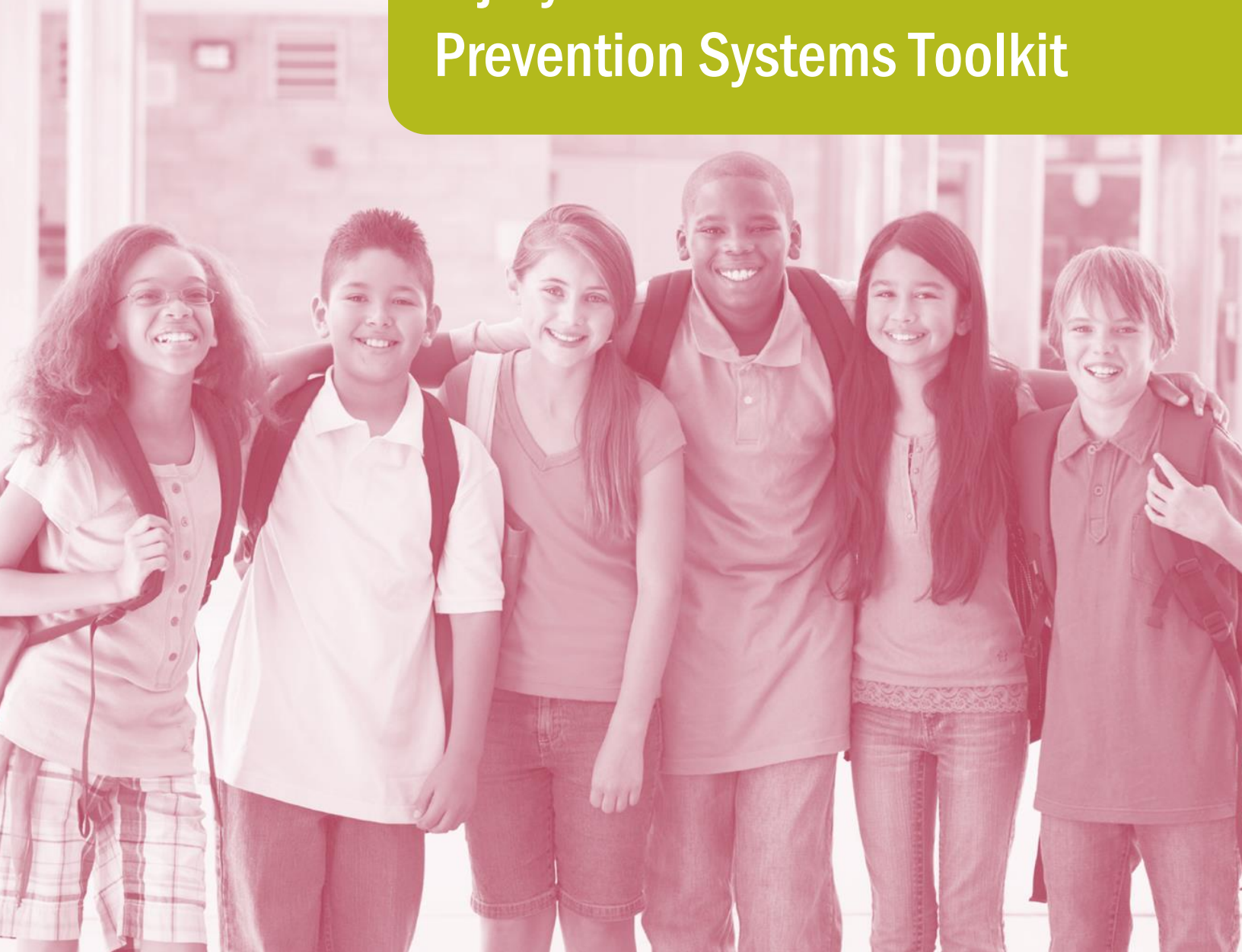# CSN
Children's Safety Network

Injury and Violence Prevention Systems Toolkit

EDC Education Development Center

Overview of the Toolkit

The injury and violence prevention systems toolkit is a compilation of resources aimed at state and jurisdiction public health practitioners and organizational leaders and managers committed to reducing injuries and violence through systems thinking and quality improvement. The toolkit is organized into six sections: 1) An introduction to systems thinking, 2) Establishing commitment to injury and violence prevention and quality improvement, 3) Recognizing leverage points in injury and violence prevention systems, 4) Defining and mapping your injury and violence prevention system, 5) Addressing complexity in injury and violence prevention systems, and 6) Improving your injury and violence prevention system. Sections 1 and 2 provide background information on the value of a systems approach to injury and violence prevention and the importance of establishing commitment to systems thinking. Sections 3 and 4 provide frameworks to help you recognize leverage points in injury and violence prevention systems and define your own system. Sections 5 and 6 introduce methods and tools for system improvement. The toolkit was developed by the Children's Safety Network and reviewed by the National Coordinated Child Safety Initiative Steering Committee.

1. Introduction to Systems Thinking

Systems thinking is an approach to solving problems by understanding how structures and processes relate. It is used by organizations and individuals to maximize efficiency, effectiveness, and results. A system involves connections, relationships, processes, and methods that come together in an organized way to achieve an aim. The major components of a system include a common purpose/aim, relationships, processes, tasks, individuals and organizations, resources, clients/beneficiaries, outcomes/results, and measures (Deming, 1994; Langley et at., 2009, p. 37).

Systems may be large, small, complex or relatively simple. A system may consist of an organization, a division, a coalition, a program, a project, or a set of partnerships. Each system has its own goals, processes, and internal logic.

Individuals and groups that take a systems thinking approach recognize that the way in which a system is designed determines the outcomes or results the system produces. To change the way your system functions and the outcomes it achieves, you must change the way the system is designed (Berwick, 1996; Langley et al., 2009).

> **Systems v. Processes**
> Systems are larger than processes. They have a common aim, but are not always clearly defined, are often non-linear, are characterized by inter-relationships, and have broad impact. Processes are small, concrete, actionable sequences of steps that are routinized and repetitive. They transform inputs into outcomes and are one component of a system.
>
> For example, you may have a statewide system of child safety seat promotion. Processes within that system may be a network of child safety seat installation sites staffed by certified child passenger safety technicians, child safety seat installation and inspection, and child safety seat education for caregivers.

