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Priorities to Accelerate Workflow Automation in Health Care

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Introduction

Creating a Path Forward for Workflow Automation in Health Care

Inefficient workflows continue to slow the delivery of health care, forcing providers to spend effort on low-value, manual tasks rather than spending the bulk of their time focused on point-of-care patient interactions.

A solution may be on the horizon. Rapid technology advancement, expanded computing power, and democratized access to information have pushed and accelerated automation across all industries. Automation increases productivity and catalyzes the emergence of new services and products. It also empowers workforces.

The increased availability of health IT tools and modern computing provide opportunities to streamline workflow through automation.

Non-health sectors that use automation offer insights into how health care processes can be automated effectively to improve health care delivery.

Methodology

This document is prepared by Clinovations Government + Health to present priorities and strategies to advance workflow automation in health care using health IT and modern computing. It is based on work completed for ONC including:

Eight semi-structured interviews conducted with automation experts across multiple industries in November and December of 2019

+

A targeted literature search drawing from sources within and outside of health care, including peer-reviewed journals, gray literature, issue briefs, government reports, conference proceedings and presentations, and web-based materials

+

A multi-disciplinary expert workshop on September 14th and 15th, 2020, to provide input on topics for workflow automation in health care

Automation Across Industries

Health care delivery involves a series of interconnected clinical, administrative, and population-level workflows that impact patients, caregivers, clinicians, and the staff that support health delivery.

These workflows occur throughout the treatment process, including times when the health care delivery process leaves the four walls of a provider. These workflows appear everywhere and can speed up or slow down the process, depending on their efficiency.

Definition of Workflow Automation

WORKFLOW + **AUTOMATION** = **WORKFLOW AUTOMATION**

The sequence of physical and mental tasks performed by various people within and between work environments[1]

The creation and application of technology to monitor and control the delivery of products and services[2]

Involves identifying redundant, manual tasks to streamline processes using technology and modern computing to provide value

Workflow Automation as a Driver Across Industries

Modern computing has created opportunities for automation across industries, leveraging the Internet of Things and Industry 4.0. It is time for the health care industry to benefit from automation on a larger scale.

Internet of Things (IoT)

A concept that describes connecting anything that can be connected and streamlining processes for personal and commercial betterment. It is a movement to advance every-day device connectivity, via the internet, to form a system and network of linked and coordinated devices that send and receive data for efficiency gains.[3]

Industry 4.0

Rapid and widespread digitization across industries, based on dramatic increases in the availability of data, computational power, and connectivity in parallel to innovations in analytics and business-intelligence capabilities and technology that facilitate human-machine interaction.[4,5]

Examples of Industries Benefiting from Workflow Automation

Health care **can learn from the automation work occurring across industries** that has led to real benefits and cost savings.[6]

Industry	Workflow Automation Examples
Aviation	• Autonomous and assisted flying • Flight patterns and flight crew scheduling
Financial Services and Banking	• Management of monetary accounts and data • Customer profiles for personalized services • Accounting and document routing
Hospitality	• Housing needs and staffing levels management • Capacity level analysis and forecasting • Hotel or entertainment experience personalization
Manufacturing	• Workforce planning, resource scheduling, and assembly line management and flow • Local, regional, and international production and distribution
Transportation and Travel	• Ride sharing/hailing • Notifications for expected and unexpected occurrences
Wastewater Treatment	• Plant operations and staffing • Water and material monitoring

Harnessing the Benefits of Workflow Automation for Health Care

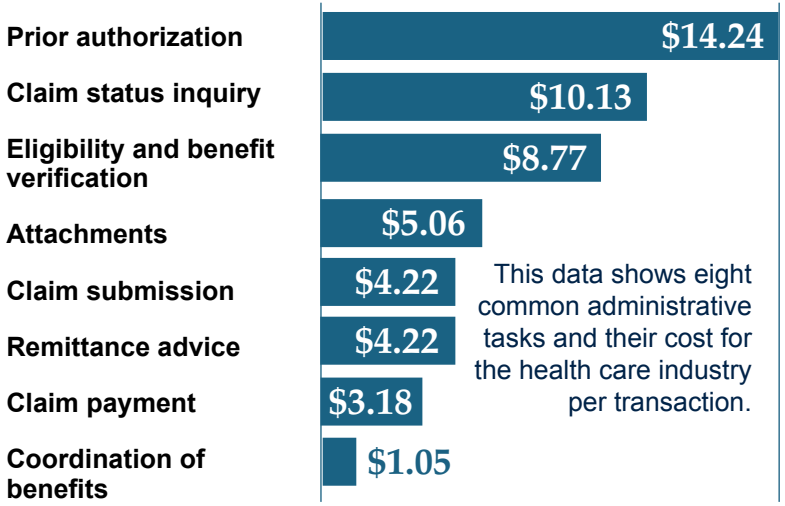
Leveraging workflow automation allows for technology to manage repetitive tasks in a way that saves time, increases efficiency and accuracy, and saves money. Workflow automation directly tackles some of the most significant challenges in health care today.

