

# What a Digital Knowledge Ecosystem Will Enhance

Revisiting the colorectal cancer screening example in the Needed: Better DKPs section illustrates how an AHRQ DKP within an interoperable digital healthcare knowledge ecosystem that supports a virtuous LHS cycle can help address the waste, harm, inefficiencies, and missed opportunities in the current system. Appendix B, Future Vision also contains an extensive discussion of a consensus future vision enabled by an effective digital healthcare knowledge ecosystem related to colorectal cancer screening and other preventive care examples. This ACTS Roadmap outlines how to realize this future vision in ways that leverage assets and efforts from AHRQ (as outlined in Appendix F, AHRQ Offerings & the Knowledge Ecosystem Cycle) and many other initiatives (e.g., as outlined in Appendix A, Interplay With a Sampling of Other Strategic Plans, Priorities & Initiatives).



## Research Results Management

Results from, and citations to, research funded by AHRQ and others are tagged using standardized, computable codes that enable information of greatest interest (e.g., about patient intervention, comparison, outcome [PICO] (41) dimensions) to be retrieved (e.g., via search, browse, or application programming interface [API]) and used in computable format to address a particular task such as answering a question, performing a systematic review, or enhancing a QI effort. Assets from AHRQ and other selected sources can be accessed in a user-focused manner from the AHRQ DKP's Insights Engine, as depicted in Figure 9. How AHRQ Supports Key Tasks in the Knowledge Ecosystem Cycle, including planned enhancements via the Center for Evidence and Practice Improvement (CEPI) Evidence Discovery & Retrieval (CEDAR) project (42). These functions build on the ACTS Computability Requirements Pilot for Tool 1: creating, storing, and accessing computable study results. See Appendix E, AHRQ-Funded ACTS Pilots.

- Research Results Management
- Evidence Synthesis
- Guidance Production
- Tool Creation
- Tool Dissemination
- Tool Integration into Systems & Workflows
- Tool Use to Support Decisions & Actions
- Care Process & Outcomes Data Gathering, Analysis & Application

## Evidence Synthesis

EPCs and other users can subscribe to be automatically notified when new research on the topic is produced and this information can flow seamlessly into tools for creating systematic reviews such as Systematic Review Data Repository Plus (SRDR+) (43) and others. Users apply these tools to process computable study information into *living* systematic reviews that likewise consist of computable and interoperable components. This enables reuse of this information for systematic review updating, guideline development and updating, answering clinical questions, and other purposes. Assets from AHRQ and other selected sources can be accessed in a user-focused manner from the AHRQ DKP's Insights Engine, as depicted in Figure 9. How AHRQ Supports Key Tasks in the Knowledge Ecosystem Cycle, including planned enhancements via CEDAR (42), SRDR+, and Effective Health Care (EPC) website (44). These functions build on the ACTS Computability Requirements Pilot for Tool 2: creating, storing, and accessing computable systematic review results. See Appendix E, AHRQ-Funded ACTS Pilots.

## Guidance Production

USPSTF and other users can subscribe to be automatically notified when new or updated systematic reviews on the topic are produced and this information can flow seamlessly into tools for creating computable guidance. Users apply these tools to process computable systematic reviews and other evidence and information into *living* guidelines that likewise consist of computable and interoperable components. This enables reuse of this information for CDS and eCQM development and updating, answering clinical questions, and other purposes. Assets from AHRQ and other selected sources can be accessed in a user-focused manner from the AHRQ DKP's Insights Engine, as depicted in Figure 9. How AHRQ Supports Key Tasks in the Knowledge Ecosystem Cycle, including planned enhancements via CEDAR (42). These functions build on the ACTS Computability Requirements Pilot for Tool 3: creating, storing, and accessing computable rationale for guidance and for Tool 4: identifying, storing, and accessing terminology for computable recommendation definition. See Appendix E, AHRQ-Funded ACTS Pilots. Explorations into a possible next-generation version of the National Guideline Clearinghouse (NGC) (45) could leverage computable information from the research, review, and guidance steps outlined above to make updating guidance in a possible, enhanced, NGC more efficient and timely.