Systems thinking has many benefits

Systems thinking integrates the five key principles of learning organizations, as articulated by Peter Senge (1990) in *The Fifth Discipline: The Art and Practice of the Learning Organization*. The five disciplines are systems thinking, shared vision, mental models, team learning, and personal mastery. Systems thinking ensures commitment to a shared vision, identifying key inputs, processes, and

outcomes, challenging mental models in order to drive system improvement, and investing in people through team learning and personal mastery.

- **Shared vision** is a broad, long-term goal for what a system aims to achieve. Shared vision instills a commitment to something larger than the day-to-day processes and priorities of sub-components of a system that may compete with the overall system aim.
- **Mental models** are beliefs or assumptions we have about the way things work. They may be positive or negative, accurate or inaccurate, and may support, interfere, or conflict with the vision. To improve your system, you may need to support and reinforce a mental model, or you may need to disrupt and replace it with a different mental model.
- **Team learning** develops the skills of groups of people, equipping them to function as a cohesive team to work together in pursuit of a higher priority and common goal rather than focusing primarily on individual needs, perspectives, and priorities.
- **Personal mastery** is the skills, competence, and motivation to continually recognize how our actions affect those around us. Personal mastery allows us to take responsibility for our role in a system rather than seeing ourselves as passive parts of the system. Equipped with a meaningful sense of personal mastery, we can each become fully engaged with the system and take action to improve the system (Senge, 1990).

Systems thinking helps you:

- **Understand and manage complexity**. By mapping the components of your system and breaking the system down into its constituent parts, you can see how the components relate to one another and understand the ways in which they interact to either achieve, or in some cases, impede the system's purpose.
- **Anticipate and prevent unintended consequences.** Systems thinking can alert you to something in one part of the system that is impacting something in an entirely different part of the system. These impacts may be unforeseen and can produce unintended consequences.
- **Identify and address challenges, gaps, or bottlenecks.** By analyzing and continually monitoring your system, you can more easily spot gaps or bottlenecks and see where problems or challenges are likely to occur. Recognizing these "pain points" in your system enables you to take steps to prevent problems.
- **Identify and implement high-leverage changes and cross-cutting strategies**. By looking across your entire system and understanding its strengths and weaknesses, you can see what kinds of strategies are most likely to have the greatest impact on the system. You can also determine where and when to implement those strategies.
- **Support more rapid scale up and spread of effective strategies and programs.** When you adopt a systems approach, you can more readily carry out your work in phases, learning as you go and carefully laying the groundwork for largescale change. For example, you can conduct small-scale tests of a strategy in one part of your system or pilot a strategy in a specific setting or with a particular population to accurately gauge its effectiveness, knowing that these steps are part of a broader effort to spread successful strategies. Collecting and analyzing real-time data from small-scale tests enables you to adapt strategies and ultimately scale them up with fewer delays and setbacks (Langley et al., 2009).

2. Establishing Commitment to Injury and Violence Prevention and Quality Improvement

Strong leadership is paramount to establishing an organization-wide commitment to injury and violence prevention and quality improvement. Leadership responsibilities include creating a culture of injury and violence prevention, mobilizing staff, providing adequate resources, and encouraging testing and learning,

A senior leadership team can establish or strengthen a culture of injury and violence prevention by inspiring staff to believe injuries and violence are preventable and by defining and widely sharing the overall system of injury and violence prevention in the organization. Senior leadership needs to communicate regularly with staff so that everyone can understand the overall purpose/aim of the system and how it is connected to the organization's vision, strategic plans, and operational plans. Senior leadership keeps staff focused, assumes responsibility for the success of system improvement efforts, and oversees funding and resources (Langley et al. 2009).

Senior leadership may have an organizational policy specific to injury and violence prevention and create an implementation team, or sub teams, to define the overall system and identify areas for system improvement. To ensure success, an implementation team should be clear on the aim, roles of team members, and tasks. The team should be expected to meet regularly, have an evaluation plan in place, and communicate with senior leadership (Zero Suicide, 2017). It may be necessary to shift staff responsibilities in order to focus on specific, time-bound improvement efforts. A culture of testing and learning needs to be established (See Section 6 of the Toolkit) to make rapid real-time decisions. This will allow team members to mitigate the risk of spreading strategies and programs widely and rapidly, without first testing and adapting them to the local context.

3. Recognizing Leverage Points in Injury and Violence Prevention Systems

The Children's Safety Network identified leverage points, or primary and secondary drivers, i.e., major processes, structures, or systems, (Langley et al., 2009) that are necessary to reduce and prevent serious and fatal injuries among children and adolescents. Comprehensive injury and violence prevention systems span all levels of the socio-ecological model (Centers for Disease Control and Prevention, 2015) and the spectrum of prevention (Prevention Institute, 2017). Public health plays a key role in providing education and convening action across sectors to address injuries and violence. An important part of this role is to lead the way in promoting equitable approaches and interventions to injury and violence prevention that address disparities across several populations within sex, race/ethnicity, geography, disability, sexual orientation and gender identity, health literacy, and socioeconomic status (SES), among others (EDC, 2017). Health equity frameworks and impact assessments are useful tools to use when deciding which interventions to select and where to apply them (Race Forward, 2009; Washington State Department of Health, 2014). For example, conducting a careful analysis of data to identify populations that are disproportionately impacted by particular injuries and ensuring that interventions to address those injuries are selected

and carried out with full engagement and active input from the affected communities are two important steps in implementing an equitable approach to injury and violence prevention.

