

Part I. Motivation and foundation

Table 1. Current Motivation and Foundation Review

Section	Section Name	Description, Topics	Comments	Perspective	Readability	Intent/ usefulness	Suggestion
0.0	Preface	Definition of symbolic information, interpretation, SOLOR is infrastructure.	At a very high-level this is what SOLOR is	High-level	Good, not too technical	Useful for orienting people to one of the goals of SOLOR which is to provide a user-friendly way to navigate disparate content	
0.1	Motivation and foundation	Gaps in C-CDA citing whitepaper to call out gaps in adherence to standard terminologies. The architectural stack is introduced.	Percent breakdown of gaps in C-CDA by source terminology. I think a lot could be added to this section.	In the weeds, introduce SOLOR, define architectural stack	Okay, but if this is the first part people read we should set the stage and introduce basic concepts	Why should people care about the remaining 400 pages?	Each of the layers in the architectural stack should be defined at a high level. In defining SOLOR, we say it should be working hand in hand with the clinical statement model, but the clinical statement model is not yet defined. The current challenges that close the section are broad and not well defined
1.0	SOLOR	Essential challenge of informatics and why we should care about		Technical, very high level about health informatics	Jargon heavy	Explain why we should care about foundational problems with	Not clear what knowledge assets are. This section

Section	Section Name	Description, Topics	Comments	Perspective	Readability	Intent/ usefulness	Suggestion
		knowledge assets				application of codes and terms .	could be simplified.
1.1	The Menagerie	Defines health informatics architecture and says that there are many disparate terminologies that are neither coordinated in their authoring nor in their update process.		Technical, very high level about health informatics			This section, as it is, should be named "Health Informatics Architecture". If we want it to be about the menagerie then we should define examples of disparate clinical terminologies in this section.
1.2	Semantic Interoperability Architecture	Defines semantic interoperability architecture, but then goes on to say that the purpose of this document is NOT to define semantic interoperability but to define foundational interoperability.	Explains how SOLOR uses SNOMED CT, LOINC, RxNORM to build coherent architecture	Technical	Convolved	The numbered bullet points highlight how SOLOR aims to build its architecture at a high level	
1.3	Life Critical Systems (All)	SOLOR should support life-critical systems. This section goes on to define many facets of life-critical		Very high-level about life-critical systems and software	Flow could be better	Explain how SOLOR is useful in the grander scheme of things.	Give examples of how exactly SOLOR supports each of the sub-headers in this section.

Section	Section Name	Description, Topics	Comments	Perspective	Readability	Intent/ usefulness	Suggestion
		systems. This is at a higher level than the previous sections about health IT systems overall and not specifically about architecture.					
1.4	Architectural Challenges (All)	Challenges related to building architecture that supports terminology models. Again, these are back in the weeds related to architecture.	I like this section, but it should be later in Part 1	In the weeds about integrated terminology systems		This is useful in highlighting that there are challenges to consider.	Move towards end of the section
1.5	SOLOR enabling milestones (All)	List of other efforts like UMLS, SNOMED CT etc. This is broader again describing various terminologies and coordination efforts.	These should be defined earlier in the Menagerie in my opinion	In the weeds about terminology			Move into Menagerie section and abbreviate it?
1.6	Data Elements Modeling	Clinical data elements, how these relate to statements and how SOLOR may help. This section on its own is a self-contained	Defines data elements and their common attributes, goes on to explain how SOLOR would assist.	Informatics-specific perspective	The section reads well but doesn't fit in with the other topics		This entire section seems out of place here

Section	Section Name	Description, Topics	Comments	Perspective	Readability	Intent/ usefulness	Suggestion
		white paper. This should be a separate section, out of place.					
2.0	ISAAC	Architecture: definitions of foundational, interaction architecture. The benefits of having layers in the architectural stack.	Good definitions, but should be grouped together with section 1.2 above.	Technical, in the weeds about SOLOR architecture	Jargon heavy but it's decent		
2.5.1, 2.5.2	Benefits of derivable layers, Binding between layers	Benefits of derivable layers should probably go with the introduction of the architectural diagram at the start of the section.	Architecture				
3.0	KOMET	This section is empty	Look at Frozen Compendium: 21, 9, Appendix A				

Overview of current SIA part 1 structure

"The Preface is about symbolic info and interpretational infrastructure. The motivation section sets the stage by describing CCDA's and lack of mapping to terminologies. Integrated terminology model is needed. The motivation section then mentions the architectural stack and 2 broad challenges related to the architectural stack.

