HSPC’s Impact to the Health Industry

2018-2024 Roadmap

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# Executive Summary

(Needs to be done)

# Introduction

*Note to Reader: This document is an early draft. The content is in the early stages of development and is provided for review, comment, and refinement.*

## Purpose of this document

HSPC has outlined a vision of the future of healthcare leveraging health information technology as a transformation agent to help realize and enable a future state of information and knowledge sharing, data availability, effective use of that information to help foster improvements in care and ultimately patient benefits and individual wellness. To realize these lofty goals necessitates the alignment and coordination of multiple efforts concurrently, and the mobilization of the HSPC community to work together and in concert to realize our objectives. The HSPC Roadmap play a key role in achieving this.

As an open community with a diverse membership, determining how the pieces fit together is essential in realizing our future vision. In particular, understanding how different activities and projects relate, determining the “critical path”, establishing shared community priorities, and articulating our community journey are all key elements that are essential if HSPC is going to deliver on our intended objectives.

This Roadmap serves several specific objectives:

* It parses a very complex domain space into smaller “swimlanes” allowing both the general public and the HSPC community alike to see the key elements of focus comprising the future state
* It defines the core set products to be developed by or within the community
* It identifies tangible milestones, organized both by “swimlane” and by time, setting expectations for outcomes to be achieved by the community.
* It reflects a set activities deemed to be shared priorities for the majority consensus of the HSPC community.
* It defines a set of expectations intended to relate to the broader community and non-HSPC stakeholders interested in leveraging HSPC work.

Note that there are other activities happening within HSPC that may not appear within the Roadmap. It is important to note that this is to be expected, and that activities will migrate from “incubator” activities into the HSPC critical path, reflected in this document. The Roadmap is a living document, expected to be low volatility, but with anticipated annual updates.

## Why produce a Roadmap?

As discussed above, HSPC has a broad membership with a diverse set of interests. One of the challenges with such a diverse and dynamic community is that there are thousands of worthy efforts and activities. That said, clearly defining if and how those pieces fit together, and more importantly how they complement one another to achieving the intended target state is murky at best without a plan. The Roadmap is that plan.

By applying good Enterprise Architecture principles, the HSPC Roadmap builds upon strategic planning and business transformation practices to elaborate the future-state vision and depict the path the HSPC community has chosen to achieve it. It provides an “at a glance” view of the principal activities underway within HSPC, and establishes the basis for business case for onboarding new members and resources to contribute to key activities needed for the industry.

By applying good Enterprise Architecture principles, the HSPC Roadmap builds upon strategic planning and business transformation practices to elaborate the future-state vision and depict the path the HSPC community has chosen to achieve it. It provides an “at a glance” view of the principal activities underway within HSPC, and establishes the basis for business case for onboarding new members and resources to contribute to key activities needed for the industry.

The Roadmap helps to focus the membership on the important by taking into account the interrelationships among activities. Any one organization can (and does) undertake specific projects to achieve their intended purpose, but rarely do those efforts have an amplified effect of changing the industry. Through the strength of community and the reach of the HSPC organization, there is an economy-of-scale impact, building on prior work and fostering sharing, co-investment, and encouraging a broader adoption that would be achieved otherwise.

In our community experience, the HIT industry is very much in need of a cohesive vision of the future, and the HSPC Roadmap serves both to help define such a vision, and articulate the path toward realizing it.

## What this document is (and isn’t)

The HSPC Roadmap represents the critical path milestones and products that comprise the mainstream critical path of work crosscutting HSPC community efforts. A set of very specific inclusion criteria (e.g., role in achieving the target state, applicability across projects/efforts, etc.) as applied to determine which milestones were appropriate for inclusion in the Roadmap. (Please reference Section 2.2 of this document). In a nutshell, you will notice only those activities that benefitted multiple projects and that were enablers of the future-state vision were included. This approach keeps the Roadmap focused on the mainstream of the ecosystem and how that will achieve community goals. It identifies key priorities, illustrates the relative timing of work being performed, and creates an “at a glance” view for HSPC community activities represented in broad strokes.

Not every project or HSPC activity will appear on the Roadmap – it is not a community inventory. Instead, it is an at-a-glance view of those project deemed as critical path toward achieving the target-state vision defined by the community. HSPC does and will continue to foster incubating projects that have not yet matured to be included on the roadmap, and other community artifacts are important but not necessarily critical path, and those are not included.

The Roadmap is not, nor is it intended to be, a project management artifact or a holistic inventory of all efforts occurring under the HSPC umbrella. While the Roadmap does identify key community deliverables and milestones, it is a complement to traditional project management tools, and by design does not include internal project activities or deliverables.

Finally, the Roadmap does not limit the work that might be performed within the HSPC community – it merely reflects the mainstream of HSPC work by depicting strategic priorities of the community along architectural lines to “separate concerns”. The community can and will undertake additional efforts, as incubator projects, as member-driven initiatives, and as community efforts, all of which are appropriate and to be expected.

## How to use this Document

This document has several intended uses, which vary fairly significantly depending upon your organization and its objectives. These can be broadly categorized into Industry, HSPC Community use, and HSPC Member Use. A more detailed treatment of these perspectives is available in Section 5, but are summarized here for convenience.

From the Industry View, the Roadmap serves as a communications vehicle to document and illustrate our primary focus and journey. The roadmap identifies major areas of activity, key milestones and product deliverables developed or fostered by HSPC, a timeline during which activities are occurring, and a classification of activities. Taken together, this provides HSPC the means to set expectations of interested parties so that they might make plans to consume relevant HSPC products, to co-invest in areas self-interest to further industry goals, and to determine the fitness-for-purpose of HSPC work to their own organizational needs. In fact, many organizations have elected to participate in HSPC as a way to amplify the impacts of their investment, realizing an economy-of-scale benefit.

Within the HSPC Community View, the Roadmap serves primarily as an organizing and prioritization function. As a broad and diverse community, one significant challenge relates to bringing different organizations “onto the same page” in terms of priorities and work efforts. In order to be successful as a community, a thoughtful course must be charted to provide the semantic and technical infrastructure enablers that can be used by projects and community stakeholders as the basis for building the future state. The Roadmap provides that structure.

The development methodology for the roadmap considered the HSPC Mission and Goals, the community’s Strategic Initiatives, existing projects, aspirational goals and needs, and industry gaps and risks. These were then analyzed to consider inter-project dependencies, architectural considerations, and the financial model/viability of HSPC to create a critical path.

The HSPC “adopted” Roadmap reflects a community consensus – the agreement among a strong supermajority of the HSPC membership, serving as a guide to both maintain focus on our overall objective, and to define interim deliverables that advance HSPC’s cause. The Roadmap is a living document, but is expected to be low volatility, with updates occurring annually to accommodate changing needs, but avoiding frequent dramatic shifts so as to allow us to remain steadfast in achieving community priorities.

Specific goals of the Roadmap within the community include:

* Articulating of externally-facing project deliverables
* Improving understanding of cross-project dependencies
* Establishing Phased Deliverables of major sets of capability to the marketplace
* Indicating and advancing overall community maturity and that relationship to project activities (e.g., improved governance, availability of community assets, etc.)
* Scoping HSPC work / priorities
* Attracting new members and participants

The HSPC Member View differs from the community view in a few significant ways. The expectation within this perspective is that members engage and participate in their self-interest. It is important to note that a member self-interest is not necessarily in conflict with a community interest, and in fact these are often aligned. That said, they are distinct differences. HSPC members are likely to use the Roadmap document to determine specific projects, deliverables, or milestones of direct interest, and to determine the extent to which they plan to engage or consume those assets.

We expect HSPC members to advocate for their priorities within the overall community, building agreement and adding new activities to the critical path as deemed appropriate by the community. These priorities will help drive investment decisions, both in terms of direct resource contribution toward specific efforts, or cost-avoidance by consuming efforts being done by others within the ecosystem. It will also help members align with broader interests, fostering interoperability on a bigger scale and better positioning participating institutions to take advantage of the advances being developed.

## Introducing the T-Map Construct

At the heart of this roadmap document is a central graphic called a “Transition Map” (abbreviated as T-Map). This graphic depicts an “at a glance” visualization of this complex domain space. The work is based upon a methodology from The Open Group (<http://opengroup.org> ), usedwith permission.

The principal objective of the T-Map is to illustrate the transitory path from a current “As Is” state toward an intended “Future State”, depicting the milestones as way-points to be achieved during the transition. Within its construct, activities are grouped into cohesive “swimlanes”, each of which maintains a directed focus around a specified theme representing a key dimension of the problem space.

These swimlanes are not categories and are not mutually exclusive. They are perspectives, looking at the problem space from a particular point-of-view, and highlighting milestones and considerations reflected from that point of view. Architecturally speaking, this is a “separation of concerns”, where each swimlane represents a different dimension of this health information technology landscape. For this reason, it is common for one project or activity to have milestones in multiple swimlanes, and that occurs in this HSPC T-Map.

As depicted in Figure ***n***, the T-Map construct is comprised of five core elements:

Figure . Transition Map Graphic Core Elements

1. Current State
2. Future State
3. Segments and Swimlanes
4. Phases
5. Milestones

A brief description of each of these elements is described in the paragraphs that follow. These descriptions will introduce the role of each element, and then contextualize the element around its specific use for the HSPC Roadmap. You will find more detailed substantiation of the content of each section in subsequent sections of the document.