Table 1: Cross-Cutting Leverage Points for Child Safety Using the Social-Ecological Model

Primary Driver	Secondary Driver
Societal culture of injury and violence prevention	Knowledgeable partners and policy makers
	Policies that reflect best practices in injury and violence prevention
	Multi-stakeholder partnerships
	Macro, real-time data collection systems that identify trends
Organizational policies and procedures that support the culture and practice of injury and violence prevention	Organizational policies that support best practices in injury and violence prevention
	Enforcement of policies, laws, and regulations that promote protective factors, address risk factors, and support individuals at risk
	Knowledgeable and proactive practitioners
	Expanded, coordinated, and collaborative networks of practitioners
	Access to programs, services, and equipment that lead to the primary prevention of injuries and violence, such as behavior change programs
	Access to programs, services, and equipment that lead to secondary prevention, or reduce harm, such as design improvements in the physical environment
	Access to programs, services, and safety equipment that lead to tertiary prevention, such as timely access to appropriate emergency medical services
	Outreach and training to at risk communities
	Real-time data collection on local trends, program processes, outcomes, and impact
Knowledgeable and engaged individuals, i.e. families, youth, peers, school personnel, mentors	Interactive learning and dissemination of educational materials
	Outreach and training to at risk families and individuals
	Culturally and linguistically appropriate educational materials and practices

Each secondary driver can be improved upon to more effectively achieve the primary driver. More than one tangible, specific action, or change idea, may be necessary for improvement in the secondary driver (Bennett & Provost, 2015).

Examples of change ideas developed by states and jurisdictions that are working in injury and violence prevention through CSN's Child Safety Collaborative Innovation and Improvement Network (CoIIN) include:

- Partner with your state's Department of Motor Vehicles to distribute materials that educate parents and teens about Graduated Driver Licensing requirements
- Train child passenger safety technicians throughout your state to use an electronic universal form for inspections to ensure consistent quality of inspections and to collect more and better data on inspections
- Require organizations that receive child safety seats for distribution to become child passenger safety inspection stations

- Systematically assess and increase the number of certified child passenger safety technicians and mobile fitting stations in counties within a state
- Educate law enforcement officers and cadets on the requirements of laws related to child passenger safety and teen driver safety and train them to be certified child passenger safety technicians
- Work with birthing hospitals to improve policies and protocols for child passenger safety
- Establish specific safety standards for intramural youth sports leagues and recognize/reward the leagues for meeting those standards
- Convene and coordinate a learning collaborative to engage key organizations and agencies in spreading evidence-based programs statewide
- Develop an accessible and user-friendly toolkit and provide follow up technical assistance on key injury prevention topics to encourage local health departments to become actively engaged in working on child safety
- Provide incentives or generate friendly competition to encourage the use, adherence and spread of evidence-based practices and programs.

Change ideas should be evidence-based or evidence- informed. Clearinghouses for reviewing the evidence supporting injury and violence prevention strategies and programs include:

- Blueprints for Healthy Youth Development. University of Colorado Boulder, Institute for Behavioral Science. Available at: http://www.blueprintsprograms.com/
- Crime Solutions. Office of Justice Programs, National Institute of Justice. Available at: https://www.crimesolutions.gov/Programs.aspx
- Model Programs Guide. Office of Justice Programs, Office of Juvenile Justice and Delinquency Prevention. Available at: https://www.ojjdp.gov/mpg/
- Technical packages for violence prevention: Using evidence-based strategies in your youth violence prevention efforts. Centers for Disease Control and Prevention. Available at: https://www.cdc.gov/violenceprevention/pub/technical-packages.html
- Top Tier Evidence. Coalition for Evidence-Based Policy. Available at: http://toptierevidence.org/
- What Works Clearinghouse. Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance. Available at: https://ies.ed.gov/ncee/wwc/

4. Defining and Mapping Your Injury and Violence Prevention System

Defining your system is an iterative process as you continually identify new components of the system and new stakeholders and partners to engage. Your system is ever-changing, especially if it is highly complex. The following actions can help you define and develop a visual map of your system. These action steps do not necessarily have to be followed in a linear way.

Engage stakeholders and partners

Identify the current stakeholders and partners that are involved in your system. As you unpack the components of your system, you may realize that additional individuals and agencies/organizations need to be engaged.

Reach consensus on the shared purpose of your system

Use real-world anecdotes and familiar terms and concepts to frame an ongoing dialogue about the shared purpose, or aim, of your system. Achieving consensus on the purpose of your system might mean some people leave the conversation and others join. It is essential that the people responsible for the major parts of your system are fully engaged and in agreement with your system's purpose. It is helpful to define your purpose using SMART criteria (specific, measurable, attainable, realistic, and time bound). If you decide to use broader language for your purpose, you may define system goals for that purpose using SMART criteria. This will be useful as you work towards optimizing your system.

Identify and discuss the interactions that must occur for the system to achieve its purpose

Identify key tasks and processes that occur within the system. Consider creating:

- Process diagrams
- Diagrams that show linkages among processes: Connect the process diagrams by tasks and people
- Causal loop diagrams: Identify reinforcing and balancing processes in your system. Multiple causal loops can be connected to diagram a specific injury issue.

