital statistics (CRVS) systems?**

**Why are so many CRVS systems failing?**

**CRVS systems strengthening – what is enterprise architecture?**

**Why is process mapping and modelling important for CRVS systems strengthening?**

**What are the four core CRVS systems processes of interest in process mapping?**

**What are the four phases in the process mapping of a country's CRVS systems processes?**

**The Bloomberg Philanthropies Data for Health Initiative experience**

**Summary – use of process mapping to strengthen CRVS design**

### What are civil registration and vital statistics (CRVS) systems?

Civil registration is a process whereby major vital events occurring in a population are officially recorded. It is defined by the continuous, permanent, compulsory and universal recording of the occurrence and characteristics of vital events in a population, in accordance with the legal requirements of the country.<sup>1</sup> The goal of civil registration is to record all vital events in a country as they occur. Vital events covered in a CRVS system include:

- Events that occur at the level of individuals – live birth, death and fetal death
- Events that relate to family and civil status – marriage, registered partnership, separation, divorce, legal dissolution of registered partnership and annulment of marriage
- Events that relate to descendants – adoption, legitimation and recognition (**Figure 1**).

According to the World Health Organization (WHO), 'A well-functioning CRVS system registers all births and deaths, issues birth and death certificates, and compiles and disseminates vital statistics, including cause of death information. It may also record marriages and divorces'.<sup>2</sup>

The office of the civil registrar maintains registers that contain information about vital events, and issues legal certificates on demand to entitled claimants. This legal documentation can be used by people to underpin claims of nationality, identity, civil status, and family relationships.

<sup>1</sup> UN Department of Economic and Social Affairs (Statistical Division) (2014). *Principles and recommendations for a vital statistics system, revision 3*. United Nations, New York. Available online: [unstats.un.org/unsd/demographic/standmeth/principles/M19Rev3en.pdf](http://unstats.un.org/unsd/demographic/standmeth/principles/M19Rev3en.pdf)

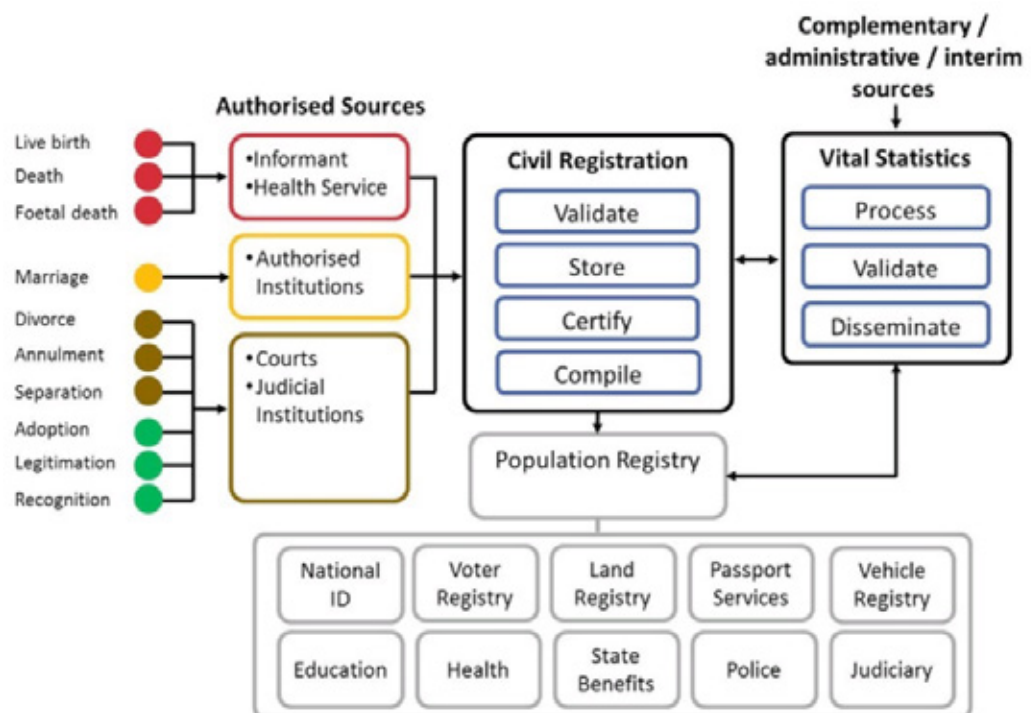
<sup>2</sup> WHO. Health statistics and information systems: civil registration and vital statistics (CRVS). Available online: [who.int/healthinfo/civil\\_registration/en/](http://who.int/healthinfo/civil_registration/en/)