**Current State (“1” on the figure).** The *current state* appears on the T-Map as a box in the lower left corner, and will contain approximately 5-7 bullet points describing the state of the industry as it stands today. The objective of this element is to resonate with the reader, calling out exemplary characteristics of today’s environment that contextualize the problem space. For HSPC, the Current State describes the key interoperability challenges and fundamental realities of HIT today, many of which are the areas HSPC hopes to improve through our work.

**Future State (“2” on the figure)**. The *future state* appears on the T-Map as a box in the upper right corner, and will contain approximately 5-7 bullet points describing the aspirational future reality that we intend to realize. These bullets taken together describe the world as we would like it to be. For HSPC, the Future State was based upon the intersection of the HSPC Mission and Goals, extended to consider community input, active and planned work, and strategic initiatives.

**Segments and Swimlanes (“3” on the figure).** Reflected on the diagram as the “sunburst” from the upper right corner, the segments on the diagram each represent a specific perspective on the problem space, and summarily described by a principal problem statement appearing along the boundary of each swimlane. One of the challenges of describing a very complex domain stems from the number of interacting concerns, and the fact that in fact all of them must be considered and addressed if the intended future can be realized. The swimlane construct simplifies these complexities by “telling the story” one perspective at a time, while recognizing the interdependencies among them.

For HSPC, we have identified six *swimlanes*: Data, Knowledge, Business, Security/Privacy, Technical Infrastructure, and Software. We have also elected to “pair” swimlanes together, recognizing that particularly within the identified pairings there were significant co-dependencies. The pairings, defined as *segments*, are **content** (comprising Data and Knowledge), **context** (comprising Business and Security/Privacy), **platform** (comprising Technical Infrastructure and Software). Rationalization of why these were chosen and their content will be described in later sections.

**Phases (“4” on the figure)**. Appearing as radial arcs, the *phases* within the T-Map represent time. The outermost band is the present day, with the innermost band reflecting the penultimate state. Note that the phases transcend the swimlanes, and in fact help to unify activities and milestones across the entirety of the effort, helping to group activities and milestones. For HSPC, these phases represent “major deliverables” from HSPC, and can be anecdotally considered HSPC 1.0, 2.0, 3.0, etc., with each “major release” including the collective set of products, guidance, capability, and content that HSPC has produced in that phase. We have elected to define phases as two year intervals, with Phase 1 completing at the end of calendar year 2018.

**Milestones (“5” on the figure)**. Within each swimlane are identified a number of milestones, each of which indicates an objective, measurable point indicating the completion of an activity within that lane. The milestones represent the path from the “As Is” to the “Future State” for each swimlane, and tracking achievement of those milestones evidences progress of the community. These milestones communicate expectations within and beyond the community, and indicate the scope of activities within each lane. For HSPC, a set of formal inclusion criteria was applied to determine which milestones were appropriate for the community roadmap. Please refer to Section *nn*. Finally, note that these milestones do intersect with project planning activities, but that they themselves are NOT that project schedule.

# HSPC-driven Health Industry Transition Map (T-Map)

## Future State Vision

The Health IT industry is at a crossroads, and if we are to realize the promise of a learning health system there are a number of foundational elements that either do not exist, are immature, or are poorly adopted that are adversely affecting our ability to achieve. HSPC has a critical role to play in transforming the health IT sector to be able to achieve this promise. We believe that full system transparency is essential, allowing information to freely flow where and when it is needed. The push toward value-based will be built upon a basis of evidence that needs to be collected, measured, and ultimately driving continuous improvement.

Positioning the health industry to more effectively engage in and adopt rapid innovation will fuel these improvements, allowing for new ideas and solutions to effectively and seamlessly integrate with legacy solutions, and to accelerate the pace of adoption making it less painful to realize benefits from new approaches and new technology.

Workflow, clinical knowledge, and evidence-based medicine all continue to advance beyond the ability for most care organization’s to be able to keep pace. By instituting approaches and tools to improve the portability, consistency, and availability of these process and clinical assets, healthcare providers can improve their efficacy, more freely share and collaborate on best-practices, and provide a sound underpinning to assist caregivers in making timely, informed, compliant decisions consistent with institutional policies and national regulations.

Key to achieving this future state is the establishing of common understandings and representations of data to achieve full semantic interoperability, and in doing so reducing development time, burden, cost, and in fostering an open ecosystem and marketplace for HIT innovation.

HSPC has a role to play in this transformation, not only in providing technical and content solutions to these challenges, but as a trusted intermediary helping establish the gold-standard of interoperability in part by providing conformance testing and helping assure interoperability capabilities by establishing a proven evidence base.

The above objectives were determined by consensus, taking into consideration the HSPC Mission and Vision, review of strategic initiatives, and an informal survey of HSPC members and their specific needs. The process resulted in dozens and dozens of potential impact areas and goals, many of which were laudable but perhaps not well aligned to the skills and capabilities of HSPC and its membership. Through iterative refinement, considering what the HSPC community could best provide and impact, we settled in on the above as they key defining characteristics of the future we are trying to enable.

As exemplars, HSPC has several key projects underway that are helping to achieve this vision. The HSPC Sandbox project allows teams to rapidly create and leverage a host of tools in support of SMART on FHIR applications, virtually eliminating technical startup burden for SMART project development. HSPC CIMI work is developing rich content models that are standards-based, that leverage broadly accepted clinical terminologies, and that are semantically unambiguous, fostering broad sharing of health information that can, for example, be used for direct care, can leverage clinical decision support, and supports secondary use analytics. The SOA Platform effort is establishing a service bus of health-oriented SOA services supporting capabilities such as the distribution of clinical content, the availability of core functions such as master person index, terminology services, and others – the essential building blocks for inter and intra-institutional sharing.

## Inclusion Criteria – What belongs on the Roadmap?

Since the Roadmap represents the mainstream projects and the critical path to achieving HSPC’s vision, by design it is not a complete inventory of activities or milestones. With dozens of projects today, likely to grow to hundreds in the future, a consistent set of criteria had to be established to maintain the integrity of the roadmap.

* Activities/milestones need to affect the “future state” vision
* Achievable/practical
* Openness, vendor neutral
* Impact more than one effort or stakeholder group
* “In our wheelhouse”

To set expectations correction, the Roadmap is a mathematical “intersection” among HSPC efforts, identifying those milestones that both support multiple projects or initiatives, and supportive of the target future state. (Note that it is deliberately NOT a mathematical “union” of all products, milestones, or activities occurring in HSPC).

Figure . HSPC Roadmap Inclusion Criteria

Figure *n* enumerates the criteria that have been used as the “gate” to assess potential roadmap milestones. While somewhat simple in nature, these criteria assure that the high-level granularity of the Roadmap is maintained, and that it does not devolve into a project management asset for any one specific effort.

# Transition Roadmap (T-Map)

The Transition Map is the focal component of the HSPC Roadmap. It was created through an iterative process of brainstorming, analysis, and modeling, with each step being assessed for fitness-for-purpose based upon the intended goal of articulating the areas of priority for HSPC and the scope that the community felt was key to achieving our mission.

**Background and Process.** Initially the “As Is” and “Future State” sections were documented to frame the work. Based upon that understanding, consideration was given as to which “dimensions” would be most effective as swimlanes. Since the swimlanes determine the ultimate focal paths around which the thinking is organized, this step is particularly important. In fact, the group underwent several iterations of swimlane elections before the baseline set was determined. Some lanes, such as the “Knowledge” lane reached an early consensus, while others (e.g., the “Software” a “Technical Infrastructure” lanes) underwent much more discussion.

The concept of grouping the swimlanes into “segments” stemmed from practicality. While subsequent refinement work was underway, many milestones vacillated between lanes as a result of subtleties unsurfaced in the analysis. There was a natural cohesion among certain themes, such as Knowledge and Data/Information. Additionally, the community interested in the corresponding topics were often the same. The resultant decision was to create Segments to recognize this cohesion of topics.

**Reading the Diagram.** There is no intended way for this diagram to be consumed. One of the strengths of the T-Map construct is that it represents multidimensional data. Those interested in understanding the overall journey to the intended target state can begin their exploration with the key themes for each swimlane (appearing on the radial lines for each swimlane segment). Others may have interest in which capabilities are to be delivered when, for which the Phase Orientation (in the radial arcs) would be more useful. Note that the following sections of the document provide detailed breakouts elaborating the content of the T-Map along both Phased (time-oriented) and Swimlane (topic-oriented) axes.

Note that the positioning of swimlanes is somewhat arbitrary, and that no swimlane is more important than the others. All of the swimlanes are critical to achieving the future state. One of the key benefits of this representation for HSPC is that it does bring together diverse skillsets and specialty expertise onto one diagram, providing a more broad perspective than can often be achieved in other visualizations.

SUMMARY PARAGRAPHS HERE FOR EACH SWIMLANE. 2 sentences that boil down the activities within that lane to the 50k foot “senior executive” view.



Figure . HSPC Transition Map, 2017-2024

*The section will close with a summary paragraph articulating in words what the visual says in pictures. This paragraph is intended to be the Executive Summary of the overall roadmap, as concisely as possible describing our plan and our vision.*

# Phase-oriented View

The HSPC Roadmap has been defined in four phases of activity to begin in 2017 and running through approximately 2024, with each phase lasting for approximately two years. The intention of the phasing is to define “plateaus” of functionality – organized as major releases of HSPC Community products – setting delivery goals for within the community and setting expectations of consumers of HSPC work.