- **Inefficient Workflows**
- **High Costs**
- **Variable Quality**
- **Poor Outcomes**

CAQH Study Provides Insight into Projected Cost Benefits

In a recent study, the Council for Affordable Quality Healthcare (CAQH) found the health care industry could save $13.3 billion if eight administrative tasks in the revenue cycle were no longer completed manually.[7]

Revenue cycle automation is one of the many applications where workflow automation can play a pivotal role.



The Opportunity to Apply Workflow Automation in Health Care

Successful workflow automation design and implementation depends on collaboration across multiple stakeholders.

Progress Requires Multi-Stakeholder Involvement

Stakeholder	Goal	Sample Call to Action
Clinicians	Understand the promise and value of automation to reduce administrative burdens.	**Collaborate in strategic planning for automation and workflows.**
Patients & Caregivers	Learn about automation as a tool to increase access to information, improve care coordination, and expand opportunities to contribute to decision making.	**Voice the needs of patients and caregivers in conversations about workflow automation to aid in automation selection and design.**
Technology Vendors	Understand opportunities to accelerate automation development and innovation.	**Support instrumentation and evolution of technology and standards to support automation.**
Researchers and Leaders in Non-Health Care Fields	Connect automation needs and opportunities in health care to lessons learned from other industries and disciplines.	**Contribute to strategies that advance automation priorities through thought leadership, research, and evaluation.**

Automation Gaps in Health Care

Automation has already been leveraged in some areas of health care, but the industry is not nearly as automated as it could be.

Automation has occurred in some administrative and operational areas, but workflows involving human judgment and decision-making have experienced less automation.

Workflow automation can support clinical and non-clinical stakeholders in care delivery by supporting performance on cognitive tasks.

Leveraging automation in health care will:

- **Reduce unnecessary variance** by standardizing workflows, where appropriate, across specialties, practices, and regions
- **Increase access to health care services** by streamlining physical and administrative barriers to care
- **Improve safety and health care outcomes** by increasing adherence to safety protocols based on evidence and reducing opportunities for human error
- **Help clinical and non-clinical health care workers improve productivity** by removing repetitive tasks, increasing time spent on care and care management

Health care is different. The solutions also need to be different.

While other industries have leveraged automation, the health care industry features several differentiating factors that have led to slower adoption. These differences must be factored into automation design and implementation.

Variation of Health Care Delivery Across Specialties, Practices, and Regions

The distribution and non-standardization of health care delivery makes automation difficult to scale.

Complex Data & Standards

Complexity of underlying data and standards to describe and share health information vary between systems.

Financial Transparency

Financing and price transparency in the health care system leads to unclear incentives for investing in automation.

Provider/Patient Relationship

The provider-patient relationship shapes the human experience of care delivery, and patients must trust the people delivering care and any automation that may support them.

Factors Impacting Health

Health outcomes are affected by factors outside of the health care delivery system, such as social determinants of health and the environment.

Co-Produced Care

Health care providers, patients, and other actors contribute to a "co-produced service" involving coordination, communication, and commitment to an intended health goal or status.

Privacy & Security

Protecting patient privacy and data security is a firmly entrenched principle in the U.S. health care system, and health data must be kept secure at all points.

Building Blocks for Automation

The U.S. health care system is complex and nuanced. Successful approaches to workflow automation will align with the realities of care delivery to augment provider care delivery.

Lessons Learned from Other Industries

Look to lessons learned from non-health care industries with similar challenges or constraints.

Thorough Planning

Execute a progressive set of strategies to support automation priorities.

Patient at the Center

Include a broad stakeholder base that includes and prioritizes patients and caregivers.