In addition to this legal function, the information collected through the civil registration system is aggregated, analysed and disseminated in the form of vital statistics of the population. Vital statistics include:

- Numbers and rates of births
- Key characteristics of births, such as births by sex, location and maternal age
- Numbers and rates of deaths
- Deaths by key characteristics such as age, sex, location and cause of death (COD).

Vital statistics are the statistical outputs of a civil registration system. The information contained in the individual civil registration records is compiled to generate vital statistics for the population.

**Figure 1: Elements of a civil registration and vital statistics system**



Even though all CRVS systems have the same purpose (production of timely and reliable vital statistics), each country's CRVS system has moved along different paths. Countries differ in their CRVS organisation, implementation, processes, scale, partners and capacities. To complicate matters further, all CRVS systems are part of a country's larger political, economic, social, health and information systems. For example, CRVS systems nest within broader system landscapes concerned with governance, security, identity, planning, resource allocation and so on.



## Why are so many CRVS systems failing?

Almost all CRVS systems in LMICs are failing to achieve adequate levels of completeness and quality despite government attempts to apply standard methods proven to work well in high income nations.<sup>3</sup> This suggests system failure challenges might predominate in LMICs, rather than technical failures.

To date, however, most attempts to improve CRVS systems have been reductionist, ad hoc, and aimed at technical faults rather than system change. Consequently, CRVS strengthening efforts have been slow to achieve results. System strengthening has the potential to efficiently and cost-effectively achieve high-leverage tipping points that could rapidly improve overall performance of CRVS.<sup>4</sup>

## CRVS systems strengthening – what is enterprise architecture?

EA is a methodology that provides a framework to describe the ‘fundamental concepts or properties of a system in its environment embodied in its elements, relationships, and in the principles of its design and evolution’.<sup>5</sup> It provides a conceptual blueprint of the structure and operation of a system. EA bridges the vision and objectives of a system (for example, to produce timely and accurate vital statistics for births and deaths) with its operating model (system processes, information flows and technology).

EA can help countries and their technical partners to assess whether CRVS systems goals and objectives are aligned with current country operations. When applied to analyse health information systems, especially those in LMICs, EA methodology can strengthen CRVS systems design.

## Why is process mapping and modelling important for CRVS systems strengthening?

Process mapping and modelling is one of the tools used in EA to describe and analyse the business architecture of a system. It is a systematic approach to understand, analyse and optimise processes within complex adaptive systems (such as CRVS systems) in order to achieve intended system goals. A process is a set of activities and tasks that logically group together to accomplish a goal or produce something of value for the benefit of the system and its stakeholders.<sup>6</sup> A process map is a visual snapshot, a graphic representation of an end-to-end description of the activities, stakeholders and requirements of a process.

Process maps can capture complexity and meaningfully display the multiple interactions (or lack of them) among different stakeholders in the CRVS system.