As might be expected, the community visibility into the content of Phase 1 is more rich and likely more accurate that our vision for Phase 4. We have a much better handle on the work that is underway today and the current market forces influencing that work. As we traverse the roadmap to the out years, many more variables are in play, and the dependencies on prior year work become stronger. As such, the milestones identified and described for the out-years will likely be less precise and less specific than work being performed sooner, and we will have higher confidence in closer-in work at this stage. The annual refresh cycle, by design, will allow practical experience to influence our strategic plan, maturing this Roadmap over time.

One of the key objectives of the phasing is to define the “major chunks of capability”, which can loosely be considered our integrated product release. If we consider the assets available today as HSPC 1.0, then one can consider the completion of Phase 1 to be the HSPC Version 2.0 product, with each subsequent phase producing the next major release.

The analysis work reflected by the milestones that have been identified in each swimlane serves to scope the priorities of the HSPC community, and their placement into Phases indicates the capabilities to be delivered considering Time as an axis. Generally speaking, milestones in Phase 2 depend upon deliverables from Phase 1, and so on.

The four sections that follow provide a vignette as to what will be delivered in each phase, and discuss the business implications of the capabilities for each HSPC release.

## Phase I (Present through 2018)

The principal focus of this phase is to establish foundational infrastructure and capabilities to position the community to take on more advanced work beyond Phase 1. To realize the vision supported by open platforms and the unfettered exchange of meaningful and semantically consistent health information, a number of foundational tools, content, and process artifacts are missing that need to be either created or matured to meet industry needs.

Phase 1 will see the establishment of core services in areas of terminology and authoring, repository support, organizational assessment and readiness tools, and underlying processes for curation, management, acquisition, and deployment of HSPC assets within healthcare institutions. Refinement of existing community processes and policies will continue, such as intellectual property licensing, community compliance and certification, and so on. Content development will result in publication of HSPC knowledge for specified domains, forming a foundation that will be broadened in subsequent phases.

Core components of the HSPC Platform will be specified, forming the basis for subsequent certification activities, and select services will be available as executable and deployed into HSPC test environments.

(Summary of other key outcomes here)

Highlights of the key business capabilities available at the conclusion of Phase 1 appears in Figure n, following, and relates those highlights to corresponding projects or deliverables. This deliverable set is not exhaustive, rather it is representative of work being performed in that phase as related to the business objectives identified.

|  |  |
| --- | --- |
| Capabilities Provided | Representative HSPC Product(s) |
| Establish foundation for open system creation, acquisition | * Standards Adoption Policy Recommendations |
| Support for organizational readiness assessment and planning | * HSPC Enterprise Readiness Strategy and Implementation Guide * Organizational Governance Model for Knowledge Content |
| Publish Foundational Knowledge Content | * Produce HSPC CIMI Models and FHIR Profiles for select domains (Laboratory Results (including pregnancy tests), Vital Signs, Wound Assessment, Pain Assessment, Pulmonary Embolysm, and Neonatal Admissions Assessment) * Develop model patterns to support VMR, QDM, FHIR, CEM |
| Establish core tooling environment | * Establish Knowledge Repository * Publish Marketplace API Specification * Establish Terminology Services * Establish Knowledge Authoring Environment |
| Establish baseline of security services | * Provide core services for identity management, authentication, authorization, audit, confidentiality, integrity. * Document expected security best-practices |

## Phase 2 (2018 through 2020)

Loosely characterized as an elaboration phase, this Roadmap stage is the predominant launch of many new HSPC efforts, now realizable as a result of the foundation established in Phase 1. For many sustained efforts, iterative refinement continues, and the elements to be able to define and test what it means to be “adopting HSPC” is created.

From a Business perspective, the conclusion of this phase provides HSPC stakeholders and consumers with a Maturity Model and a robust suite of self-assessment tools, allowing them to determine risks and gaps in their own organizational portfolios and assisting with navigation to relevant community assets. This phase also brings the underpinnings for certification, including a self-certification toolkit as part of the full HSPC Interoperability Toolkit envisioned in later phases.

The HSPC tooling portfolio, particularly related to terminology authoring and support, becomes available with the delivery of the HSPC Knowledge Representation toolset, supporting the view, review, curation, environment, and access API to this resource.

Knowledge produced and curated by HSPC expands commensurate with the availability of enhanced knowledge authoring and management environments. IN addition to information and terminology models, the scope of curated content expands to include clinical decision support and workflow models.

Security capabilities continue to mature, and inclusion of “Opt-In” capabilities become available.

(Summary of other key outcomes here)

Highlights of the key business capabilities available at the conclusion of Phase 2 appears in Figure n, following. The table indicates the business capability realized, and then relates some of the specific products delivered that support that capability in the corresponding column.

|  |  |
| --- | --- |
| Capabilities Provided | Representative HSPC Product(s) |
| Deployment of HSPC Knowledge Representation Tool Suite | * Knowledge Authoring Environment * KR View, Review, Curation Tools * Modeling Authoring Environment |
| Improved alignment among industry semantic models | * Process for surveying Terminology Standards and Info Models * Development of CIMI Model Patterns |
| Release of Clinical Decision Support content/knowledge | * Defined CDS Knowledge Artifacts * Care Process Resource Model |
| Enhanced User Experience consistency | * Example Display Components for UI |

## Phase 3 (2020 through 2022)

Phase 3 can be broadly characterized as the general availability of integrated HSPC Platform capabilities, processes, and knowledge. Prior to this phase, HSPC projects and activities were mutually-aware but largely loosely dependent. Beginning in Phase 3, those interdependencies among activities become more closely bound, forming more integrated suites of capability allowing HSPC consumers to benefit from higher orders of value.

The maturation of HSPC technical services into integrated suites, forming the basis for the HSPC Platform and its certification efforts brings together technical components and begins to foster execution-time consumption of knowledge artifacts created. Infrastructure established in this phase allows for the curation, management, and distribution of process models, and sees in compliance criterial to allow for validation and vetting of those models.

With the underpinnings largely complete, early stages of more complex, composite goals can be fostered, such as improving transparency and visibility into metrics across processes, and the establishment of analytics capabilities.

SOA Governance is now in place, allowing for the integration, oversight, and certification of products and platforms as HSPC compliant.

(Summary of other key outcomes here)

Highlights of the key business capabilities available at the conclusion of Phase 3 appears in Figure n, following. The table indicates the business capability realized, and then relates some of the specific products delivered that support that capability in the corresponding column.

|  |  |
| --- | --- |
| Capabilities Provided | Related HSPC Product(s) |
| Analytics Services | * Analytics Model Sharing * Analytics Compliance Self-Assessment |
| Enhancement of computable model execution environments | * Publication/subscription/notification services * ADL/AML to FHIR Services * Artifact/Model Transformation Tools |
| Extended and enhanced clinical knowledge catalog | * Refined and matured knowledge authoring, workflow models, care process models |
| Security infrastructure services substantially available | * Attributed-based Access Control * Secure Delegated Access * Share with Protection |
| Sharable clinical workflow models | * BPM For Health Model Repostory * Hosted Clinical Workflow Modeling environment |

## Phase 4 (2022 through 2024)

As the final phase, the conclusion of Phase 4 sees a fully realized and thriving HIT ecosystem, fueled and fostered by innovations from HSPC and beyond. Tooling is available, mature, and under ongoing refinement to support the knowledge, processes, and software supporting the provision of healthcare and maintenance of health.

Available to the industry are self-assessment tools, implementation guidance, asset repositories, and certified solutions that are fit for purpose to help realize value-based care and support learning health systems. HSPC’s Interoperability Toolkit is a practical and valuable indicator helping organizations make informed decisions, and HSPC’s marketplace is a trusted delivery channel for the discovery and acquisition of relevant software and content supporting the delivery of health IT solutions.

(Summary of other key outcomes here.)

Highlights of the key business capabilities available at the conclusion of Phase 4 appears in Figure n, following. The table indicates the business capability realized, and then relates some of the specific products delivered that support that capability in the corresponding column.

|  |  |
| --- | --- |
| Capabilities Provided | Related HSPC Product(s) |
| Clinical Knowledge Marketplace / Content Ecosystem | * HSPC Marketplace * Executable Workflow Model compliance testing |
| Interoperability Assessment and Compliance | * HSPC Interoperability Toolkit * SOA Platform Certification |

# Swimlane and Segment Detail

In this section, we explore each of the swimlanes (and segments), considering the journey from the “As Is” state to the “Future State”. Each segment was produced by a dedicated project team focused on that viewpoint and with participation from existing HSPC projects and initiatives in that space.

What is reflected in this section is a description of the overall objective of each swimlane, and then a detailed breakout of select milestones illustrative of the work being performed in that swimlane. As previously mentioned, the Roadmap does not and is not intended to be an exhaustive list of all work being performed, nor does all the work of any given project appear in one swimlane.[[1]](#footnote-1)

For the milestones included within this section, you will find a short summary of the work reflected underneath that milestone, the rationale for its inclusion on the roadmap, its relationship to the phased project roadmap (as some milestones are iteratively matured over multiple phases), and identification of specific dependencies where they are known.

## Content Segment

The Content Segment comprises the Data/Information and Knowledge Swimlanes. Its principal concern is about health information, how that information is represented and shared, and about clinical knowledge, and how that is represented and shared. Particularly relevant in this segment is the intersects with other bodies and standards activities, as data representation and clinical content spans dozens if not hundreds of other efforts occurring in multiple standards communities.