Identify the structures and rules under which the system operates

What practices, habits, customs, rules, procedures, organizational policies, or values shape the behavior of the system? Consider reviewing:
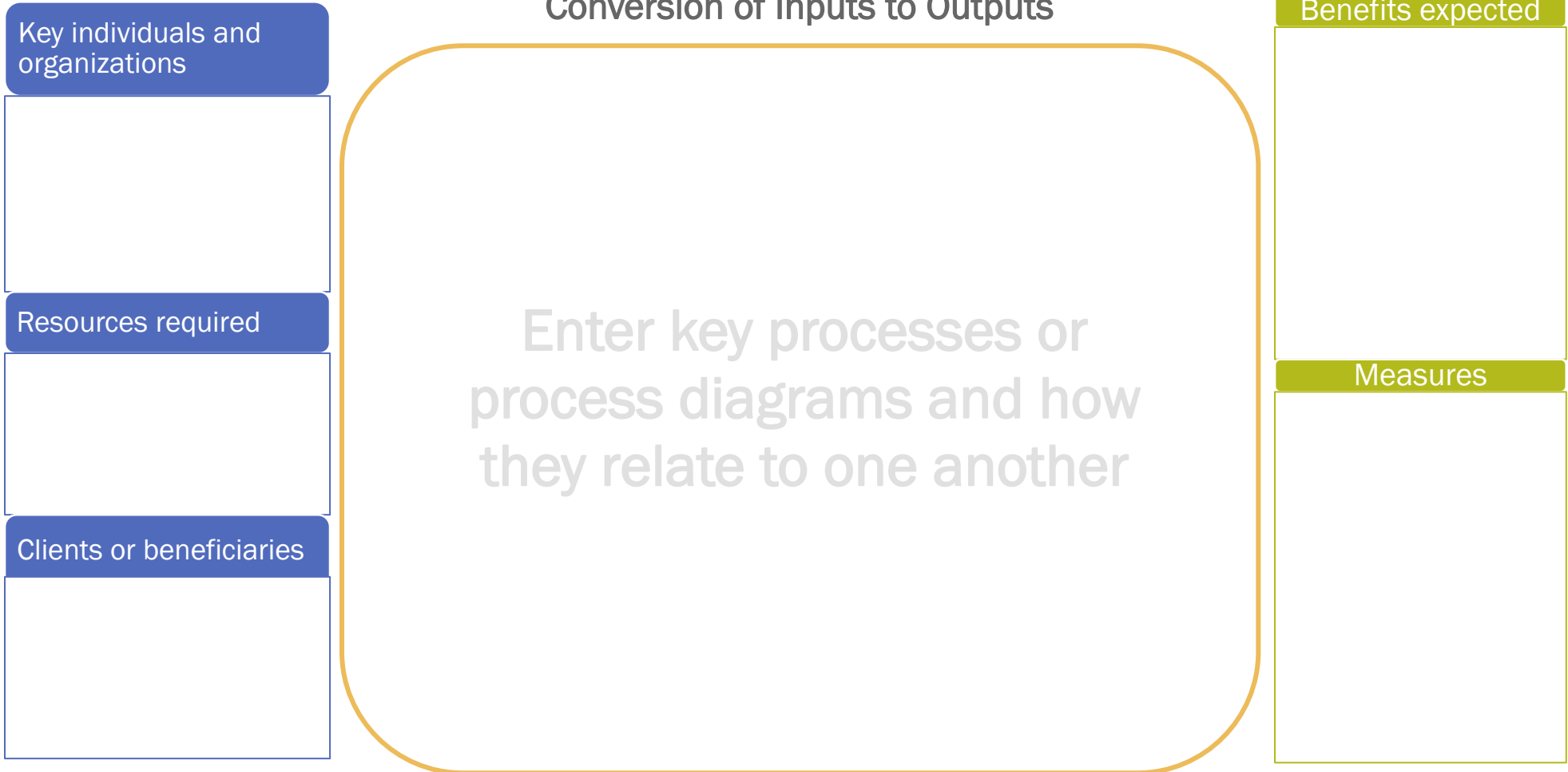
- Vision and mission statements
- Strategic plans
- Contracts/memoranda of understanding
- Operational or work plans
- Available data (datasets, needs assessments, landscape assessments, evaluations,)
- Evidence-based and evidence-informed strategies and programs
- Protocols, policies, and legislation
- Grants and funding sources

Key Questions to Ask When Defining a System:
- What is the purpose (aim) you are trying to achieve?
- What are the boundaries of your system?
- What are the key processes that help you achieve that purpose?
- Who are the key individuals and/or organizations involved in carrying out those processes?
- Who is responsible for managing your system?
- What documents define the structures or operating rules of those processes?
- What measures tell you whether or not you are achieving your purpose in an optimal way?
- What resources are required to achieve your purpose and carry out your processes?
- Who are the clients or beneficiaries of the system? What population are you aiming to impact?
- What benefits do you expect from achieving your purpose?

Purpose of the System: _____

_____

Conversion of Inputs to Outputs

Key individuals and organizations

Resources required

Clients or beneficiaries

Enter key processes or process diagrams and how they relate to one another

Benefits expected

Measures
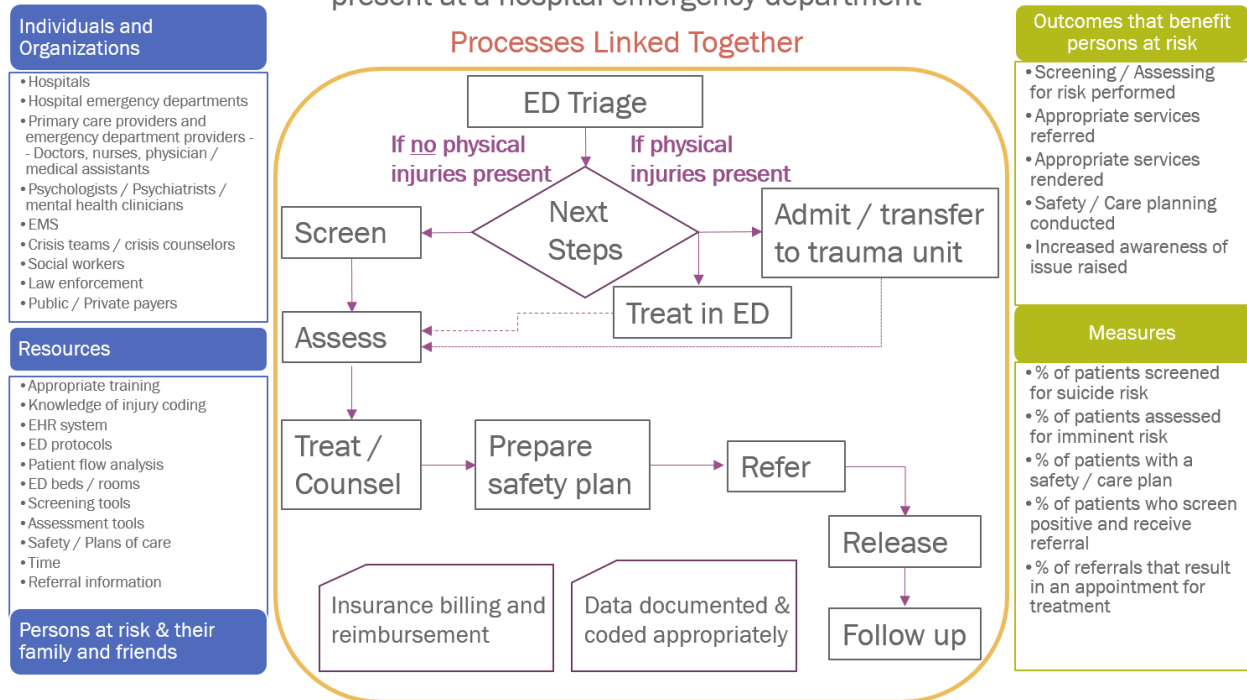
This diagram is informed by Health Quality Ontario's *Quality Improvement Guide*, which can be found at:
http://www.hqontario.ca/portals/0/documents/qi/qi-quality-improve-guide-2012-en.pdf

