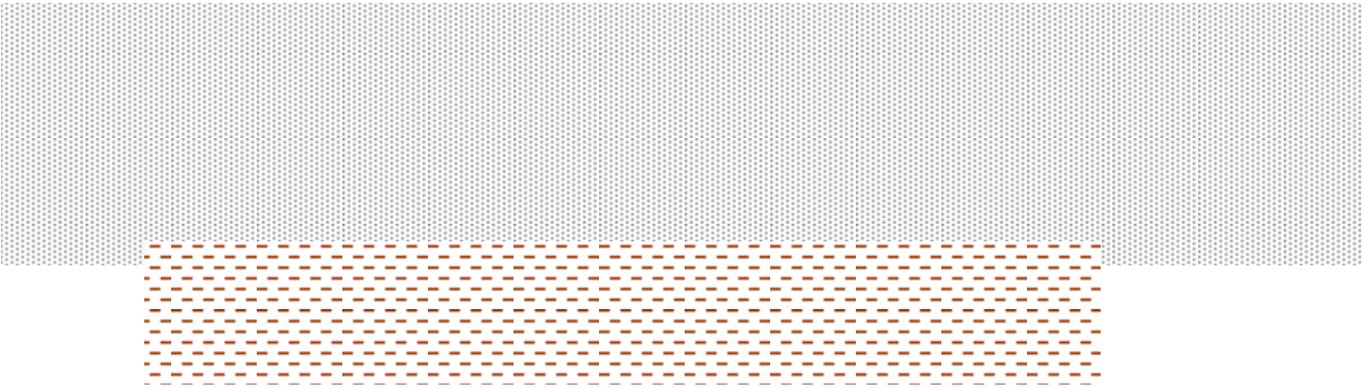# Orange County Fire Authority

Enabling Good Decisions
Data Quality Handbook

The Challenge . . .

Imagine you are the Fire Chief and you need to make good decisions about people, money, equipment or facilities. Imagine that the information you need to make critical decisions can only be found in file drawers or handwritten notes, is unreliable or inaccurate, or doesn't exist at all.

Think about the impact of decisions made without valid data – time and money spent on work that won't make a difference; some employees may be overworked while others are underutilized and bored; a slow response; a lost life.

What would you do?

The Vision . . .

You have high-quality information at your fingertips every day.   You know, at any moment, what the greatest threats to community safety are and what your employees are doing or not doing about it.   You can see exactly what is causing injuries and death and where improvements can be made.   You can see up-to-the-minute financial information and you can drill into the specifics to get a better understanding of shortages or overspending. You can do all of this without making a single phone call or having to sort through conflicting messages from various sources.

Imagine a fire service where all of this information is available to all employees at any moment, is summarized, and is easy to understand.

This is the vision for the Orange County Fire Authority.   It involves all employees who create or use data. It involves designated Data Owners who oversee data quality.   It involves recognizing how data that is created every day feeds into important decisions.

This vision begins with good, quality data; and good, quality data begins with this handbook.

Good Data,
Good Decisions

Poor Data,
Poor Decisions

All Employees Make a Difference

Data Owners
Are Responsible

Table of Contents

A   Introduction

Decision makers need good data to make good decisions. Decision makers include not just managers and supervisors, but anyone who is using data to decide what to do or how to do it (e.g. deciding which tasks are the priorities of the day based upon a computer report).

Data quality matters and all OCFA employees are responsible for data quality. Each data stream or subject area within OCFA is assigned a designated Data Owner. The Data Owner is responsible and accountable for data quality and is the gate keeper for all data changes. The Data Owner always involves data creators and data users in data decisions.

Decision maker requirements must determine data policies, not vice versa. In other words, the Data Owner must ask what decisions will be made and how the data will be used BEFORE data is collected. To maintain a high level of data quality, it's important to always keep in mind how the data will be used, not just how it is entered.