The pairing of these swimlanes was fortuitous, particularly as the distinction between information models and knowledge can be somewhat muddled depending upon your perspective and experience. The content segment is elaborated within the swimlane descriptions.

### Data/Information Swimlane

The Data/Information Swimlane complements the Knowledge Architecture Swimlane in that both aim to support “true semantic interoperability” by enabling the structured and declarative representation of clinical care models manifested in captured health data compliant with those models and available to do complex and heuristic inferencing based on that data. This swimlane defines those milestones necessary to have all of the models and tools available to represent medical information and knowledge for HSPC projects and platforms.

#### Data/Information Swimlane Milestones Summary

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Milestone** | **Phase 1** | **Phase 2** | **Phase 3** | **Phase 4** |
| Develop Priority Terminology Management Environment | X |  |  |  |
| Develop CIMI Model Patterns to capture expressivity of VMR, QDM, FHIR, CEM | X |  |  |  |

#### Data/Information Milestones Detail

**Milestone**: Develop Priority Terminology Management Environment

**Overview**: Terminology management is a critical enabler and the foundation upon which information semantics are specified and modeled – a capability that will be used by many other milestones and in support of multiple use cases with dependencies on terminology. This milestone will enable the core of terminology management capability, including support for SOLOR, LOIC, SNOMED, and RxNORM, while providing SNOMED/LOINC integration

**Comments:** This activity will mature and extend into subsequent phases

|  |  |
| --- | --- |
| **Milestone Name:** | Develop Priority Terminology Management Environment |
| **Milestone Type** | Software Deliverable |
| **Applicable Phases** | Phase 1 |
| **Known Dependencies** | Terminology Authoring Environment availability  Terminology Repository availability  Terminology Authoring Process Governance |

\* \* \* \* \*

**Milestone**: Create CIMI to FHIR Transformation

**Overview**: CIMI provides general, foundational models, and the ability to transform these into FHIR will allow them to be exposed as part of the FHIR standard. This activity will encompass authoring declarative transformation for CIMI expressed models.

**Comments:** None

|  |  |
| --- | --- |
| **Milestone Name:** | Develop CIMI Model Patterns to capture expressivity of VMR, QDM, FHIR, CEM |
| **Milestone Type** | Software |
| **Applicable Phases** | Phase 1 |
| **Known Dependencies** | Terminology Management Environment  Profile Management Environment  Terminology File Repository  Profile File Repository  Terminology Authoring Process Governance  Profile Authoring Process Governance |

### Knowledge Swimlane

The Knowledge Swimlane complements the Information/Data Swimlane in that both aim to support “true semantic interoperability” by enabling the structured and declarative representation of clinical care models and providing the infrastructure and tools necessary to create, curate, manage, and distribute that content. This swimlane defines those milestones necessary to have all of the models and tools available to represent medical information and knowledge for HSPC projects and platforms.

#### Knowledge Swimlane Milestones Summary

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Milestone** | **Phase 1** | **Phase 2** | **Phase 3** | **Phase 4** |
| Process for Surveying Terminology Standards/ Information Models |  | X |  |  |
| Create HSPC CIMI Models and FHIR Profiles for Selected Domains | X |  |  |  |
| Develop CIMI Model Patterns to capture Expressivity of VMR, QDM, FHIR, CEM |  | X |  |  |
| Develop Knowledge Authoring Environment | X | X | X | X |
| Declarative Representations of Workflows and Care Processes using Sharable Medical Knowledge Models | X | X | X | X |
| Provide Example Display Components for UI |  | X |  |  |
| Defined CDS Knowledge Artifacts |  | X |  |  |
| Care Process Resource Model |  | X | X | X |

#### Knowledge Swimlane Milestones Detail

**Milestone**: Process for surveying terminology standards/information models

**Overview**: In order to develop reasonable models, a review of existing terminology and information models needs to be undertaken. Establishing a process that can be applied consistently and repeatedly is important as this will be undertaken many times.   
  
A process will be developed and documented outlining steps to survey current standards and information models, including FHIR, when developing CIMI information models.

**Comments:** The intention is to evolve this work from initially documenting activities and maturing the process definition into a semi-automated workflow.

|  |  |
| --- | --- |
| **Milestone Name:** | Process for surveying terminology standards/information models |
| **Milestone Type** | Process Deliverable |
| **Applicable Phases** | Phase 2 |
| **Known Dependencies** | Terminology Management Environment  (into which we can embed the process) Environment availability |

\* \* \* \* \*

**Milestone**: Create HSPC CIMI models and FHIR profiles for selected domains

**Overview**: A foundational product of HSPC, the creation of Clinical Information Models in the form of HSPC CIMI Models and FHIR profiles will allow for robust information sharing. Domains included in this release are Laboratory Results (including pregnancy tests), Vital Signs, Wound Assessment, Pain Assessment, Pulmonary Embolysm, and Neonatal Admissions Assessment.  
  
Specific requirements supported by this milestone include:  
- Creation of sharable HSPC/FHIR profiles for reading data  
- Creation of sharable HSPC/FHIR profiles for writing data  
- Sharable HSPC/FHIR profile for supporting a publish/subscribe environment (including event models beyond store/retrieve  
- Sharable HSPC/FHIR profiles for orders and order sets.

**Comments:** Elaboration of this work will continue in subsequent phases

|  |  |
| --- | --- |
| **Milestone Name:** | Process for surveying terminology standards/information models |
| **Milestone Type** | Content |
| **Applicable Phases** | Phase 1 |
| **Known Dependencies** | Terminology Management Environment  Profile Management Environment  Terminology File Repository  Profile File Repository  Terminology Authoring Process Governance  Profile Authoring Governance |

\* \* \* \* \*

**Milestone**: Develop CIMI Model Patterns to capture expressivity of VMR, QDM, FHIR, CEM

**Overview**: An assessment of VMR, QDM, FHIR, and CEM is required to guarantee that HSPC modeling activities will meet or exceed previously recognized requirements for data models. Subjects of analysis will include:  
  
- Assertion - Procedure including specializations  
- Evaluation Result - Order  
- Lab Evaluation Result (QN, ORD, Nom) - Goal

**Comments:** Elaboration of this work will continue in subsequent phases

|  |  |
| --- | --- |
| **Milestone Name:** | Develop CIMI Model Patterns to capture expressivity of VMR, QDM, FHIR, CEM |
| **Milestone Type** | Content |
| **Applicable Phases** | Phase 2 |
| **Known Dependencies** | Terminology Management Environment  Profile Management Environment  Terminology File Repository  Profile File Repository  Terminology Authoring Process Governance  Profile Authoring Process Governance |

\* \* \* \* \*

**Milestone**: Develop Knowledge Authoring Environment, Versions 1-4

**Overview**: A general environment that supports the use of models in clinical applications, this will be a part of the tooling allowing developers to specify and configure models of data, events, orders, etc. within their applications. The authoring environment will:  
  
- Allow for the creation of new models in a variety of knowledge areas  
- Support different types of users  
- Support the full artifact lifecycle governance

**Comments:** Elaboration of this work will continue in subsequent phases

|  |  |
| --- | --- |
| **Milestone Name:** | Develop Knowledge Authoring Environment, Versions 1-4 |
| **Milestone Type** | Software |
| **Applicable Phases** | Phases 1-4, with incremental enhancement in each phase |
| **Known Dependencies** | Terminology Management Environment  Profile Management Environment  Terminology File Repository  Profile File Repository  Terminology Authoring Process Governance  Profile Authoring Process Governance  Model management and authoring environment  Model Repository  Model Authoring Process Governance |

\* \* \* \* \*

**Milestone**: Declarative representations of workflows and care processes using sharable Medical Knowledge Models, Versions 1-4

**Overview**: Workflow and process models (functional clinical models) are the target of this effort in order to enable and foster the sharing of clinical processes among care institutions more accurately, easily, and quickly. Models developed using industry standard formalisms, such as Business Process Modeling Notation (BPMN) and complementary notations can be constrained by use of process patterns and style guidance to promote portability and sharability.  
  
This activity will include development of process models using BPMN, CMMN, and DMN to create computable guidelines. Candidate areas include PE, HTN, Mental Health, and Pregnancy. Subsequent work on Diagnostic and Risk Assessment models based upon pub/sub environment such as PMML and DMN could be used for Pneumonia, Sepsis, and others.

**Comments:** Elaboration of this work will continue in subsequent phases

|  |  |
| --- | --- |
| **Milestone Name:** | Declarative representations of workflows and care processes using sharable Medical Knowledge Models |
| **Milestone Type** | Content |
| **Applicable Phases** | Phases 1-4, with incremental enhancement in each phase |
| **Known Dependencies** | Terminology Management Environment  Profile Management Environment  Terminology File Repository  Profile File Repository  Terminology Authoring Process Governance  Profile Authoring Process Governance  Model management and authoring environment  Model Repository  Model Authoring Process Governance |

\* \* \* \* \*

**Milestone**: Provide Example Display Components for UI

**Overview**: In order to move closer to plug-and-play applications, the ability to implement and demonstrate standards-based user interfaces is important. This activity will define the characteristic of select display components (such as an application banner) whose use will promote portability and interoperability.