Figure 2: Systems Map Example: Screening for Suicide in Hospital Emergency Departments

Purpose: Identify and provide services to individuals at risk for suicide who present at a hospital emergency department

Processes Linked Together

Individuals and Organizations
- Hospitals
- Hospital emergency departments
- Primary care providers and emergency department providers - - Doctors, nurses, physician / medical assistants
- Psychologists / Psychiatrists / mental health clinicians
- EMS
- Crisis teams / crisis counselors
- Social workers
- Law enforcement
- Public / Private payers

Resources
- Appropriate training
- Knowledge of injury coding
- EHR system
- ED protocols
- Patient flow analysis
- ED beds / rooms
- Screening tools
- Assessment tools
- Safety / Plans of care
- Time
- Referral information

Persons at risk & their family and friends

ED Triage

If no physical injuries present — If physical injuries present

Next Steps

Screen → Admit / transfer to trauma unit

Treat in ED

Assess

Treat / Counsel → Prepare safety plan → Refer → Release → Follow up

Insurance billing and reimbursement

Data documented & coded appropriately

Outcomes that benefit persons at risk
- Screening / Assessing for risk performed
- Appropriate services referred
- Appropriate services rendered
- Safety / Care planning conducted
- Increased awareness of issue raised

Measures
- % of patients screened for suicide risk
- % of patients assessed for imminent risk
- % of patients with a safety / care plan
- % of patients who screen positive and receive referral
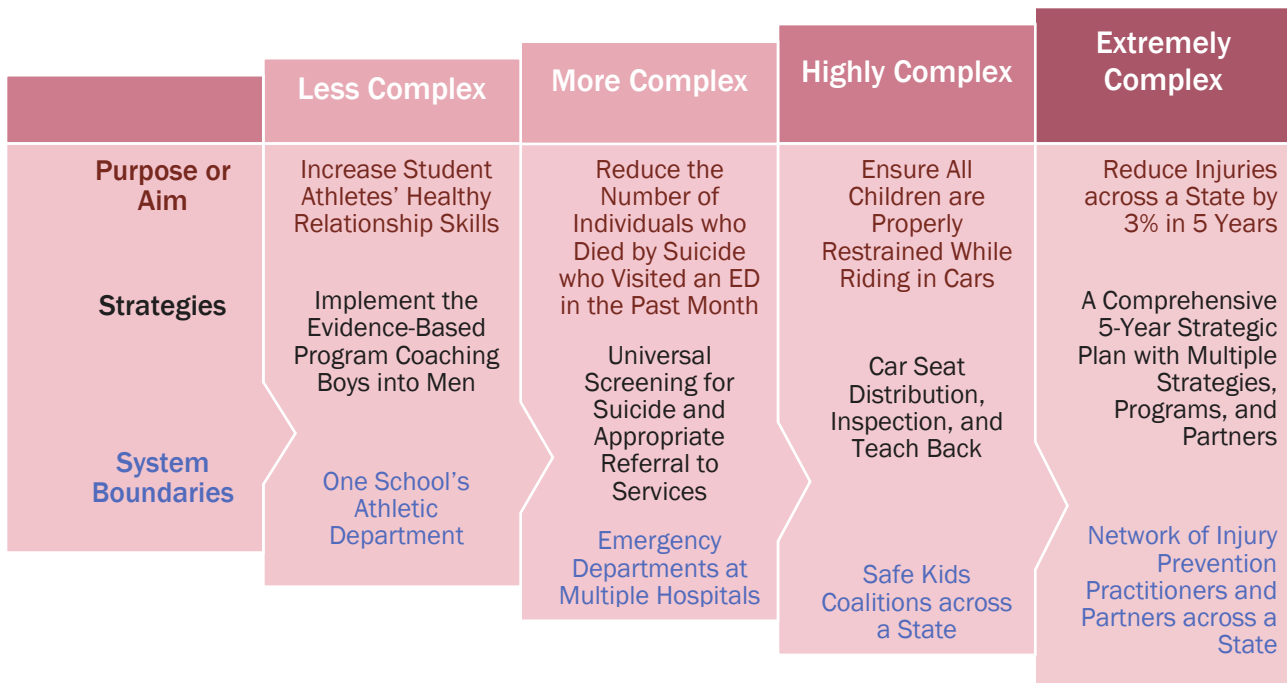- % of referrals that result in an appointment for treatment

Source: Child Safety CoIIN Vermont Suicide and Self-Harm Prevention Strategy Team

5. Addressing Complexity in Injury and Violence Prevention Systems

Although any group of items, people, or processes with a common purpose can be seen as a system, some systems are inherently more complex than others. The more diverse the problem and its context are (e.g., geographic, demographic, knowledge or skills, actors involved), the more complex the system becomes. Some systems require the implementation of many strategies and work across multiple organizational boundaries for the purpose to be achieved. The graphic below illustrates differences in the purpose/aim, strategies, and system boundaries when you move from a less complex to a highly complex system.

Figure 3: Complexity Continuum

	Less Complex	More Complex	Highly Complex	Extremely Complex
Purpose or Aim	Increase Student Athletes' Healthy Relationship Skills	Reduce the Number of Individuals who Died by Suicide who Visited an ED in the Past Month	Ensure All Children are Properly Restrained While Riding in Cars	Reduce Injuries across a State by 3% in 5 Years
Strategies	Implement the Evidence-Based Program Coaching Boys into Men	Universal Screening for Suicide and Appropriate Referral to Services	Car Seat Distribution, Inspection, and Teach Back	A Comprehensive 5-Year Strategic Plan with Multiple Strategies, Programs, and Partners
System Boundaries	One School's Athletic Department	Emergency Departments at Multiple Hospitals	Safe Kids Coalitions across a State	Network of Injury Prevention Practitioners and Partners across a State

Common Challenges in Highly Complex Systems

The Improvement Guide, a core text in the science of quality improvement, identifies four challenges of highly complex systems: delayed response time; integration, coordination, and synchronization; behavior change; and disruption (Langley et al., 2009, pp. 237-238). Understanding and addressing these challenges allows teams to stay motivated, appreciate the context in which they are working, and make real progress.