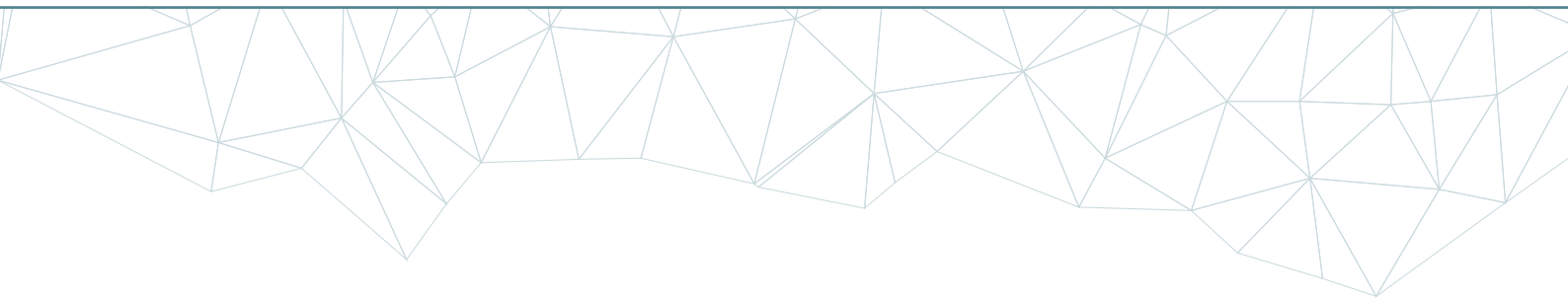
<sup>3</sup> AbouZahr C, de Savigny D, Mikkelsen L et al (2015). Civil registration and vital statistics: progress in the data revolution for counting and accountability. *The Lancet* 386:1373–1385.

<sup>4</sup> de Savigny D, Riley I, Chandramohan D et al (2017). Integrating community based verbal autopsy into civil registration and vital statistics (CRVS): system-level considerations. *Global Health Action* 10:1272882.

<sup>5</sup> International Organization for Standardization (2013). ISO/IEC/IEEE42010: Systems and software engineering – architecture description. ISO: Switzerland.

<sup>6</sup> Davenport TH & Short JE (1990). The new industrial-engineering: information technology and business process redesign. *Sloan Management Review* 31:11–27.





Process maps make it easier to understand complex interactions and present them in a graphical format that helps policy makers, managers and implementers better understand their CRVS system. This is a prerequisite for innovative solutions. Process mapping is a new way of looking at CRVS system processes. It stimulates innovative thinking and pioneering solutions that will consider not only the technical aspects of a problem but also their causal roots and the systemic implications.

Using process maps has been also shown to be very useful to help regulators understand what needs to be considered in the CRVS legal and regulatory environment and review. Ideally, the entire process would be regulated, with different forms of laws and regulations describing roles and responsibilities.

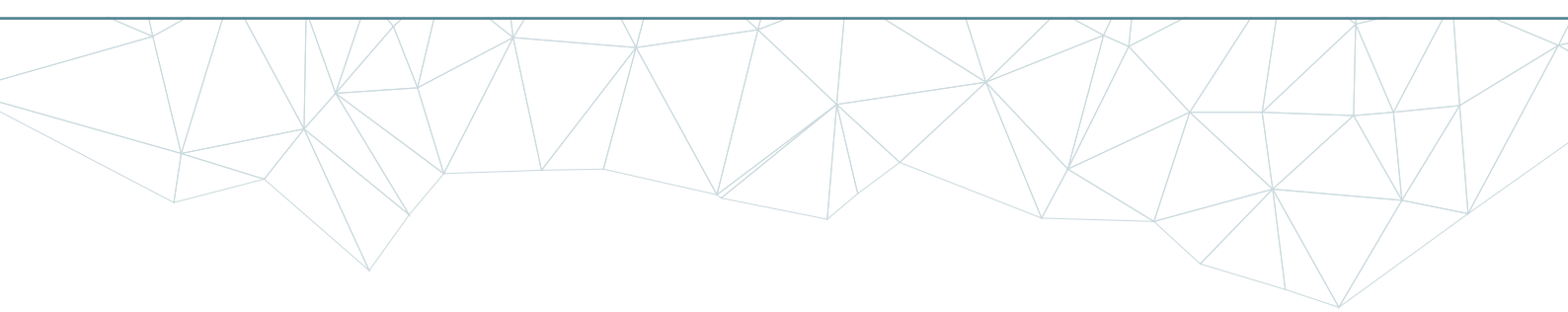
### What are the four core CRVS systems processes of interest in process mapping?