**Comments:** None.

|  |  |
| --- | --- |
| **Milestone Name:** | Provide Example Display Components for UI |
| **Milestone Type** | Software |
| **Applicable Phases** | Phase 2 |
| **Known Dependencies** | Model management and authoring environment  Model Repository  Model Authoring Process Governance  SMART on FHIR Support  CDS Hooks Support |

\* \* \* \* \*

**Milestone**: Defined CDS Knowledge Artifacts

**Overview**: In order to demonstrate the success of HSPC’s approach, there will need to be a collection of working data models, decision support models, workflow models, documentation models, etc. available for download and evaluation. This activity will establish libraries of HL7 standards-based rules, orders sets, and documentation templates to make them available for consumption and use.

**Comments:** None.

|  |  |
| --- | --- |
| **Milestone Name:** | Defined CDS Knowledge Artifacts |
| **Milestone Type** | Content |
| **Applicable Phases** | Phase 2 |
| **Known Dependencies** | Terminology Management Environment  Profile Management Environment  Terminology File Repository  Profile File Repository  Terminology Authoring Process Governance  Profile Authoring Process Governance  Model management and authoring environment  Model Repository  Model Authoring Process Governance  SMART on FHIR Support  CDS Hooks Support |

\* \* \* \* \*

**Milestone**: Care Process Resource Model

**Overview**: Detailed models of care processes invariably refer to resources available in the healthcare delivery environment. These include tests, procedure, facilities, and the roles played by different care providers. To make models portable, they must reference resources in a way that facilitates mapping to local instances of resources, allowing for the adoption of sharable models. This work becomes a key support element leveraged by process modeling activities. The work will encompass the creation of models and terminologies to support care processes. It will describe provider capabilities and roles (e.g., within their scope of practice and context).

**Comments:** None.

|  |  |
| --- | --- |
| **Milestone Name:** | Care Process Resource Model |
| **Milestone Type** | Content |
| **Applicable Phases** | Phases 2, 3, 4 |
| **Known Dependencies** | Interoperability Maturity Model  Model management and authoring environment  Model Repository  Model Authoring Process Governance |

\* \* \* \* \*

## Context Segment

### Business Swimlane

#### Business Swimlane Milestones Summary

****

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Milestone** | **Phase 1** | **Phase 2** | **Phase 3** | **Phase 4** |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

#### Business Swimlane Milestones Detail

**Phase 1**  - These are activities that are necessary for an enterprise to get started on HSPC Interoperability and SOA Roadmap

|  |  |  |
| --- | --- | --- |
| **Metadata Item** | **Guidance** | **Notes** |
| Milestone Name | Draft of Interop Maturity Model Published |  |
| Short Narrative Description | HSPC will provide an interoperability and SOA standards maturity model for enterprises to benchmark their evolution of full interoperability and SOA service capabilities |  |
| Milestone Type | Document |  |
| Rationale | To acquire buy in from members and potential adopters for long term acceptance of HSPC interoperability mission. |  |
| Phase I? | Yes |  |
| Phase 2? | No |  |
| Phase 3? | No |  |
| Phase 4? | No |  |
| Dependencies |  |  |

|  |  |  |
| --- | --- | --- |
| **Metadata Item** | **Guidance** | **Notes** |
| Milestone Name | Strategy for Coordination with External Stakeholders |  |
| Short Narrative Description | Develop a coordinated strategy for the HSPC organization to engage with health system and standard org in the development and adoption of the HSPC interoperability roadmap and maturity model |  |
| Milestone Type | Document |  |
| Rationale | Enable timely and wide spread consensus and adoption of HSPC standards and services by engaging our constituents early in the process |  |
| Phase I? | Yes |  |
| Phase 2? | No |  |
| Phase 3? | No |  |
| Phase 4? | No |  |
| Dependencies |  |  |

|  |  |  |
| --- | --- | --- |
| **Metadata Item** | **Guidance** | **Notes** |
| Milestone Name | CDS and workflow/BPM adoption strategy and implementation guide |  |
| Short Narrative Description | HSPC will provide an enterprise adoption strategy and implementation guide for Clinical Decision Support SOA services incorporating the HSPC-recommended technical infrastructure, knowledge model and content, cybersecurity, and SOA governance standards |  |
| Milestone Type | Document |  |
| Rationale | Provide a high value near-term use case and adoption strategy for an initial HSPC implementation. |  |
| Phase I? | Yes |  |
| Phase 2? | No |  |
| Phase 3? | No |  |
| Phase 4? | No |  |
| Dependencies |  |  |

|  |  |  |
| --- | --- | --- |
| **Metadata Item** | **Guidance** | **Notes** |
| Milestone Name | Data services governance and models |  |
| Short Narrative Description | HSPC will provide an enterprise adoption strategy and implementation guide for Clinical Decision Support SOA services incorporating the HSPC-recommended technical infrastructure, knowledge model and content, cybersecurity, and SOA governance standards HSPC will provide an enterprise readiness strategy and implementation guide. |  |
| Milestone Type | Document |  |
| Rationale | The guide includes necessary data standards and resources required to begin adoption of the HSPC SOA and interoperability standards and services. |  |
| Phase I? | Yes |  |
| Phase 2? | No |  |
| Phase 3? | No |  |
| Phase 4? | No |  |
| Dependencies |  |  |

|  |  |  |
| --- | --- | --- |
| **Metadata Item** | **Guidance** | **Notes** |
| **Milestone Name** | Open standards and IP content recommended license and policy |  |
| **Short Narrative Description** | HSPC will provide a governance strategy, IP issues analysis, and license recommendation for the open standards addressing roles for the HSPC constituency (members, adopters, technical contributors), includes sustainable adoption strategy for enterprise constituents |  |
| **Milestone Type** | Document |  |
| **Rationale** | Allows enterprise to legally begin adoption of HSPC standards and services |  |
| **Phase I?** | Yes |  |
| **Phase 2?** | No |  |
| **Phase 3?** | No |  |
| **Phase 4?** | No |  |
| **Dependencies** |  |  |

**Phase 2** - These are activities that are necessary/sufficient to say “adopting HSPC”

|  |  |  |
| --- | --- | --- |
| **Metadata Item** | **Guidance** | **Notes** |
| **Milestone Name** | Detailed interop maturity Model |  |
| **Short Narrative Description** | This maturity model will also incorporate a self-certification toolkit as part of the full HSPC interoperability toolkit as that is released. |  |
| **Milestone Type** | Document |  |
| **Rationale** | Allows adopters the ability to benchmark their progress toward interoperability in comparison to their peers and to implement interoperability capability across multiyear budgets. |  |
| **Phase I?** | No |  |
| **Phase 2?** | Yes |  |
| **Phase 3?** | No |  |
| **Phase 4?** | No |  |
| **Dependencies** |  |  |

|  |  |  |
| --- | --- | --- |
| **Metadata Item** | **Guidance** | **Notes** |
| **Milestone Name** | Advance Analytic services adoption guide |  |
| **Short Narrative Description** | HSPC will provide and mechanism for members and adopter to share domain- or use-case-specific analytics models and implementations that are HSPC compliant. |  |
| **Milestone Type** | Document |  |
| **Rationale** | Support value based healthcare transformation and improve population health by adopting this HSPC use case package |  |
| **Phase I?** | No |  |
| **Phase 2?** | Yes |  |
| **Phase 3?** | No |  |
| **Phase 4?** | No |  |
| **Dependencies** |  |  |

|  |  |  |
| --- | --- | --- |
| **Metadata Item** | **Guidance** | **Notes** |
| **Milestone Name** | Sharable Workflow/BPM model Content |  |
| **Short Narrative Description** | HSPC will provide an enterprise adoption strategy and implementation guide for Clinical Workflow/Business Process Management SOA services incorporating the HSPC-recommended technical infrastructure, knowledge model and content, cybersecurity, and SOA governance standards |  |
| **Milestone Type** | Document |  |
| **Rationale** | HSPC will provide a mechanism for members and adopter to share domain- or use-case-specific workflow/BPM models and content that are HSPC compliant. |  |
| **Phase I?** | No |  |
| **Phase 2?** | Yes |  |
| **Phase 3?** | No |  |
| **Phase 4?** | No |  |
| **Dependencies** |  |  |

|  |  |  |
| --- | --- | --- |
| **Metadata Item** | **Guidance** | **Notes** |
| **Milestone Name** | KPIs and Business Outcomes from HSPC Adoption |  |
| **Short Narrative Description** | Develop and provide value proposition and set matrix arising from HSPC adoption |  |
| **Milestone Type** | Document |  |
| **Rationale** | Allow widespread enterprise adoption of HSPC standards |  |
| **Phase I?** | No |  |
| **Phase 2?** | Yes |  |
| **Phase 3?** | No |  |
| **Phase 4?** | No |  |
| **Dependencies** |  |  |

|  |  |  |
| --- | --- | --- |
| **Metadata Item** | **Guidance** | **Notes** |
| **Milestone Name** | Draft Interop Self-Assessment Methodology |  |
| **Short Narrative Description** | Develops and provide written conformance for self-certification |  |
| **Milestone Type** | Document |  |
| **Rationale** | Allow enterprises to implement maturity model using testable certification criteria |  |
| **Phase I?** | No |  |
| **Phase 2?** | Yes |  |
| **Phase 3?** | No |  |
| **Phase 4?** | No |  |
| **Dependencies** |  |  |