The book starts with Chapter 1 called SOLOR with a description of the overall challenge of informatics and why we need improved systems for CDS, patient safety etc. Then the paper defines health informatics architecture, and points out the menagerie of various terminologies that are not coordinated in their processes. Next, the semantic interoperability architecture is introduced; however the scope of this document is to describe the foundational architecture NOT the semantic interoperability architecture.

The following section introduces life-critical systems and how a foundational architecture is needed to save lives.

Next, the text goes back into the details of architectural challenges related to terminology models. After this we get a description of various terminologies and coordination efforts that have enabled SOLOR.

Chapter 2 brings us back to informatics architecture again, providing definitions of foundational and interaction architecture and the needs for the architectural layers. Then we dive into the benefits of the layers.

Chapter 3 is reserved for KOMET which is blank. "

Recommended SIA part 1 structure

Table 2. Recommended Part 1 Structure

Section	Description
Preface	The goal of this book to describe informatics architecture. Define this at a high-level somehow.
Motivation and the Architectural Stack	Setting the stage, starting first with why informatics is of urgent importance for CDS and patient safety. Then, define the essential challenges of informatics. Perhaps here mention that the scope of this book is to define and explore informatics architecture.
	Informatics Architecture: definitions of foundational, interaction architecture etc. The benefits of having layers in the architectural stack.
	Broadly introduce the architectural stack and a overall definition of each.
	Life-critical systems need this sort of architectural stack upon which they can save lives.
	Design principle
Foundation Intro	Definitions for building blocks : concepts, semantics etc
	Introducing health informatics arch. and disparate terminologies. Deep dive into SNOMED CT, LOINC, RxNorm, UMLS etc. and how these efforts are siloed.
	Introduce the notion of informatics architecture. Re-iterate the fact that this chapter focuses on the foundational level of the stack.
	Description of Foundational Layer: [this is a bit of a black box to me]
SOLOR back-end	SOLOR' Architecture will help provide an integrated model. Describe the transformation process, chronology process.
	Architectural Challenges we must address
SOLOR front-end	KOMET: Knowledge management environment is the user-interface to the front-end. Define user-interface principles, DevOps processes.

Recommended Part 1 (Opening) structure

PREFACE

States the goals to explore informatics architecture.

MOTIVATION

Begin by highlighting medical errors and how health IT can assist and save lives. Then, the essential challenge of informatics is defined and discussed which has limited our ability to truly be effective. In this book we will define and explore informatics architecture.

Definitions for informatics architecture: what is foundational architecture and interaction architecture. Introduce the architectural stack and overall definition of each layer. Discuss the benefits of a architectural stack composed of layers.

FOUNDATION

Define building blocks of foundational/semantic informatics: concepts, semantics, etc. Then introduce and describe health informatics architecture, including the landscape of disparate terminologies. Describe SNOMED CT, LOINC, RxNorm, and efforts like UMLS are siloed.

RE-introduce the notion of informatics architecture. Re-iterate that this chapter is about the foundational level of the stack. The description of the foundational layer will follow [this is a black box to me].