Delayed response time

The time between making a change and observing its effect is substantial in complex systems, and the complexity of a system makes it difficult to predict all of the consequences of a change (Langley et al., 2009, p. 237). In injury and violence prevention systems, there is typically a one- to two-year delay in the availability of data on injury-related deaths, hospitalizations, and emergency department (ED) visits. These data are centrally collected at the state level, and on an annual basis they are cleaned by the state, released, and submitted to a national dataset. This cleaning and release process produces a lengthy delay.

However, because states centrally collect and house the data, there are opportunities for innovation in accessing and analyzing real-time data. Public health practitioners may work with state epidemiologists and data managers to learn of different data sources, access real-time data, and make use of process measures (Langley et al., 2009, p. 252) for decision making. Process measures should be linked to the implementation and spread of evidence-based strategies and programs that can be expected to lead to a shift in long-term outcome measures (e.g., reductions in injury-related deaths, hospitalizations, and ED visits). Some examples of real-time data in injury prevention include:

The National Highway Traffic Safety Administration's Fatality Analysis Reporting System, state Traumatic Brain Injury Registries, and state Ambulance Use Records.

Integration, coordination, and synchronization

Injury and violence prevention solutions are found across different sectors. For example, health care providers, schools, and insurers, along with other businesses, play a crucial role in educating parents and caregivers about injury risks and the ways to minimize or eliminate these risks. Engineers design and test interventions, such as seatbelts, airbags, child safety seats, and smoke detectors, that create safer environments, while policymakers help to ensure the broader adoption of measures that are proven to increase safety, and state and local agencies implement and enforce these measures as well as other evidence-based programs and strategies.

Public health plays a unique role in convening stakeholders, forming partnerships, and facilitating coordinated action to reduce injury. When we implement change ideas in complex systems, we work across multiple organizational boundaries, increasing the importance of coordinating and sequencing change ideas to ensure successful adoption and integration (Langley et al., 2009, p. 257). For example, if you are creating coalitions and partnerships and educating policy makers across several geographically disbursed pilot sites that involve multiple sectorsand have different goals, processes, and resources, you will likely need to approach the implementation of these change ideas in phases. This requires planning, careful coordination, and time. The complexity of your system depends on the number of people in your system and their knowledge, skills, and availability. As integration, coordination, and synchronization become more complex, the importance of strategies and tools for managing complexity increases. Strategies for managing complexity could include developing memoranda of understanding between agencies, establishing coalitions and advisory committees, and forming and facilitating learning collaboratives.

Behavior change
When implementing changes in complex systems, you must often introduce and support behavior change across diverse settings and with large numbers of individuals. There are likely to be challenges in accessing different settings and populations, engaging partners, and persuading people to alter the way they do things, even when data and evidence point to the need for change. Common strategies for behavior change could include education, changes in policy or legislation, and social marketing or social norms campaigns (Langley et al., 2009).

Disruption
New technology, changes in administration, or changes in funding may disrupt the status quo. In some cases, this can make systems change necessary and unavoidable. In other cases, disruption may create obstacles and barriers to changing your system. Strategies to address disruption include placing increased emphasis on testing and learning on a small-scale, continually scanning for external opportunities and threats, and developing a commitment to innovation (Langley et al., 2009).

Table 2: Illustrative Example of Strategies for Addressing Common Challenges in a Complex Teen Driver Safety System

Challenge	Proposed Solution
Delayed response	• The system aim is to reduce motor vehicle-related fatalities involving teen drivers. Over the course of 1–3 years, work with multiple partners to educate parents and teens on Graduated Driver Licensing and work with policy makers to adopt higher standards of Graduated Driver Licensing. Track intermediary measures to gauge progress, such as the number of schools offering teen driver safety education, the number of health care providers offering anticipatory guidance, knowledge of GDL among parents and teens, and behavior change among parents and teens.
Integration, coordination, synchronization	• Expand the state's teen driver safety coalition to include insurance companies, car dealers, and social services organizations and agencies. • Incorporate Graduated Driver Licensing information into the parent handbook distributed by the Registry of Motor Vehicles
Behavior change	• Have teens track and submit a log of supervised driving hours over time • Test the use of Uber or Lyft as effective alternative transportation options for teens who are under the influence or who are with friends under the influence
Disruption	• Pilot incentives for teens and parents to participate in teen driver safety education (e.g. parking permits at high schools) • Create a peer-to-peer app with video tutorials

6. Improving Your Injury and Violence Prevention System

If the purpose of your system is not being achieved, you must ask, *"Why and what can be done to improve the system in order to achieve our shared purpose?"* When you and your team map the processes, tasks, people, materials, relationships and operating rules of your system, you will likely find areas or issues that are difficult to navigate, that cause or contribute to delay or confusion, or that aren't working as intended. This section provides resources and examples to help you unpack these challenges and arrive at solutions.

Using a tested quality improvement model can build staff capacity in improvement science, lead to system improvements, and produce results. The Model for Improvement (MFI) is a widely used quality improvement framework in healthcare that

Examples of Negative Unintended Consequences
- Focusing on preventing bullying in one location within a school (e.g., classrooms) may result in its occurrence or escalation in another location in that school (e.g., hallways, the cafeteria, on buses)
- Improving or increasing screening for suicide risk within a healthcare organization may reveal a lack of capacity or training to provide treatment and referrals for those that screen positive
- Increasing distribution of child safety seats in a county may lead to a need to address incorrect installation of seats in that county
- Increasing the prescribing of opioids to reduce pain may inadvertently contribute to an increase in opioid addiction

consists of 3 questions and a Plan-Do-Study-Act framework for testing, implementing and spreading evidence-based change ideas (e.g. child safety promotion strategies) (Langley et al., 2009).

The following questions are adapted from the MFI.