A.1 Purpose

The purpose of this handbook is to:

- Train and motivate employees to create and maintain high quality information that will aid good decisions
- Change the way all OCFA employees think about data
- Help OCFA employees understand how the data they create fits into the big picture

This will result in:

- Providing decision makers with useful and timely information whenever decisions are made
- Enabling decision makers to generate strong results for the community

A.2 Audience

This handbook was written for:

- All employees who create, maintain, or use data at OCFA
- Employees who make decisions based on OCFA data
- Employees who have overall responsibility for the quality of data (Data Owners)

A.3 Background

The contents of this manual were researched and developed by the <u>Improve Risk Data Quality</u> project team, a cross-departmental team of data owners, data users, and data analysts. Team members were:

Laura Blaul	Fire Prevention
Kris Concepcion	Community Relations and Education
Bryan Brice	Strategic Services
Jon Jones	Fire Prevention/Operations
Ruth Grubb	Emergency Medical Services
Joel Maclean	Operations
Todd Muilenburg	Information Technology
Cari Purkey	Investigations Services
William Blumberg	Investigations Services
Ginny Praisler	Fire Prevention Automation Support
Kathy Nakamoto	Consultant

In addition to creating this handbook, the project team reviewed and analyzed data quality in multiple OCFA subject areas, made recommendations for data quality improvements, and enlisted and trained Data Owners. The data quality review results and recommendations made by the team are available on the OCFA Intranet at the following link: [Data Quality documents](#). These documents are organized by subject area.

Note: The primary focus of the project team was data that could be used for analyzing and making decisions about community safety and risk. Other subject areas were not evaluated during the project. However, the long-term intention is that all OCFA data would be evaluated and included in Data Quality management in order to aid good decision making in all subject areas.

B   All Employees

B.1   What is Data?

Data is any information that OCFA creates or uses including:

- Databases
- Prehospital Care Reports
- Files on a personal computer
- File folders, drawers, and cabinets
- Handwritten notes
- Articles in magazines or from the Internet
- Brochures, fliers, and pamphlets
- Video footage, DVD's
- Employee memories and experiences
- Many others

B.2   Why is Data Important?

Data is important for many obvious reasons:

- Track and evaluate patient care
- Track and pay employees
- Track income and expenses
- Track obligations and commitments, within OCFA and with our customers
- Track regulatory compliance
- Record policies and procedures
- Record emergency information
- Identify person/s responsible for starting a fire
- Many other reasons

Making Decisions

Data is also important for a not-so-obvious reason. **OCFA decision makers use data every day to make decisions that affect** employees, fire stations, city and county agencies, and Orange County at large:

- Where should fire stations be located?
- How many vehicles and employees are needed? What type?
- What are our real response times? Are they adequate?
- What equipment and supplies do paramedics need?
- Which inspections actually make the community safer? Which don't?
- Should criminal charges be filed against person/s responsible for starting a fire?
- How much should OCFA charge for its services?
- Do employees need more or less training?
- Does what we do every day make a difference?
- Could we achieve more with less effort?

The data that we create every day may be used to make decisions that **affect lives**.

The Dilemma

OCFA cannot currently answer the following basic questions with certainty:

1. *How well are we meeting our mission to save lives and property?*

   Much data is collected, but it is not designed or organized in a way that can answer questions about civilian injuries and deaths, how they might have been prevented, and how and when they were prevented.

2. *What are the community's greatest fire and life safety risks?*

   We know that civilians are getting injured, killed, and losing their property; but our data is not captured in a way that allows us to determine *how* and *why* other than on an incident-by-incident basis.

3. *What are we doing that works? What isn't working but is taking our time and resources away from what might be more effective?*

   Measurable results and outcomes are not available for most of our efforts.

4. *Do the decisions we make contribute to, or detract from, our mission?*

   We cannot easily measure whether the decisions made about fire station locations, unit placements, helicopter programs and other deployment decisions, community outreaches, prevention activities, paramedic training and equipment, have been the best decisions and have achieved the intended results.

5. *Are we efficient?*

   What is the labor cost of our effort?   Could we achieve more safety and prosperity for the community if we refocused how we do what we do? Are we spending time collecting data that has no clear purpose?   Are we collecting the wrong data for a real need?