It is useful to separate vital statistics on births and deaths into four distinct categories for process mapping. These are processes for: birth in the community, birth in a health facility, death in the community, and death in a health facility (**Figure 2**).

**Figure 2: The focus of the process mapping exercise**

<b>Process for declaration, notification and registration of births in the community</b> <ul style="list-style-type: none"><li>■ As-Is process map</li><li>■ As-Desired process map</li></ul>	<b>Process for declaration, notification and registration of deaths in the community</b> <ul style="list-style-type: none"><li>■ As-Is process map</li><li>■ As-Desired process map</li></ul>
<b>Process for declaration, notification and registration of births in a health facility</b> <ul style="list-style-type: none"><li>■ As-Is process map</li><li>■ As-Desired process map</li></ul>	<b>Process for declaration, notification and registration of deaths in a health facility</b> <ul style="list-style-type: none"><li>■ As-Is process map</li><li>■ As-Desired process map</li></ul>

The country team examining CRVS systems processes will aim to develop As-Is CRVS process maps and As-Desired CRVS process maps. The As-Is CRVS process maps will assist countries and their technical partners assess whether current CRVS systems goals and objectives are aligned with current country operations. The As-Desired CRVS process maps will explore and map out what a country's desired CRVS system might look like.



## What are the four phases in the process mapping of a country's CRVS systems processes?

The entire process mapping and modelling exercise should preferably consist of four sequential phases.<sup>7</sup> These are described below.

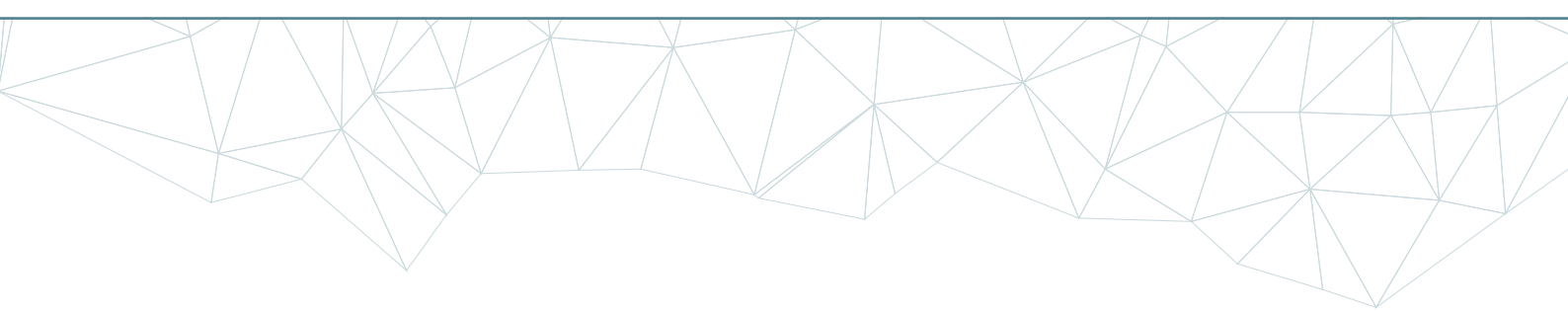
**Phase 1:** A country team with the responsibility of overseeing the entire activity is assembled, and all the existing information about the current CRVS systems processes (and its goals) are compiled. Examples of documents to include in this compilation process are listed in **Box 1**.

**Phase 2:** The current end-to-end flow of activities and stakeholders involved in a process are described using a process map. This results in the team developing an As-Is CRVS process map of the country's CRVS system.

### Box 1: Examples of documents for Phase 1 analysis

- Reports from previous comprehensive assessments
- Reports from any previous process mapping activities
- Strategic documents containing vision and mission statements for, as well as aims and goals of, the CRVS system
- Relevant laws and regulations
- Standard operating procedures and workflow diagrams
- Operational guidelines, manuals and protocols
- Job descriptions of staff involved in the CRVS process
- Memorandums of understanding between different stakeholders
- Performance monitoring reports
- International standards for the process under analysis

<sup>7</sup> Cobos Muñoz D & de Savigny D (2017). Process mapping and modelling: a tool for visualizing system processes from end-to-end. In: de Savigny D, Blanchet K & Adam T (eds). *Applied systems thinking for health systems research*. Open University Press, Maidenhead, UK.