## Tool Creation

Those who create and maintain CDS interventions (such as order sets, documentation tools, dashboards, patient-driven care plans using tools like the CDS Connect Authoring Tool (46) and others), eCQMs, and QI tools (such as those provided by the Center for Quality Improvement and Patient Safety [CQuIPS] (47)) can subscribe to be automatically notified when new or updated guidance on the topic is produced. This computable guidance information can flow seamlessly into these tools, which are used to create and maintain *living* CDS interventions, eCQMs, and QI tools that likewise consist of computable, interoperable, and reusable components (48). Assets from AHRQ and other selected sources can be accessed in a user-focused manner from the AHRQ DKP's Insights Engine, as depicted in Figure 9. How AHRQ Supports Key Tasks in the Knowledge Ecosystem Cycle, including planned enhancements via CEDAR (42), and to other relevant websites that provide AHRQ tools. These functions build on the ACTS Virginia Commonwealth University (VCU)-led Patient-driven Care Plan Tool Refinement and Implementation Pilot. See Appendix E, AHRQ-Funded ACTS Pilots and planned enhancements to CDS Connect Authoring Tool functionality.

## Tool Dissemination

Authoring tools that produce the output from the step above—as well as the resulting tools that are produced—are accessible via the marketplaces depicted in Figure 11. Digital Healthcare Knowledge Ecosystem. Tools produced by AHRQ, other Federal agencies, and other organizations that want to freely disseminate their offerings, flow seamlessly into the open, free, public-sector marketplace. Vendors and other private-sector organizations have parallel commercial marketplaces, and all tools in all marketplaces are seamlessly interoperable due to the common reference architecture and governance mechanisms established by the PPP. These functions build on the current and planned CDS Connect Repository functions and sustainability efforts (49) as well as corresponding efforts around marketplaces as outlined in Figure 8. Sampling of Non-AHRQ Initiatives Addressing the Knowledge Ecosystem With Which Roadmap Execution Coordinates and Appendix A, Interplay With a Sampling of Other Strategic Plans, Priorities & Initiatives.

## Tool Integration into Systems & Workflows

Computable evidence, guidance, and tools from AHRQ (e.g., from the CEPI and CQuIPS) and other public and private sources can be readily identified, selected based on user needs, and integrated into information systems that are used to support patients, care teams, QI teams and others involved in care delivery and QI. When critical information changes, users are notified, and associated tools are readily updated. Playbooks, courses, and other materials foster the dynamic workforce learning required to integrate and apply evolving information and tools in practice. The information and tools are highly responsive to user needs for effectively supporting important decisions, workflows, and actions. These functions are supported by the AHRQ DKP, other DKPs and public and private marketplaces.

## Tool Use to Support Decisions & Actions

The preceding steps ensure that the CDS 5 Rights (29) are realized for the clinical target (i.e., the right information is delivered to the right people in the right formats through the right channels at the right times). These functions are supported by the AHRQ DKP and other DKPs. The AHRQ–National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) Project (50) to develop eCare plans as IT-enabled tools that support seamless care coordination, communication, and collaboration among care team members will be leveraged as one key mechanism for addressing the CDS 5 Rights in ways that put evidence into practice.

## Care Process & Outcomes Data Gathering, Analysis & Application

Data from EHRs, systems that manage patient-generated health data (PGHD), and other sources that characterize care processes and results related to the clinical target are produced and managed using the same reference architecture that supports developing and disseminating standards-based, computable evidence, guidance, and tools in earlier ecosystem cycle steps. This enables more immediate and efficient use of process and outcomes data to drive QI and public health efforts, support feedback and reflection for workforce learning, and close the ecosystem cycle by providing new evidence for further care delivery enhancements. These functions are supported by extensive efforts to make patient data more FAIR (e.g., see Figure 8. Sampling of Non-AHRQ Initiatives Addressing the Knowledge Ecosystem With Which Roadmap Execution Coordinates and Appendix A, Interplay With a Sampling of Other Strategic Plans, Priorities & Initiatives). They will also be supported by AHRQ's Insight Platform (51), which provides publicly available data and analytic tools to support evidence-based answers to questions about healthcare system performance and improvement opportunities. In turn, the knowledge ecosystem will support enhancements to how these AHRQ offerings that detail healthcare performance are produced and disseminated. These enhancements will be driven by greater computability of the information they contain, which enables more seamless data input from sources (e.g., EHRs) and more seamless and user-needs-focused delivery of targeted information.