An Example

Consider the following example.   Suppose there had been a big fire with several injuries, a large dollar loss, and many OCFA resources involved. Suppose that all of this was recorded in the incident reporting database, including that the fire cause was undetermined.   What decisions could be made in the future with this data? Perhaps, some deployment and staffing decisions might be made.

Now suppose that all of OCFA's data systems were not only integrated, but they also had complete and accurate data including the following:

- ☑ A recent history of false alarms at this same facility
- ☑ A long history of fire safety violations, including three outstanding violations
- ☑ A history of chemical storage violations
- ☑ A previous "smoke, no fire" incident in same location recently
- ☑ Three OCFA staff members, a Captain, a Community Relations & Education Instructor, and a Fire Inspector had been on site during the six months prior to the fire, for various reasons, and they each noticed and recorded a potential hazard

With this information, dispatch could have launched an augmented equipment response to the fire ensuring responders had the right equipment for the type and severity of the incident.

Or suppose that the following additional information had been available afterward.

- ☑ Good quality OCFIRS data indicates the fire cause was directly related to violations
- ☑ Good quality IFP data indicates four other facilities have similar violation histories
- ☑ Good quality GIS data indicates the owner is operating two similar facilities within the county

Using this information, decision makers are able to take immediate action to reduce the probability of a similar incident through:

- ☑ Strict enforcement of similar code violations
- ☑ Increased inspection frequency of the owner's three facilities
- ☑ Increased inspection frequency of all facilities with similar violation histories
- ☑ Development and distribution of safety notices

The lesson of this story is that data matters and good data allows OCFA to make good decisions. The data we create every day may, ultimately, contribute to saving a life or property.

Good
Decisions

Good Data

What I type
every day
may save a life

Injuries

People
and
Places

Violations

Medical
Aid

Time &
Money
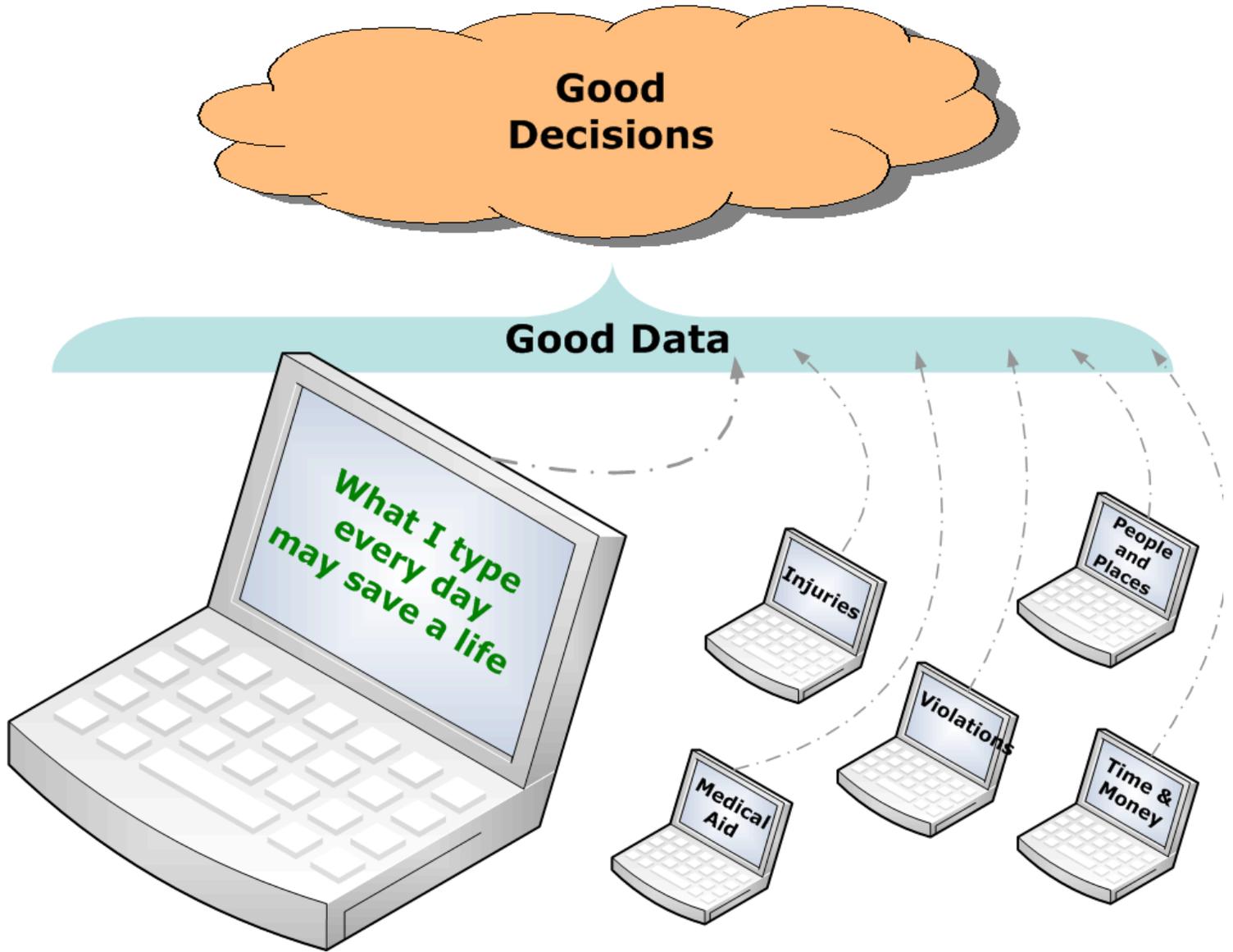
B.3 Who are the Data Owners at OCFA?