**Phase 3:** The team then brings the As-Is CRVS process map to either a regional workshop (with several countries participating) or a national workshop. An analysis of the As-Is CRVS process map is conducted with relevant country stakeholders and partners to identify errors in the process maps, flaws in the design and areas that could be streamlined to improve the performance of the whole system. Design flaws, inefficiencies and bottlenecks in CRVS processes are identified and documented, and potential solutions and new interventions canvassed.

**Box 2** highlights key questions that should be asked in Phase 3 by and of the workshop attendees.

**Box 2: Examples of key questions to be asked at Phase 3 workshops**

- Is the current CRVS system process aligned with the vision, mission, legal authority, and objectives of the system and the various actors within it?
- Is the current CRVS process producing what is expected? That is, high-quality and reliable data for population health policy and planning?
- Are there bottlenecks or dead ends in the current CRVS system?
- Are there duplications or parallel systems?
- Is there room for gains in efficiency in the current CRVS system – that is, room for savings in time, resources, technology and cost?

**Phase 4:** Together with the technical team, workshop attendees review the stakeholders involved, document the flow of activities and information, and ensure all key processes are addressed.

An As-Desired CRVS process map is then designed to capture the proposed changes, which identify gaps between the current (As-Is) and future (As-Desired) CRVS systems situation.

Following Phases 1–4, the next step would relate to formal adoption and sponsorship from the CRVS governance body, such as the national CRVS committee, of the As-Desired CRVS process map(s).

### The Bloomberg Philanthropies Data for Health Initiative experience

For 16 countries, the Bloomberg Philanthropies Data for Health Initiative (BD4H) process mapping team has prepared initial draft As-Is process maps for each of the four CRVS activities (birth in the health facility, birth in the community, death in the health facility, and death in the community). These were shared with national CRVS stakeholders for an initial round of correction and amplification. Countries then convened in regional workshops of five to six countries each, including representatives from the civil registry, vital statistics and health sector from each country. In facilitated workshops, they continued to edit, correct, amplify and understand their process maps. Workshop attendees then returned to their respective countries and convened a larger group of national stakeholders to repeat the facilitated process and widen the buy-in and understanding of the end-to-end system. Countries were then challenged to respond to what they had learned by creating a new set of process maps for the As-Desired CRVS system, and approach BD4H for intervention support. **Figure 3** shows the variety of uses to which the process maps were put in the various countries.

**Figure 3: The wide range of uses to which process maps have contributed, for the 16 countries involved in the mapping process**

**CRVS Process Mapping Applications in 16 Bloomberg Data for Health Initiative Countries**

Application	Country																Count
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
New insights after training	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	16
Stakeholder management	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	13
VA intervention integration	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	12
Routine process analysis	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	7
Managing SOPs	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	6
IT and digitizing CRVS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	4
DHS2 integration	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	5
Supporting legal review	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	4
Sub-national analysis	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	3
Performance analysis	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	3
COD certification	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	3
IRIS integration	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	1
Comprehensive assessment	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	1
National ID integration	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	1
Change management	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	1
COD Coding Intervention	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	4
<b>Application Count</b>	<b>9</b>	<b>5</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>5</b>	<b>1</b>	<b>6</b>	<b>3</b>	<b>5</b>	<b>3</b>	<b>8</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>6</b>	



### **Summary – use of process mapping to strengthen CRVS design**

The design of CRVS systems is highly variable and countries have put in place many different operational arrangements in response. Process mapping has been shown to be an extremely useful tool to understand CRVS systems and strengthen their design. Process maps have been able to capture complexity and meaningfully display the multiple interactions (or lack of them) among different stakeholders in a system.