The section that follows will include SOLOR and how it helps the foundational layer. SOLOR's architecture and architectural challenges that remain to be solved will be discussed. Finally, SOLOR's front-end knowledge management environment will be described, including important design elements that were incorporated. "

A recent whitepaper² cited that great strides have been made in healthcare data interoperability in the past decade... the vast majority of clinicians and patients have access to some portion of their health data in electronic format, thanks to the proliferation of electronic health record (EHR) systems installed in clinical care environments. The data in these EHRs usually follow HL7's Consolidated Clinical Document Architecture (C-CDA) as it has become the generally accepted primary data standard for structured clinical data exchange.

However, the whitepaper also found that significant gaps exist in the accurate encoding of the data contained in those C-CDA documents – in an analysis conducted of C-CDA documents produced by various EHR vendors and clinical organizations, the four most frequent problems identified as part of this analysis were that medications should be encoded in RxNorm (frequency of medication appearing in 13.7% of sampled test case documents), vital signs and results should use LOINC (9.2% of sampled documents), vital signs, and results should use unified code of units of measure (UCUM) for physical values (8.7% of sampled documents) and the inclusion of conflicting status information for medications (6.7% of sampled documents)³.

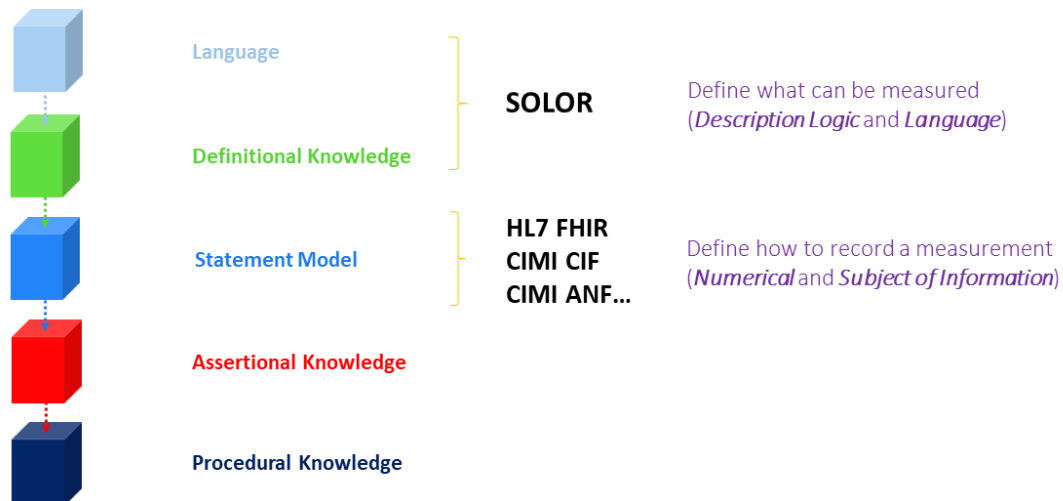
These issues can have a direct impact on patient safety and point to the need to be able to consistently represent and encode clinical data and observations. This is the next great challenge to conquer for health data interoperability to positively influence patient outcomes nationwide through clinical decision support.

SOLOR (System of Logical Representation) is an effort that is directly tackling these issues of representation. SOLOR is an integrated medical terminology system, based on the overlapping but distinct terminology systems of SNOMED, LOINC and RxNorm. SOLOR was designed to unambiguously define what can be measured (concepts). Working hand in hand with SOLOR, there needs to be a clinical statement model, of which there are quite a few (HL7 FHIR, CIMI, ANF) which defines how to record a measurement. Measurements may be quantitative or existential.

The following diagram shows how SOLOR and clinical statement models are interrelated in the architectural stack:

²John D. Amore, et. al; "Interoperability Progress and Remaining Data Quality Barriers of Certified Health Information Technologies", July 6, 2018

³Ibid, Page 6

Figure 1. Architectural Stack - proposed new graphics

Current challenges include the following:

1. Further tooling and guidance need to be developed to be able to show how concepts can be modeled in SOLOR and particular statement models applied
2. Gaps need to be addressed in the various statement models in terms of representing measurements consistently, especially with existential (non-quantitative) measurements

ab

DRAFT