The following table identifies the subject areas and the Data Owners that have been assigned so far. Some OCFA subject areas are not yet assigned.   Most of the assigned subject areas are risk-related (i.e. determining what the emergency risks of the community are and how they are addressed through prevention, education, and emergency response).

Subject Area	Data Owner	Software Involved *
Dispatch	ECC Battalion Chief	CAD
Emergency Medical Services (EMS)	EMS Coordinator	OCFIRS, hospital database
Fire, Rescues, Other incidents	OCFIRS Steering Committee	OCFIRS, PIIP , CM4
Crime	Investigations	CM4
Deployment	Strategic Services	ADAM
Development	Fire Prevention Business Analyst	IFP
Access, Water, Lanes	Fire Prevention Business Analyst	IFP
Structures	Fire Prevention Business Analyst	IFP
Wildland	Wildland Unit	IFP
Inspections	Fire Prevention Business Analyst	IFP
Permits	Fire Prevention Business Analyst	IFP, CAD
Community Outreach	Community Education Supervisor	To be developed
Training (Operations)	Fire Training Program Specialist	TRS
GIS	GIS Manager	GIS

- The following acronyms were used in the table above:

| Acronym	System Name	Data Involved
ADAM	Deployment Analysis Module	Mapping, Incident
CAD	Computer-Aided Dispatch System	911 calls
iCMS	Investigations Case Management	Incidents involving Investigations
GIS	Geographic Information System	Mapping (various subjects)
IFP	Integrated Fire Prevention System	Inspections, plan reviews
OCFIRS	Orange County Fire Incident Reporting System	Incident reports
PIIP	Post Incident Inspection Program	Incident research
TRS	Training Records System	Operations training records

B.4   What is Data Quality?