A Path Forward for Automated Health Care

The use of modern computing is needed to increase efficiency, improve health outcomes, and deliver value for stakeholders.

Achieving Greater Automation

Modern Technology

Automate workflows using modern computing approaches, such as artificial intelligence and machine learning, big data analytics, natural language processing, robotics, and wearable sensors.

Look Forward

Research areas that cannot yet be automated and investigate options for addressing them more effectively.

Integrate People

Ensure people are integrated into processes alongside the machines, technology, and data needed to perform cognitive tasks.

Focus on Patients/Caregivers

Improve care experience for patients and caregivers using automation to streamline processes and free clinicians' time to focus on patient needs.

Improve Care

Enable safe, secure, and effective care across populations using automation.

Dependable Data

Stakeholders should be able to trust the information generated in automated workflows, as well as the data that supports automated health workflows.

Examples of Modern Computing Technologies

Technology is a tool that supports automation.

Technology supports automation when it is flexible, interoperable, reusable, and scalable.

Development and implementation requires input from interdisciplinary teams and user-centered design for a variety of users.

Artificial Intelligence

Big Data Analytics

Machine Learning

Natural Language Processing

Robotics

Wearable Sensors

People, Process, and Technology Factors for Automation

The path to workflow automation must address who is involved in workflows, their needs, and how automation might change their work.[6,8]

	Workflow Selection Criteria	Automation Approaches	Implementation Barriers
People Stakeholders affected by workflow automation	• Degree of human intervention required	• Stakeholder engagement • Role-based training development	• User concerns and complexity perceptions • Lack of multi-disciplinary input
Process How tasks are conducted and relate to organizational structure	• Repetition of simple tasks • Clear roles and responsibilities	• Current and future state mapping • Constraint and dependency identification	• Lack of definition, consistency, and agreement • Poorly modeled workflow
Technology Tools that support automation	• Available tools for low, semi, or full automation	• Technology selection for workflows to automate • Integration with other technology	• Lack of interoperability and scalability • Poor integration of existing systems and data • Lack of standards and “messy” data

Workflow Characteristics Drive Level of Automation

Workflows with characteristics that promote automation may be suitable for full levels of automation, such as those with a high degree of manual tasks, high frequency and repetition, and clearly defined roles. Workflows with characteristics that challenge automation may be suitable for lower degrees of automation, such as those with inconsistently followed rules and unclear roles.[6,8]

Low Automation

- Manual tasks repeat infrequently
- Roles and responsibilities shift and are not well-defined
- Human cognition and/or intervention required often
- Low sophistication for technology

Semi-Automated

- Some manual tasks repeat
- Some roles and responsibilities are well-defined
- Human intervention is defined for specific tasks
- Technical sophistication increases

Fully-Automated

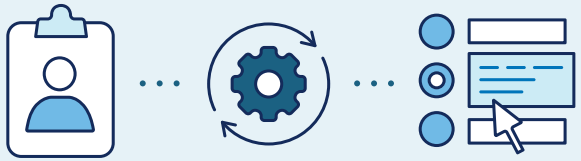
- Manual tasks repeat frequently
- Roles and responsibilities are concrete and well-defined
- Tasks are simple and clear
- Technology and analytics are advanced

Based on the workflow and the level of automation, select the appropriate technology.

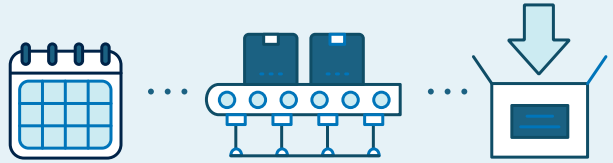
Examples of Workflows that Could Be Automated

BUSINESS FUNCTIONS

Administrative



Operational



The processes that support the operational, business functions of health care delivery

CARE & MANAGEMENT

Treatment and Care Delivery

Patient-level care and navigation activities

Population Health

Steps to monitor, communicate, and engage with groups of individuals

Surveillance

Processes to identify, document, and report adverse events

Reporting

Manual abstraction, calculation, and transmission of quality, safety, and public health data

Analytics

Machine-based and manual data collection, analysis, and display

See Appendix for additional examples and descriptions

Priority Areas for Health Care Automation

Six priority areas have been identified for health care that can improve workflow automation. The priority areas include a set of strategies recommended to support a planned and gradual transformation of health care workflows.