Process mapping can also help stakeholders share a common view of the system, identify problems and work collaboratively to find solutions. Usually, stakeholders within a system operate in their own silos, and therefore have a limited view of the different operations within the processes they participate in. Sometimes, they also differ in their vision and objectives for the system. Process mapping offers the opportunity to overcome the piecemeal treatment of CRVS systems across different government agencies so they can develop an aligned and end-to-end view of the system in its current operations. This is a key prerequisite to identify ideas to improve CRVS process performance and to consider how to integrate corrective interventions and manage the necessary changes.



## Related resources and products from the Bloomberg Philanthropies Data for Health Initiative

University of Melbourne (2017). MODULE 1.1 What is CRVS and why does every country need it? Carla AbouZahr (Topic: Introduction to CRVS – Back to Basics). Civil Registration and Vital Statistics Improvement Group, Bloomberg Philanthropies, Data for Health Initiative: Melbourne, Australia.

University of Melbourne (2017). MODULE 2.2 CRVS Process Mapping. Don de Savigny and Daniel Cobos Muñoz (Topic: CRVS Governance and Architecture). Civil Registration and Vital Statistics Improvement Group, Bloomberg Philanthropies, Data for Health Initiative: Melbourne, Australia.

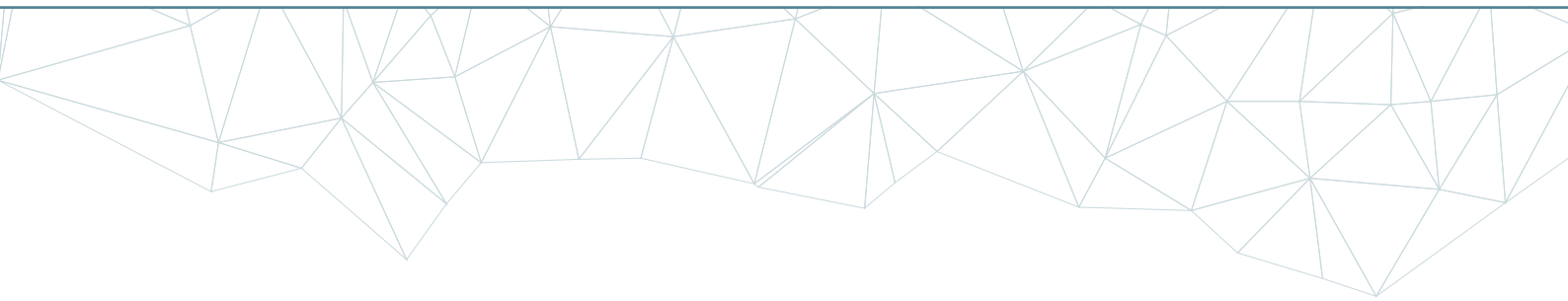
University of Melbourne (2017). Understanding country CRVS systems: the importance of mapping processes. CRVS Roadmaps for Action. Civil Registration and Vital Statistics Improvement Group, Bloomberg Philanthropies, Data for Health Initiative: Melbourne, Australia.

### Recommended further reading

Cobos Muñoz D & de Savigny D (2017). Process mapping and modeling: a tool for visualizing system processes from end-to-end. In: de Savigny D, Blanchet K & Adam T (eds). *Applied systems thinking for health systems research*. Open University Press, Maidenhead, UK.

Owen M & Raj J (2004). BPMN and business process management: introduction to the new business process modeling standard. BP Trends.

Africa Programme for Accelerated Improvement of Civil Registration and Vital Statistics (APAI CRVS). *CRVS digitisation guidebook 2016*. Available from: [crvs-dgb.org/en/](http://crvs-dgb.org/en/).



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Civil Registration and Vital Statistics partners:



**THE UNIVERSITY OF  
MELBOURNE**

**For more information, contact:**

**E: [CRVS-info@unimelb.edu.au](mailto:CRVS-info@unimelb.edu.au)**

**W: [mspgh.unimelb.edu.au/dataforhealth](http://mspgh.unimelb.edu.au/dataforhealth)**

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