If data is important, then the quality of the data is equally important.   Data is considered high quality if it meets these standards:

Data Entry	
Standard	**Description**
Accuracy	Correct, error free, does not conflict with other data
Precision	Enough detail, not too much detail
Understandability	Clear, easy to understand, not confusing
Completeness	Enough depth and scope
Believability	Accepted as true, real, and credible
Interpretability	Simple, usable language with clear definitions, reader can interpret the meaning accurately
Objectivity	Unbiased and impartial
Reliable	Captured and measured consistently
Reputation	Trusted or highly regarded
Data Design	
Timeliness	Available when needed and as long as needed, not outdated
Relevancy	Useful or helpful, not irrelevant, adds benefit
Stability	Does not change over time *This standard may not apply to all data*
Analyzability	Can be searched, sorted, filtered, Data is not embedded in a comment or narrative
Linked	Is connected and can be used with other related data
Non-Redundant	Is not duplicated elsewhere
Data Use	
Consistent Presentation	Presented in the same format consistently over time
Concise Presentation	Presented compactly, not overwhelming
Accessibility	Available and easy to retrieve
Security	Protected from unauthorized viewing and editing

B.5 Why is Data Quality Important?

The following two diagrams illustrate how seemingly insignificant data entry can affect future emergency responses, OCFA programs and procedures, and, ultimately, the good of the community.

Data that meets the Data Quality Standards on the previous page is useful for good decision making.   If data is incomplete, inaccurate, untimely, unreliable or confusing, it will probably lead to poor decisions.
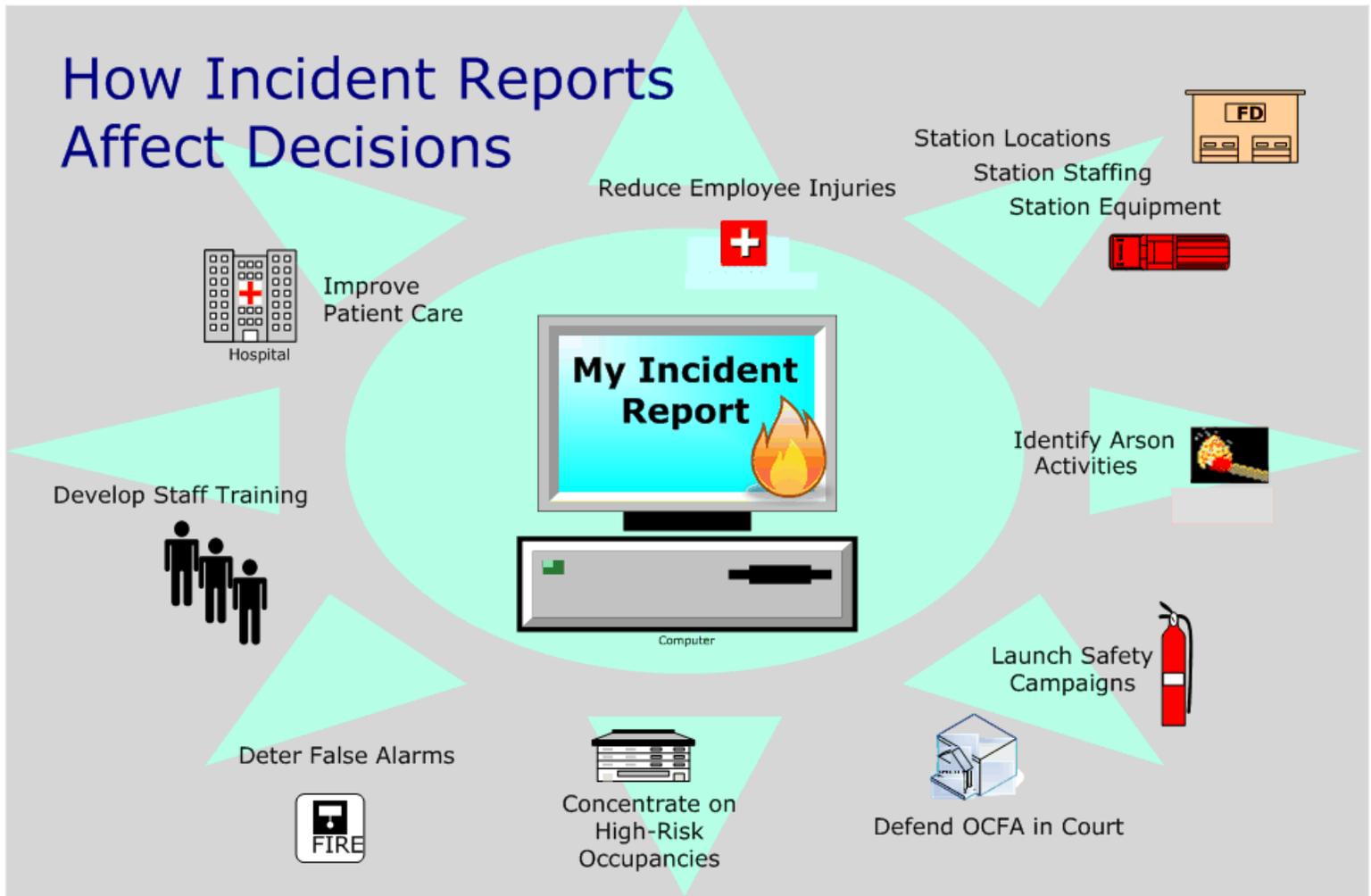
B.6 How is Data Quality Achieved?