The goal is to use automation to improve the health care experience for patients, clinicians, and the organizations delivering care.

PRIORITIES

- **Mobilize nationwide, scalable automation** in near-term “sprints” and long-term “marathons”
- **Ensure automation improves** patient and caregiver interaction with health and health care
- **Ensure a ready clinician base** for workflow automation
- **Enable all stakeholders** to effectively and efficiently engage in health and health care tasks
- **Enable discovery** of redundant tasks
- **Leverage interoperable health data** for automation

The priority areas are designed to address an ecosystem of organizations and individual stakeholders – including clinicians, health care staff, patients, and caregivers, as well as the technology that must collectively support automation to achieve the vision of increased efficiency, improved health outcomes, and value for all stakeholders.

PRIORITY AREA 1

Mobilize Nationwide Scalable Automation in Near-Term "Sprints" and Long-Term "Marathons"

TARGET END STATE

The health care industry aligns to pursue automation for widespread gains.

Stakeholder-driven priorities and desired results should drive workflow automation initiatives, which in turn should guide the selection of the appropriate technology. Automation that affects many stakeholders and involves overlapping workflows requires long-term planning, but existing technologies and approaches used in non-health care industries can be applied to less complex processes now. Automation designed around a single technology or applied to a narrowly defined workflow may not achieve widescale application or scale across multiple organizations with varying people and technology resources.

GOALS

- Identify smaller, feasible automation opportunities that can be implemented rapidly where numerous stakeholders benefit in the near-term
- Plan longer-term efforts that fully automate entire processes
- Use technologies that easily can be plugged into an electronic ecosystem, regardless of the size, type, and sophistication of an organization's technology

START with the sprint. BUILD to the marathon.
Don't wait to address all aspects of automation to get started.

PRIORITY AREA 2

Enable Discovery of Redundant Tasks

TARGET END STATE

Organizations independently identify automation opportunities.

Supporting workflow automation may involve adopting a new operational mindset for many health care delivery organizations. Identifying tasks for automation requires pinpointing inefficient tasks and reimagining them with modern computing applications. The health care industry can look at other business sectors to help determine existing workflows that can be improved through new automation tasks.

GOALS

- Create an operational routine and culture of identifying workflows to automate across health care organizations
- Promote a workforce with the skills needed to analyze existing workflows and data, design and implement automation, and conduct ongoing monitoring and optimization
- Scale automation initiatives across health care organizations in a manner that supports organizations of different sizes, resources, and patient population

FIND the redundant, wasteful tasks and AUTOMATE them.

PRIORITY AREA 3

Ensure a Ready Clinician Base for Workflow Automation

TARGET END STATE

Clinicians embrace automation to relieve workflow burden.

The adoption of health IT has created opportunities to leverage data to improve patient care, but sometimes increased data can contribute to clinician burden. Properly designed automation can save clinicians time on repetitive tasks like inbox monitoring or gathering information stored across disparate sources. Automation design must involve input from clinicians to find these burdensome tasks so they can spend more time on treating patients.

GOALS

- Reinvigorate the joy of practice by designing automation that supports cognitive tasks and patient interaction
- Improve situational awareness for care management by identifying and filling data blind spots to provide person-centered care
- Uphold strict and high levels of data security and patient safety
- Streamline data collection, review, and translation for patient care and population health

FROM WEAR TO CARE: Clinicians focus on health with efficient workflows and data.

PRIORITY AREA 4

Enable All Stakeholders to Effectively and Efficiently Engage in Health and Health Care Tasks

TARGET END STATE

Individuals' time shifts from repetitive to cognitive tasks of managing and supporting care.

Health care stakeholders interact with many technologies and data sources. Automation can remove burden for tasks with clear roles and responsibilities that involve manual data entry, high frequency, and repetition. Automation should facilitate people working alongside machines, technology, and data to support administrative and operational business processes to improve the health care management of patients.