* **Phase 3** - These are activities that are necessary for full agile releases and for an enterprise to say they are adherent to initial full HSPC functionality (HSPC V1.x)

|  |  |  |
| --- | --- | --- |
| **Metadata Item** | **Guidance** | **Notes** |
| **Milestone Name** | Full HSPC interoperability  package |  |
| **Short Narrative Description** | Provide complete HSPC version 1,0 interoperability and SOA services adoption package |  |
| **Milestone Type** | Document and technical IP content |  |
| **Rationale** | Allow organizations to adopt first complete version of HSPC package |  |
| **Phase I?** | No |  |
| **Phase 2?** | No |  |
| **Phase 3?** | Yes |  |
| **Phase 4?** | No |  |
| **Dependencies** |  |  |

**Phase 4** - These are activities that are necessary for full agile releases and for an enterprise to say they are adherent to advanced HSPC functionality (HSPC V2.x)

|  |  |  |
| --- | --- | --- |
| **Metadata Item** | **Guidance** | **Notes** |
| **Milestone Name** | Implementation Guide for Advanced Services |  |
| **Short Narrative Description** | Provide HSPC adopters with strategy and implementation guide for advanced HSPC version 2.X interoperability and SOA services. |  |
| **Milestone Type** | Document |  |
| **Rationale** | Enable enterprise to adopt HSPC advanced functionality. |  |
| **Phase I?** | No |  |
| **Phase 2?** | No |  |
| **Phase 3?** | No |  |
| **Phase 4?** | Yes |  |
| **Dependencies** |  |  |

### Security Swimlane

The security swimlane focuses on establishing Interoperability through trusted exchange using secure, standards-based, and privacy-preserving technologies. Elaborate this paragraph to speak in business terms….

#### Security Swimlane Milestones Summary

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Milestone** | **Phase 1** | **Phase 2** | **Phase 3** | **Phase 4** |
| Baseline [Security] Capabilities | X |  |  |  |
| Secure Interoperability |  |  |  | X |
| Share with Protection |  |  | X | X |
| Attribute-based Access Control |  |  | X | X |
| Data Segmentation | X | X | X | X |
| Patient Choice/Consent | X | X | X | X |
| Provenance |  |  |  | X |
| Transparent Security |  |  | X | X |
| Secure Delegated Access |  |  | X | X |
| Opt-In |  | X | X | X |

#### Security Swimlane Milestones Detail

##### Baseline capabilities

|  |  |  |
| --- | --- | --- |
| Metadata Item | Guidance | Notes |
| Milestone Name | Baseline |  |
| Short Narrative Description | Services and capabilities assumed at the beginning | Includes:   * Identity: establish means to classify discrete users. * Authentication: Verifying users are who they say they are. * Authorization: Confirm users are supposed to have access to the resources requested * Audit: Record user access to resources and for what purposes. * Confidentiality: Prevent unauthorized access to information. * Integrity: guard against unauthorized modification of healthcare information |
| Milestone Type | Best Practice |  |
| Rationale | Baseline services necessary prior to the implementation of new and improved capabilities | It is necessary to baseline where we are in order to measure progress for a goal. |
| Phase I? | Yes |  |
| Phase 2? | No |  |
| Phase 3? | No |  |
| Phase 4? | No |  |
| Dependencies | Establish state of each of listed baseline services. |  |

##### Secure Interoperability

|  |  |  |
| --- | --- | --- |
| Metadata Item | Guidance | Notes |
| Milestone Name | **Secure Interoperability** |  |
| Short Narrative Description | Automated cross-enterprise trust, consent, authorization, and privacy-preserving access at runtime. | Common interoperable semantic value sets for cross-enterprise security and privacy. Runtime negotiation for context-sensitive exchange. |
| Milestone Type | Software Deliverable   Best Practice |  |
| Rationale | Final goal |  |
| Phase I? | No |  |
| Phase 2? | No |  |
| Phase 3? | No |  |
| Phase 4? | Yes |  |
| Dependencies | Success dependent upon implementation of other milestones. |  |

##### Share with Protection

|  |  |  |
| --- | --- | --- |
| Metadata Item | Guidance | Notes |
| Milestone Name | Share with Protection |  |
| Short Narrative Description | Security and Privacy protections are carried with the content. | All information returned in request. Specific data masked by purpose of use or clearance. All information available to trusted CDS to ensure patient safety. |
| Milestone Type | Best Practice | Avoids practice of redacting data. All information backed by policy-based granular protections based on role and clearance. Ensures that needed information is available to ER without exception. |
| Rationale | Key Milestone |  |
| Phase I? | No |  |
| Phase 2? | No |  |
| Phase 3? | Yes |  |
| Phase 4? | Yes |  |
| Dependencies | Assumes ability to classify content (including unstructured data) according to sensitivity. |  |

##### Attribute-based Access Control

|  |  |  |
| --- | --- | --- |
| Metadata Item | Guidance | Notes |
| Milestone Name | ABAC. | Classifying data sensitivity provides basis for access control based upon need. Provides capability to provide security for FHIR resources, medical devices and IoT. Modernizes and transforms the way security and privacy is managed and enforced. |
| Short Narrative Description | Manage access control at a granular level. Facilitates managing emerging technologies such as FHIR. |  |
| Milestone Type | Best Practice |  |
| Rationale | Key trend in access control. Ideal approach to IoT. | According to Gartner, 70% of organizations will employ ABAC by 2020. ABAC has emerged within NIST as providing policy-based enforcement rules. |
| Phase I? |  |  |
| Phase 2? |  |  |
| Phase 3? | Yes |  |
| Phase 4? | Yes |  |
| Dependencies | Assumes ability to establish and enforce policy including provisioning of clinical staff by assigned duties or workflow. |  |

##### Data Segmentation

|  |  |  |
| --- | --- | --- |
| Metadata Item | Guidance | Notes |
| Milestone Name | Data Segmentation/Security Labeling Service. | Technical mechanism for analyzing structured and unstructured data and applying labels according to flexible security and privacy rules. |
| Short Narrative Description | Identify, mark, and segment healthcare information at an appropriate granular level of functionality according to organizational and patient policy/rules. | Core HL7 standards have been in place since 2014. HL7 content has been created “label” ready. See:   * HL7 Privacy and Security Healthcare Classification System (HCS), * HL7 Privacy and Security Services: Security Labeling Service |
| Milestone Type | Software Deliverable  Content Deliverable  Best Practice | Security labeling is well understood, however, implementation in healthcare requires construction of detailed rules requiring high confidence of proper operation. |
| Rationale | Key capability |  |
| Phase I? | Yes |  |
| Phase 2? | Yes |  |
| Phase 3? | Yes |  |
| Phase 4? | Yes |  |
| Dependencies | HL7 Label vocabulary, Availability of mature security labeling services. |  |

##### Patient Choice/Consent

|  |  |  |
| --- | --- | --- |
| Metadata Item | Guidance | Notes |
| Milestone Name | Patient Choice /Consent | This milestone merges concepts of electronic patient consent, and choice (individual control of their own information as provided by law). This typically involves “authorizations” (approvals and/or directions to share and “restrictions” (patient policy restricting access to certain information to authorized persons organizations.). It also includes “Directions” to healthcare organizations to transmit a copy of their own information to destinations of their choice under patient right of access law. |
| Short Narrative Description | Electronic patient permissions regarding disclosure of their own protected health information. | Eliminates a burden on providers to maintain paper records. Allows automated management of patient privacy preferences. |
| Milestone Type | Document  Software Deliverable  Best Practice | Technical implementation using patient managed OAuth Authorization Server demonstrated during HIMSS 2017. See milestone “Secure Delegated Access”. |
| Rationale | Key milestone |  |
| Phase I? | Yes |  |
| Phase 2? | Yes |  |
| Phase 3? | Yes |  |
| Phase 4? | Yes |  |
| Dependencies | Electronic Consents, Secure Delegated Access, Security Labeling Service, ABAC | Paper based consents are not computable and represent a significant management burden. Implementing electronic consents ensures electronic workflows are not broken. Electronic consents provide the “policy” for Secure Delegated Access engines. |

##### Provenance

|  |  |  |
| --- | --- | --- |
| Metadata Item | Guidance | Notes |
| Milestone Name | Provenance | Ensures the integrity of data from origin to destruction. |
| Short Narrative Description | Determine the origin and history of healthcare information | Integrity is one of the most desirable characteristics of a trustworthy health record. |
| Milestone Type | Content Deliverable |  |
| Rationale | Key capability |  |
| Phase I? | No |  |
| Phase 2? | No |  |
| Phase 3? | No will |  |
| Phase 4? | Yes |  |
| Dependencies | Availability of suitable technology | Blockchain ledger has been proposed, however, concerns remain regarding overhead impacts. |

##### Transparent Security

|  |  |  |
| --- | --- | --- |
| Metadata Item | Guidance | Notes |
| Milestone Name | Transparent security. | Security remains in background, unobtrusive. Goal is to eliminate security as an impediment to clinical workflow. |
| Short Narrative Description | Provide appropriate safeguards to healthcare information while minimizing impact to clinical workflow or information availability. |  |
| Milestone Type | Best Practice, Implementation Guides |  |
| Rationale | Crosscutting policy |  |
| Phase I? | No |  |
| Phase 2? | No |  |
| Phase 3? | Yes |  |
| Phase 4? | Yes |  |
| Dependencies | ABAC, workflow enhancements. | HL7 Implementation Guides may lag need. |