Creating and maintaining high quality data is a significant challenge.   It involves awareness and commitment from all employees that create and use data.   It also involves three concepts on which everything depends.

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Concept 1: Data Ownership
**There must be a
designated Data Owner
assigned to each subject area**

</div>

A Data Owner is an employee, or team of employees, responsible for maintaining the Data Quality Standards for a designated subject area. For example, there is a Data Owner for medical aid calls.   There is another Data Owner for fire data and a separate one for deployment data.

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Concept 2: Gate Keeping
**The Data Owner must be involved whenever
data or data procedures are
created, acquired, revised, or discontinued**

</div>

The Data Owner must ensure that he is involved in any changes that affect his area of responsibility (i.e. subject area).   All users of his data must know that he is the keeper of the data and that he must be involved as early as possible in any proposed additions or revisions to databases, data entry procedures, output reporting, data transmission, data management responsibilities, documentation, etc.

<div align="center">

Concept 3: Quality Standards & Checklists
**The Data Owner must follow the
checklists in this handbook whenever
data or data procedures are
created, acquired, revised, or discontinued**

</div>

The Data Owner must ensure that he understands the expectations placed upon him and the importance of his role in good decision making.   He must understand his subject area well and must coordinate with everyone affected whenever there are changes to the data or the data procedures. He must ensure that the people who use his data will be able to make knowledgeable decisions.