- What is the purpose/aim of your system?
- What are the drivers and evidence-based change ideas that lead to accomplishment of your system purpose/aim?
- What data will allow you to determine if you are making system improvements? What outcome and intermediary measures will you monitor?

Review section 4 of the Injury and Violence Prevention Toolkit, "Defining and mapping your injury and violence prevention system," to help you answer the first and third questions on the purpose/aim of your system and identify measures you will monitor. To answer the second question, identify areas for improvement in your system, review leverage points in injury and violence prevention systems (see section 3) and develop a plan for how you will work on improvement.

Identifying areas for improvement in your system

As you assess your system for areas that are ripe for improvement, it is important to prioritize the change ideas you will test, implement, and spread. Categorize the change ideas according to what needs to happen immediately and what will help in the long run.Ask yourself what unintended consequences could result from each change, how you will monitor that risk, and how you will address that risk if it occurs.

Several tools exist to help teams identify problems, explore their primary causes, examine existing mental models, and uncover areas that are ripe for improvement. Here are two tools you may find useful:

Fishbone Diagram or Ishikawa Diagram	Identify the cause of a problem; Overcome group think or "falling into a rut"
Five Whys	Identify the root cause of a problem; Determine the relationships between problems

Identifying sources of injury data

Monitoring data and incorporating data into your decision-making process allow you to effectively adapt and scale-up strategies. However, national-level data typically has a lag time of two to three years before it becomes available. For example, 2016 data on injury fatalities and 2015 non-fatal injury data became available in 2018. This creates a challenge for injury prevention practitioners on the ground who want to test change ideas rapidly and on a small scale in order to remain innovative and make informed decisions. To explore ways to obtain data more rapidly, public health practitioners can work with health departments, hospitals, and other agencies and institutions that

> ### Monitoring Progress
> Don't forget to monitor the implementation of child safety programs and strategies, and their effectiveness, through the use of intermediary measures. Consider working with local partners to build or access existing data collection systems. Examples of data sources include school records on traumatic brain injuries, participation in social and emotional learning programs, and completion of teen driver safety courses; hospital records on provider training in child safety, caregiver education on abusive head trauma in infants, and hospital policy statements; and local health department records on child safety campaigns.

maintain relevant data sets. Table 3 shows the types of data sources for mortality, morbidity, and behavioral risk factors. Appendix I lists specific injury data sources, along with information on how to access this data.

Table 3: Injury Records and Surveillance Systems

Data Type	Source Type
Mortality data	Vital records
	Medical examiner and coroner records
Morbidity data	Hospital inpatient records
	Trauma registries
	Emergency medical services records
	Post-acute-care data
Risk factor data	Injury surveillance data (transportation injuries, residential injuries, occupational injuries, violence and firearms)
	Behavioral surveys

Connecting with stakeholders and forming partnerships

Partners can help each other maximize and leverage new resources, capacity, and expertise. Partnership implies that there is trust and genuine engagement in decisions made to achieve a system's purpose. It also implies that each partner is a champion for the other's ideas. Engaging a partner is an inclusive process, which should foster cooperative planning toward the system's goals.

Read more about innovative strategies for obtaining real-time data in the CSN resource *Stories of Innovation: Collecting Real-Time Outcomes Data for Injury Prevention*.

There are, of course, challenges to working with partners, such as:

- Lack of time for all partners to be equally engaged (Himmelman, 2002);
- A potential partner's narrow focus or reliance on silos;
- Turf issues resulting from concerns over individual program integrity, competition for funding, and different perspectives such as "we know best" (Himmelman, 2002);
- Data linkage problems resulting from different systems and structures.

Working with partners requires a more intensive effort to document the purpose and promise of the partnership, including:

- Identifying the common interests, intersections, benefits, challenges, and specific strategies for working with a partner;
- Describing the structure and expectations for working together in a more formal way;
- Spelling out the role each partner will play in the system;
- Comparing and clarifying the "language" each partner uses to determine if common terms are defined in the same way (e.g., surveillance, intervention, infrastructure, at-risk, prevention);
- Deciding how each partner will report and track outcomes for their own purposes and to ensure achievement of the system's purpose and goals.

Working with a group of partners also involves narrowing down your larger group of partners to the "team" that will have primary responsibility for implementing and monitoring system goals. This requires early and clear identification of a leader to oversee the efforts of the "team" – someone with responsibility for the overall effort who can coordinate the work and integrate input and contributions from all participants, guiding efforts to successful completion.

> **Be sure to consider partnerships within the following:**
> - Schools
> - Hospitals
> - Community health centers
> - Insurers
> - Coalitions
> - Task forces
> - Committees
> - Child care centers
> - Preschool programs
> - After-school programs
> - Parent groups
> - Businesses
> - Faith-based organizations
> - Professional associations
> - Policymakers
> - Law enforcement

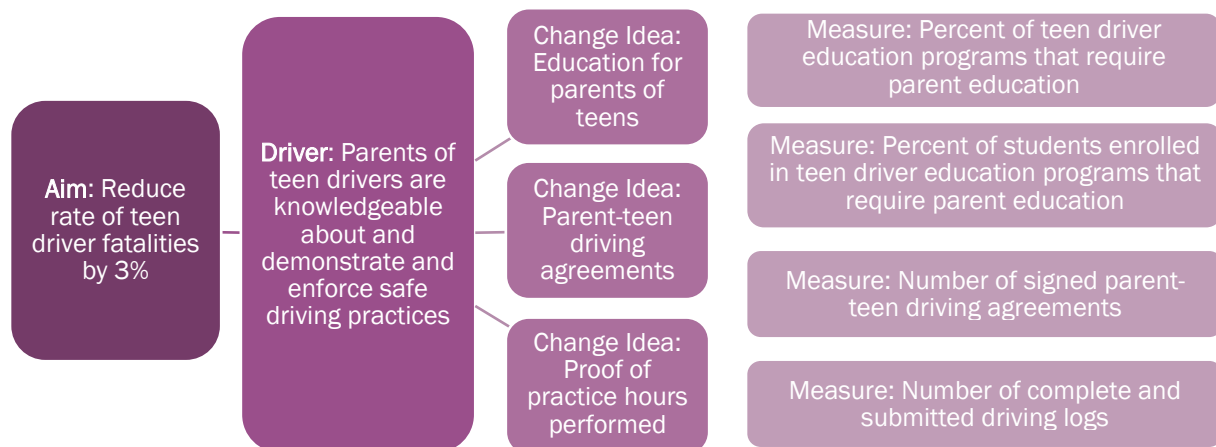## Developing a plan for improvement

Once the problem(s) have been identified and discussed, the team should develop a plan for short-term and long-term improvements. The improvements should aim to simplify feedback loops and eliminate delays between cause and effect.