##### Secure Delegated Access

|  |  |  |
| --- | --- | --- |
| Metadata Item | Guidance | Notes |
| Milestone Name | Secure Delegated Access | Mechanism for implementing patient control |
| Short Narrative Description | Provides patients with ability to express their choices for disclosure of protected health information. | Intent is to implement OAuth and patient owned Authorization Server. See ONC HIMSS 2017 Patient Choice demonstration.  Secure Delegation Access is part of HL7’s approved international standard for Privacy and Security services: Access Control |
| Milestone Type | Content Deliverable  Best Practice |  |
| Rationale | Key capability |  |
| Phase I? | No |  |
| Phase 2? | No |  |
| Phase 3? | Yes |  |
| Phase 4? | Yes |  |
| Dependencies |  |  |

##### Opt-In

|  |  |  |
| --- | --- | --- |
| Metadata Item | Guidance | Notes |
| Milestone Name | Opt-In |  |
| Short Narrative Description | Healthcare information is shared by default. Patients may opt-out or use restrictions to control disclosure of protected health information. | The opt-in model represents an approach most beneficial to the majority of patients. Patients that do not wish to share protected health information have the option of opting-out or requesting restrictions on disclosures. This approach provides the most economical mechanism for healthcare organizations while providing patients choice in how they wish their information to be disclosed. Legislation has been proposed to Congress in support of this initiative. |
| Milestone Type | Best Practice |  |
| Rationale | Provides a significant benefit to providers when dealing with protected health information. |  |
| Phase I? | No |  |
| Phase 2? | Yes |  |
| Phase 3? | Yes |  |
| Phase 4? | Yes |  |
| Dependencies | Congressional action. |  |

## Platform Segment

### Infrastructure and Software Swimlanes

In today’s HIT systems, the data they store, the information upon which that data is based, and the knowledge of the clinical domains are generally “locked” and inaccessible to the institutions that run them and the marketplace of innovators seeking to add value atop those systems. The use of proprietary formats limit the ability to share these content across HIT products and health provider organizations.

When sharing does take place it frequently defaults to either a “least-common denominator” or a coarse-grained, high-level representation such as a document-oriented standard like HL7’s Clinical Document Architecture (CDA). Knowledge assets, such as decision support logic and care practice guidelines, are almost entirely vendor- or technology-specific.

HSPC seeks to foster the development of platforms that will create a robust marketplace of software -- including tools, services and applications – that are open and standards-based. This will allow the health provider community to share the various information assets produced by health providers, HIT vendors, and knowledge creators more efficiently and completely.

The milestones that follow are critical path elements necessary to realize this open software platform vision, based upon standards, fostering interoperability of data, information, knowledge, and applications.

#### Software Milestones Summary

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Milestone** | **Phase 1** | **Phase 2** | **Phase 3** | **Phase 4** |
| Knowledge Repository Specification | X |  |  |  |
| Marketplace API Specification | X |  |  |  |
| CDS Hooks Support | X |  |  |  |
| Terminology Services API | X | X |  |  |
| Knowledge Authoring Environment |  | X |  |  |
| Knowledge Representation View, Review, Curation Tools |  | X |  |  |
| Knowledge Representation API |  | X |  |  |
| Model Authoring Environment |  | X |  |  |
| Publication/Subscription/Notification Capability |  |  | X |  |
| ADL/AML to FHIR Services |  |  | X |  |
| Artifact/Model Transform Tools |  |  | X |  |
|  |  |  |  |  |

#### Software Milestones Detail

**Milestone**: Knowledge Repository Specification

**Overview**: A Knowledge Repository (KR) is necessary in the Platform in order to contain and share knowledge artifacts. The KR Specification outlines the functions that a KR needs to support, including artifact storage capabilities, metadata requirements, artifact access services, and governance policies.

**Comments:** None.

|  |  |
| --- | --- |
| **Milestone Name:** | Knowledge Repository Specification |
| **Milestone Type** | Document |
| **Applicable Phases** | Phase 1 |
| **Known Dependencies** | None |

\* \* \* \* \*

**Milestone**: Marketplace API Specification

**Overview**: The Marketplace is where developers of information assets can make their products available to others in the health community, and where customers can browse, find and access/download these assets. The API Specification describes how developers and customers can access the Marketplace. Note that there may actually be more than one physical/virtual Marketplace, but a single API specification would help developers and customers to access any Marketplace in a common way.

**Comments:** None.

|  |  |
| --- | --- |
| **Milestone Name:** | Marketplace API Specification |
| **Milestone Type** | Document |
| **Applicable Phases** | Phase 1 |
| **Known Dependencies** | None |

\* \* \* \* \*

**Milestone**: CDS Hooks Support

**Overview**: CDS Hooks is a newer specification, now under HL7 oversight, for allowing CDS services to be called from an HIT application (e.g., EHR) using a standard API and triggering events. Support for CDS Hooks within the Platform is a first step towards a more general capability to support decision support logic in an open, standards-based environment. Software Deliverable. Phase 1. Dependencies on Development Environment Initiative and its resources, CDS Hooks leadership and resource support.

**Comments:** None.

|  |  |
| --- | --- |
| **Milestone Name:** | CDS Hooks Support |
| **Milestone Type** | Software |
| **Applicable Phases** | Phase 1 |
| **Known Dependencies** | Development Environment Initiative CDS Hooks Leadership and Resource Support |

\* \* \* \* \*

**Milestone**: Terminology Services API

**Overview**: In order to be truly interoperable, data will need to be transformed from a source terminology (standard or proprietary) to a secondary terminology. Applications, including decision support services, will also need to access terminology in order to resolve terms, domains, and term relationships. Translations may also be needed for terminology within knowledge assets. The Terminology Services API will provide open, standards-based methods for handling these terminology functions at run-time.

**Comments:** None.

|  |  |
| --- | --- |
| **Milestone Name:** | Terminology Services API |
| **Milestone Type** | Software |
| **Applicable Phases** | Phases 1 and 2 |
| **Known Dependencies** | Content Segment Leadership  Terminology Server availability  Terminology Content (for testing) |

\* \* \* \* \*

**Milestone**: Knowledge Authoring Environment

**Overview**: In order to support efficient generation and editing of sharable knowledge assets, including decision support logic, automated guidelines, and survey tools, a Knowledge Authoring Environment that incorporates terminology services and approved data models is needed. This Environment would access the KR for storage of knowledge assets.

**Comments:** None.

|  |  |
| --- | --- |
| **Milestone Name:** | Knowledge Authoring Environment |
| **Milestone Type** | Software |
| **Applicable Phases** | Phase 2 |
| **Known Dependencies** | Content Segment Leadership |

\* \* \* \* \*

**Milestone**: Knowledge Representation View, Review, Curation Tools

**Overview**: KR View, Review and Curation Tools: Users of the KR will need to view assets within the KR in vendor and technology agnostic environment. The assets will also need to go through a review process during their development lifecycle, and tools to support this process are needed so that reviewers may make comments on assets and these comments can be efficiently addressed by developers. Curation tools will allow the full lifecycle of the knowledge assets to be handled, from original development to review, and subsequently to testing, promotion, regular review and retirement.

**Comments:** None.

|  |  |
| --- | --- |
| **Milestone Name:** | Knowledge Representation View, Review, Curation Tools |
| **Milestone Type** | Software |
| **Applicable Phases** | Phase 2 |
| **Known Dependencies** | Content Segment Leadership for Requirements  Sample Knowledge Content (for testing) |

\* \* \* \* \*

**Milestone**: Knowledge Representation API

**Overview**: The KR API will support the various functions of the KR for creating, editing, searching, accessing, and managing the knowledge assets within the KR. It is informed by the KR Specification. Software Deliverable. Phase 2. Dependent on Content Segment leadership for requirements.

**Comments:** None.

|  |  |
| --- | --- |
| **Milestone Name:** | Knowledge Representation API |
| **Milestone Type** | Software |
| **Applicable Phases** | Phase 2 |
| **Known Dependencies** | Content Segment Leadership for Requirements |

\* \* \* \* \*

**Milestone**: Model Authoring Environment

**Overview**: This is a special case of the Knowledge Authoring Environment since models are a knowledge asset. The Model Authoring Environment will allow model authors to develop detailed clinical models according to best practices and aligned with a specific modeling language.

**Comments:** None.

|  |  |
| --- | --- |
| **Milestone Name:** | Model Authoring Environment |
| **Milestone Type** | Software |
| **Applicable Phases** | Phase 2 |
| **Known Dependencies** | Content Segment Leadership for Requirements |

\* \* \* \* \*

**Milestone**: Publication/Subscription/Notification Capability

**Overview**: A Publication/Subscription capability allows systems to publish events on their systems in an open, standards-based method, and allows users to subscribe to events of interest to them. The notification capability provides notification of events through multiple communication channels (e.g., email, text, cell phone alerts) and allows users to specify their channel of choice.

**Comments:** None.

|  |  |
| --- | --- |
| **Milestone Name:** | Publication/Subscription/Notification Capability |
| **Milestone Type** | Software |
| **Applicable Phases** | Phase 3 |
| **Known Dependencies** | None identified |

\* \* \* \* \*

**Milestone**: ADL/AML to FHIR Services

**Overview**: These services would provide the capability to transform models, and model instances, from ADL/AML (the preferred languages for HSPC detailed clinical modeling) to FHIR Resources. FHIR Resources are the current physical messaging model chosen by HSPC for transmitting and sharing data.