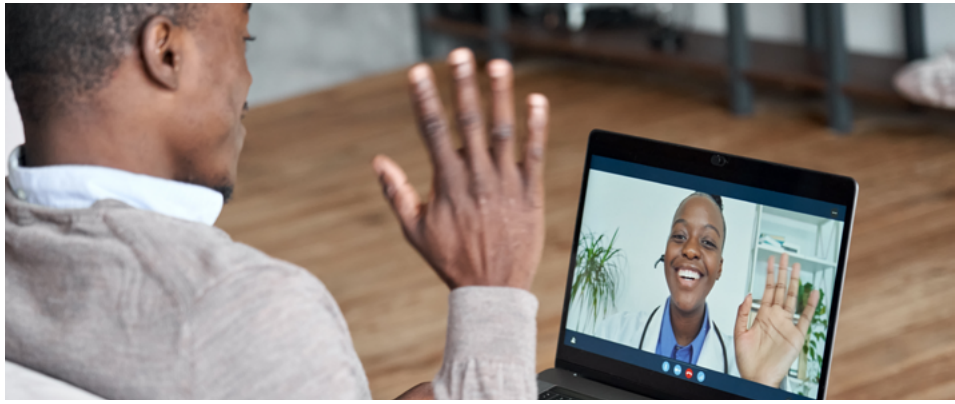
GOALS

- Simplify redundant data entry at multiple points within and across health care encounters
- Eliminate "hunting and gathering" data across multiple platforms by enabling easy access to information for use in decision making
- Present complete, accurate data for workflows through tools that streamline care management
- Improve feedback and status monitoring across the continuum of care and across settings

Focus on HIGH-VALUE work. Not repetitive or menial tasks.

PRIORITY AREA 5

Improve Patient and Caregiver Interactions with Health and Health Care



TARGET END STATE

Patients and caregivers have a more seamless and integrated experience in health and health care management.

Patients and caregivers need automation to more seamlessly manage health and wellness anywhere and anytime. Automation must remove administrative tasks that create burden, such as: appointment making, check-in and registration; accessing portals and applications; data sharing and gathering; connecting to community and social resources. Automation can elevate the patient and caregiver role in decision making and improve access to care, but privacy and data security must be prioritized in the creation and implementation of new tools and systems.

GOALS

- Streamline information and data sharing across patients, caregivers, clinicians, staff (provider and payer), and other stakeholders involved in health care workflows
- Simplify administrative tasks such as appointments, registration, portals, and applications for health data access
- Empower patients to manage health by facilitating faster access to needed information
- Improve care access and outcomes by reducing barriers, allowing care to be managed anytime and anywhere

Use technology to REDUCE FRUSTRATION for patients and caregivers through EASY ACCESS to information.

PRIORITY AREA 6

Leverage Interoperable Data for Automation

TARGET END STATE

Data shared across disparate technologies delivers insights and efficiencies.

Reliable, accurate, comprehensive data is essential for workflow automation. Data must be accessible via standardized interfaces and other interoperable methods to integrate modern computing technologies into workflow automation. Workflow automation holds the greatest promise when it utilizes and shares data across health care delivery organizations to drive widescale improvements. The design must focus on interoperability, taking into account technological disparities in underserved and rural areas.

GOALS

- Streamline health information exchange workflows
- Improve situational awareness for care management by finding, parsing, and presenting data across multiple systems (relates to missing data, stage of wellness/care for the patient)
- Reduce use of paper forms and processes that require multiple inputs of clinical and administrative information
- Integrate clinician and patient workflows by bringing information, communication, and care into harmony

Strategies to Advance Automation Priority Areas

Six sequential strategies to advance the priorities and vision for workflow automation:

Educate **Convene** **Prioritize** **Demonstrate** **Incent** **Scale**

These strategies illustrate how people, process, and technology must synchronously orchestrate and mobilize to realize the workflow automation vision.

Strategies to Advance Automation Priority Areas

1

Educate

Focuses on spreading awareness of the need and opportunity to automate, identifying and addressing barriers to automation (including concerns about privacy and security, and job loss or reassignment).

2

Convene

Builds national dialogue about workflow automation by gathering more stakeholders into the process to support the next strategy for prioritization. This is an opportunity to gain input and consensus on measurable goals to achieve through automation.

3

Prioritize

Identifies workflows to automate and their appropriate level of automation. Prioritize automation for workflows for tasks that include manual data entry, a high frequency of repetition, clearly defined independent and dependent variables for models, and clear roles and responsibilities.

4

Demonstrate

Focuses on the design of pilot projects, demonstrations, and evaluations to determine the success and scalability of prioritized workflows. It should consider the effect on health outcomes and access across populations.