Several tools exist to help your team brainstorm improvements. Here are three tools you may find useful:

| Driver Diagram | Display the theory of change for an improvement project |

| Force Field Analysis | Summarize forces supporting or hindering change |

| Matrix Diagram | Arrange information to understand relationships and make decisions |

Developing a driver diagram allows you to work on smaller, more manageable parts of your system. The key is to intentionally start small, allowing you to test and adapt evidence-based and evidence-informed change ideas for your context, create increased political and organizational will, and keep teams inspired. This will create a solid foundation for implementing and spreading your change ideas in a complex system with multiple actors, processes, and resources. The example below illustrates a driver diagram (or theory of change) and intermediary measures for a system of teen driver safety.

Figure 4: Getting Started by Breaking Your Work into Manageable Pieces: Teen Driver Safety Theory of Change and Intermediary Measures

Aim: Reduce rate of teen driver fatalities by 3%

Driver: Parents of teen drivers are knowledgeable about and demonstrate and enforce safe driving practices

Change Idea: Education for parents of teens
- Measure: Percent of teen driver education programs that require parent education
- Measure: Percent of students enrolled in teen driver education programs that require parent education

Change Idea: Parent-teen driving agreements
- Measure: Number of signed parent-teen driving agreements

Change Idea: Proof of practice hours performed
- Measure: Number of complete and submitted driving logs

Testing solutions to problems

Implementing short- and long-term improvements is an iterative process, much like systems thinking. The first step in this process is to conduct small-scale tests of proposed change ideas to determine if those change ideas are effective in resolving the problems you have identified. Depending upon the results of these tests, the proposed change ideas can either be adopted if they work, adapted if they do not work well enough, or abandoned if they do not work at all(Langley et al., 2009).

Plan-Do-Study-Act cycles (PDSAs), a key component of the Model for Improvement, provide a framework for testing change ideas. Often, it is necessary to run several PDSA cycles to test a change idea under a wide variety of conditions. Successful tests gradually increase in scope and size (Langley et al., 2009). The four components of PDSA cycles are:

Plan: Identify the objective of the test (What do you want to achieve?). Make a prediction about what the test will show (What do you believe will happen as a result of the test?). Develop a specific plan to carry out the test (How will this test be implemented? Who will be responsible for conducting the test? Where and when will the test take place? How long will the testing phase continue?). Collect real-time data on the results of the test (How will you determine whether or not your test is successful? What measures will you use to evaluate success or failure? How will the data be collected and by whom?).

Do: Carry out the plan, document what happens, and collect the data.

Study: Analyze the data and information you collected in the Do portion of the PDSA cycle. Compare the results with your prediction and summarize the lessons learned.

Act: Decide what you will do with the lessons you learned. Will you work to make the change you tested a permanent part of your system (adopt), tweak the change idea for your local context and try the cycle again (adapt), or do away with the change because it did not yield the expected results or created negative unintended consequences (abandon)?

For more information on running PDSA cycles, see Langley et al., 2009.

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Appendix I. List of Commonly Used Injury Data Sources

Data Source	Years Data Collected	State Data Available	Link to Access Data
CDC Web-based Injury Statistics Query and Reporting System (WISQARS) - Fatal Injury Data	1981-present	Y	Centers for Disease Control and Prevention - https://www.cdc.gov/injury/wisqars
National Violent Death Reporting System (NVDRS)	2003-present	Y	Centers for Disease Control and Prevention - https://www.cdc.gov/violenceprevention/nvdrs
Fatality Analysis Reporting System (FARS) Traffic-related fatalities	1975- present	Y	National Highway Traffic Safety Administration - https://crashstats.nhtsa.dot.go
National Electronic Injury Surveillance System (NEISS)	1979- present	N	Consumer Product Safety Commission - www.cpsc.gov/library/neiss.html
National Ambulatory Medical Care Survey (NAMCS)	1989-present	N	Centers for Disease Control and Prevention - www.cdc.gov/nchs/about/major/ahcd/ahcd1.htm
National Hospital Ambulatory Medical Care Survey (NHAMCS)	1992-present	N	Centers for Disease Control and Prevention - www.cdc.gov/nchs/about/major/ahcd/ahcd1.htm
Healthcare Cost and Utilization Project (HCUP)	1988-present	N	Agency for Healthcare Research and Quality - https://hcupnet.ahrq.gov
National Child Abuse and Neglect Data System (NCANDS)	1995- present	Y	U.S. Department of Health and Human Services Administration for Children and Families - http://www.ndacan.cornell.edu/
National Crime Victimization Survey (NCVS)	1973- present	N	Bureau of Justice Statistics - https://www.bjs.gov/index.cfm?ty=dcdetail&iid=245
National Child Death Review Case Reporting System (NCDR-CRS)	2005 - present	Y	https://www.ncfrp.org/resources/child-mortality-data/
National Survey of Children's Health (NSCH)	2003, 2007, 2011/2012, 2016-present	Y	http://childhealthdata.org/browse/survey
National Health Interview Survey (NHIS)	1957-present	N	Centers for Disease Control and Prevention - https://www.cdc.gov/nchs/nhis/index.htm
Youth Risk Behavior Surveillance System (YRBS)	1991-present (biennial)	Varies	Centers for Disease Control and Prevention - https://www.cdc.gov/healthyyouth/data/yrbs/index.htm
Behavioral Risk Factor Surveillance System (BRFSS)	1984-present	Y	Centers for Disease Control and Prevention - https://www.cdc.gov/brfss/index.html
Monitoring the Future (MTF)	1975-present (12 graders); 1991-present (8th and 10th graders)	N	https://www.icpsr.umich.edu/icpsrweb/ICPSR/series/35