**Comments:** None.

|  |  |
| --- | --- |
| **Milestone Name:** | ADL/AML to FHIR Services |
| **Milestone Type** | Software |
| **Applicable Phases** | Phase 3 |
| **Known Dependencies** | Dependency on Tooling Initiative  Input from Content Segment |

\* \* \* \* \*

**Milestone**: Artifact/Model Transform Tools

**Overview**: These tools are the general case tools for transforming models from one standard to another. (See AD/AML to FHIR Services for a specific use case.)

**Comments:** None.

|  |  |
| --- | --- |
| **Milestone Name:** | Artifact/Model Transform Tools |
| **Milestone Type** | Software |
| **Applicable Phases** | Phase 3 |
| **Known Dependencies** | Dependency on Tooling Initiative |

# Using the Roadmap

The HSPC Roadmap will serve several purposes and objectives, depending upon your individual role and the nature of engagement with the HSPC community. It merits mention that most stakeholders will likely interact with only portions of the Roadmap in any given context. For example, a specific HSPC project will likely produce one or several products that are identified as Roadmap milestones, but will also have other milestones that do not appear. That is to be expected. Similarly, that same project will likely have dependencies on other Milestones produced by other efforts. The roadmap provides a unified view, showing how different parts of the ecosystem fit together to build the greater whole.

In the subsections below are characterized some of the likely interactions with the Roadmap document. These should be considered informative and not declaratory, as each individual situation may vary. That said, the examples provided should give some context for how the Roadmap document fits a variety of needs, and illustrate how it might be leveraged.

## Use within HSPC

While HSPC is one community with a shared Mission and Vision, it is also a collection of organizations, initiatives, projects, members, and relationships that naturally comprise what is a complex ecosystem. One of the challenges of this type of environment is that there are multiple sets of intersecting interests that blend into a community.

The HSPC Roadmap has a role to play for many of those constituencies, and for the organization as a whole, it provides a unified view showing how different parts of the ecosystem fit together to build the greater whole.

**Establishing Community Priorities.** For the HSPC organization itself, determining what are key priorities and the mainstream activities of the HSPC Organization is a principal role of the HSPC Roadmap. The iterative refinement process, followed by membership voting on the document, and its ultimate ratification by the HSPC Board establishes the Roadmap as the principal scoping document to define the mainstream of activities for HSPC. There are intended intersection points with other HSPC efforts, including but not limited to HSPC Strategic Initiatives. The expectation is that a natural tension will exist between these efforts, with the Initiatives affecting and changing the Roadmap over time, and the Roadmap defining and shaping existing and potentially new initiatives.

By design, the Roadmap document will be a living but durable document. To maintain long-term integrity, an organization cannot change its strategic goals too frequently. The Roadmap will be refreshed annually, with the expectation that incremental enhancements will be made, but not drastic changes unless areas prove untenable.

While it is a scoping mechanism, the Roadmap does not and should not limit or prohibit work from occurring within HSPC, or limit or constrain HSPC members from contributing, initiating, or incubating new work not reflected on the Roadmap. Fostering innovation is a key tenet of HSPC, and today’s incubating project may become tomorrow’s critical path.

**Maturing Work Into the Mainstream.** As a document defining the path from the current to future state, it is to be expected that new projects and initiatives that are incubating will become critical path as they mature, and other efforts might be superceded and atrophy over time. As part of the annual refresh cycle, new efforts would be evaluated and a determination made as to what gets placed onto the roadmap. The Roadmap is intended to reflect the broad consensus of the community. HSPC is also a community about fostering innovation.

The expectation is that the “onboarding” process will be defined and itself matured to reflect the overall will of the community and the alignment with the mission as reviewed by the Steering Committee and the Board. In the future, we should expect specific compliance criteria to be defined as pre-conditions for mainstream HSPC work, and we should expect the Roadmap Inclusion criteria to align.

**HSPC Initiatives.** For HSPC Initiatives, the Roadmap provides an architectural melting pot, blending the key milestones and products from across initiatives to show distinct perspectives based upon the Data, Knowledge, Business, Security, Platform, and Technical Infrastructure perspectives. HSPC Initiatives are not specific projects, rather they are disciplines that have broader goals and are likely to spawn work in multiple projects that work together. The Roadmap helps foster understanding that spans initiatives, helping to identify cross-initiative dependencies, potential collaborative work, situational awareness, and outwardly communicating delivery intention.

Initiatives should expect to identify key milestones that should be surfaced to the Roadmap, to review and ingest related work affecting internal timelines and work dependencies, and to identify related or potentially duplicative work. Note that initiatives do not live within any one swimlane or segment, rather they are likely to influence and consume activities from across the entirety of the T-Map.

**HSPC Projects.** Any given project within HSPC will have its own milestones, deliverables, inter-project dependencies, and potentially relationship to HSPC Strategic Initiatives. For projects, the HSPC roadmap is a way to see holistically what else is going on, fostering community and assisting in making strategic decisions. For example, if a given project has need of an information model or terminology construct, they could use the Roadmap to make product release decisions, determining at what stages they can establish dependencies on other HSPC efforts, such as accessing a terminology server. Conversely, projects will be delivering capabilities upon which others will depend, and putting those milestones onto the Roadmap will allow others to make informed decisions.

Just as with the HSPC Initiatives, the Roadmap has a role to play in assisting to identifying related work, fostering cross-project collaboration and in avoiding duplication where sensible. Also, projects do not reside exclusively within any swimlane, and it is appropriate to both contribute and consume from across the entire T-Map.

**HSPC Leadership.** The Roadmap has the potential to be a valuable tool to HSPC Leadership in that it encompasses a scope and vision against which the community is executing, and it charts the course as to how we are going to achieve it. For the HSPC Board, a review of identified priorities and milestones should be expected, resulting in either affirmation or revision to assure alignment with the HSPC mission. For the CEO and other HSPC Executives, the Roadmap can serve as a tool with which to have conversations with prospective members, determining areas of interest and alignment with community needs. For the CxO community, this becomes a benchmark for how well the community is performing and advancing, serving as a management tool to maintain focus on what we collectively have determined to be important.

## Member (or Prospective Member) Organization Use

The needs of HSPC members differ from those of the HSPC community, and the Roadmap has a role to play for both. HSPC members elect to participate within the community for what could be a vast variety of reasons. Regardless of the reason, few (if any) members are able to participate in everything, and as a result members will have stronger interest in some areas than others.

Ascertaining an awareness of where HSPC as a whole is going, determining those specific areas of organizational interest, and determining which specific activities and milestones that are important to their own organization are all areas where the Roadmap can play a role.

For internal project planning, the Roadmap sets expectations in terms of what is being produced by HSPC and when it will be available. This allows member organizations to make investment decisions regarding contributions to community efforts, and consumption decisions related to artifacts being produced by the community.

For some organizations, the Roadmap will serve as a legitimator, demonstrating the importance of certain activities, and helping to substantiate a business case for investment. Other organizations will leverage the roadmap for internal strategic planning, following a complementary path to HSPC, and perhaps extending the HSPC Roadmap to address specific institutional needs beyond those of the community. Ultimately, for HSPC Members the Roadmap serves as a communication and alignment vehicle.

## Other Uses

There are other potential uses and benefits of the HSPC Roadmap. For example, only HSPC members are able to vote on the roadmap, and thus able to impact the community priorities. As a collaborative tool, the Roadmap will be used in joint efforts and discussions with peer organizations to determine co-investment and collaborative opportunities, and potentially to identify cross-organizational dependencies.

For non-members, the roadmap communicates the intentions of the community. I might identify an area of need and bring that to HSPC as a gap to be filled, potentially proposing a new incubator project and carving my niche within the community. Alternatively, I may find efforts in which I’m presently investing and where collaboration would allow me a cost avoidance.

Finally, for interested parties or consumers of HSPC products, the roadmap sets expectations (via the phased releases) about what will be available and when, and how pieces fit together, allowing me to make my plans and take advantage of what HSPC is offering.

# Roadmap Refresh Process

The HSPC Roadmap will be refreshed annually. Following the initial baseline release, we anticipate that the core content of the roadmap will be essentially stable, validated annually and adjusted as necessary. Since the Roadmap serves as a strategic transition plan, we anticipate limited volatility within the document.

This will form the basis for public commitments and external expectations of the HSPC community, so it is important that we “stay the course” and adjust only where absolutely necessary. Adding new priorities is expected and will occur as they are identified and vetted via the inclusion criteria.

Any changes to the Roadmap will need community affirmation consistent with the acceptance/governance processes established by the HSPC Board. As a matter of practice, it is anticipated that the document will undergo update as needs permit, with the working document not holding any official status until it has been voted/approved. A policy determination will need to be made whether the emergent next release of the document will be generally available, or available only to HSPC members.

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|  |  |
| --- | --- |
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# Appendices

Remains to be done. Plan is to include:

* How this Roadmap was created
* Example: Relating an HSPC Project to the Roadmap
* Example: Relating an HSPC Initiative to the Roadmap
* Acknowledgements

1. This architectural “separation of concerns” is a classic analysis approach commonly used in the Enterprise Architecture discipline. Manifestations of this approach can be found in The Open Group Architecture Framework (TOGAF), the DOD Architecture Framework (DODAF), the Zachman Framework, and many others. [↑](#footnote-ref-1)