5

Incent

Focuses on the design and deployment of appropriate policy and market levers tailored to the people, process, and technology that support workflow automation. Occurs in coordination with payers and should include all stakeholders, even if they have conflicting goals.

6

Scale

Uses automation tools and processes to implement and conduct continuous improvement in automation at organizations across the U.S.

Conclusion

Automation holds tremendous potential to drive efficiency in health care delivery in the United States, particularly where manual, repetitive tasks burden current workflows.

Identifying a set of priorities and strategies for advancing workflow automation in health care that multiple stakeholders can adopt and promote can help accelerate improvements in the quality and safety. By helping to identify the ideal end state, the industry can work collaboratively together to achieve it.

Workflow automation has the ability to directly address many of the largest challenges in health care today, among them the cost, quality, and safety of health care, as well as mounting provider burnout.

But automation will not be achieved overnight. It requires a deliberate process predicated on short-term gains to show value, combined with a longer-term vision to reach the full potential for health care workflow automation.

For more information about ONC's work in health care automation, visit https://www.healthit.gov/topic/scientific-initiatives/health-information-technology-workflow-automation-policy-development.

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Appendix

Exhibit 1 – Patient and Caregiver Workflows To Consider for Automation[9]

Workflow	Rationale
Management of permissions to access and share electronic health data	• Enable patients and caregivers to more quickly access their data and control its transfer to third party apps and other providers without relying on care providers and paper-based systems • Empower patients and caregivers to be active participants in their care and verify provider data • Level of automation to consider: High
Post-encounter care coordination	• Ensure care management and monitoring processes are immediately underway after ambulatory and inpatient encounters to improve health outcomes • Connect patients and caregivers with advocates and community and non-clinical resources for social needs • Level of automation to consider: High to semi-automated
Care planning	• Facilitate information sharing, communication, data verification, and decision-making with care teams • Level of automation to consider: Semi-automated
Billing and payment processes	• Streamline, simplify, and bring transparency to costs from providers and payers • Level of automation to consider: High
Customer service bots	• Reduce burden on providers and administrative staff for scheduling and other tasks that support care delivery • Provide digestible information in patient friendly terms and venues • Level of automation to consider: High
Preferences applied across automated workflows	• Improve patient experience • Ensure critical messages are received, understood, and acted upon • Level of automation to consider: High

Exhibit 2 – Clinical and Care Delivery Workflows To Consider for Automation

Workflow	Rationale
Telehealth and virtual health	• Extend remote monitoring across the care spectrum • Transform care delivery across settings with monitors and alerts that notify patients, caregivers, and their providers of an appropriate visit based on wearables, sensors, and other available technologies • Use bots to schedule and onboard patients to virtual health platforms, such as apps
Inpatient and outpatient decision making workflows	• Streamline data collection, review, and translation into practice (for example, synthesizing more than 20 parameters for starting extubation) • Reduce “hunter/gatherer” burden on clinicians to locate missing data to support real-time care decisions
Encounter follow-up tracking	• Streamline follow-up schedules for clinical reminders to eliminate reliance on work-arounds, such as Excel spreadsheets for procedure reminders, that reside outside the EHR
Inbox triage	• Reduce inbox monitoring by assigning messages to appropriate care team members and administrative staff and tracking their responses
Scheduling	• Improve appointment scheduling to better understand and respond to condition severity and requests for medical records prior to scheduling
Care team member collaboration and communication	• Reduce duplicative information gathering by streamlining check-in, registration, and rooming processes

Exhibit 3 – Population Health Workflows To Consider for Automation

Workflow	Rationale
"Define" the patient	• Enable care providers and delivery organizations to understand "data blind spots" and provide "life-focused" care • Facilitate widespread availability of sophisticated population health analytics tools and data
Streamline interoperability with non-clinical data sets (for example, schools and the justice system)	• In support of the workflow detailed above, provide innovative ways to advance understanding of social determinants of care • Exploit workflow models to understand precision data requirement for interoperability (what and where).
Advance use of customer relationship management for communication, information gathering, and identify verification	• Reduce use of paper forms and processes that require providing the same administrative and/or clinical information multiple times • Consistently collect and support use of information regarding patients' communication needs and preferences, such as primary language or method of contact
Reporting registry, public health, and quality measurement data	• Reduce manual burden associated with report development, generation, and transmission • Decrease length of time to share public health and quality measurement data