These three concepts of Data Ownership, Gate Keeping and Quality Standards & Checklists work together to supply OCFA with quality information in order to make well-informed and effective decisions about staffing, emergencies, customers, funding, and strategic planning.
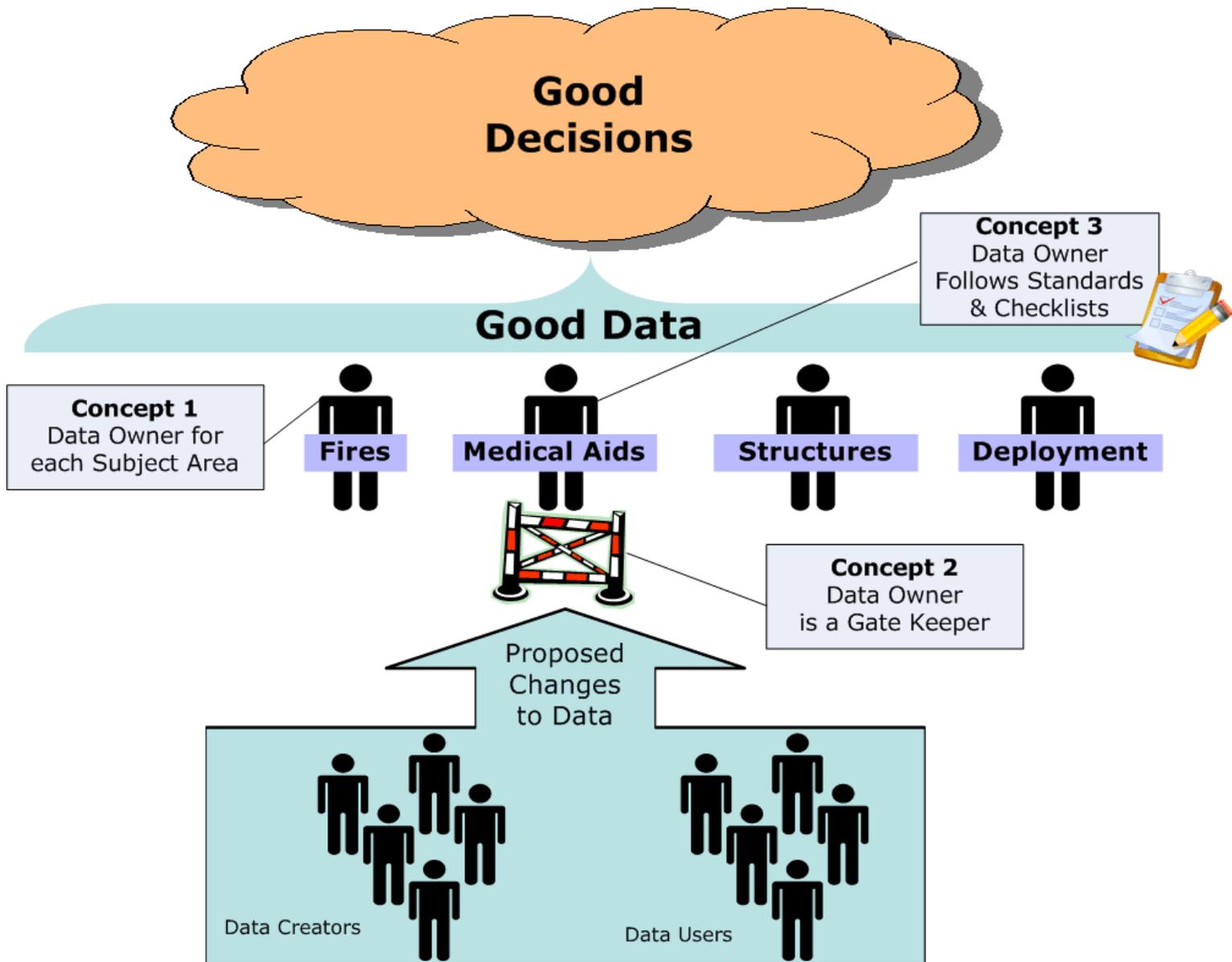
C   Data Owner Responsibilities

Data Owners have several responsibilities.   These responsibilities are straight forward, but they are time consuming and they take commitment.

C.1   What does a Data Owner do?

Data Owners have the following responsibilities within their own subject areas:

When Data Ownership is Assigned

Awareness
- ☑ Understand the Data Quality Standards in this handbook
- ☑ Understand the Quality Assurance Points of Failure in this handbook
- ☑ Understand the data within the subject area and what it means
- ☑ Understand the flow of data (where the data comes from and where it goes)
- ☑ Understand why the data is collected, how the data is used, and what decisions are based on the data

Relationships
- ☑ Identify the individual data creators and data users.   Maintain these relationships, especially when new employees are involved
- ☑ Notify data creators and data users of a new Data Owner and related responsibilities

Quality Assurance
- ☑ Create or verify that there is an effective quality assurance process for any critical data whenever it is entered, modified, or deleted and that the Data Quality Standards are met.   Refer to the What is a Quality Assurance Process section of this handbook

When there are Proposed Changes to data or data procedures

Gate Keeping
- ☑ Serve as the gate keeper for changes to data and data procedures so that all proposed changes are filtered through and coordinated by Data Owners; eliminate other gatekeepers and backdoors that circumvent this process
- ☑ Use the What Happens When a Data Owner is Involved checklist in this handbook whenever there are changes to data or data procedures, ensuring that the Data Quality Standards are met
- ☑ Create and maintain a list of requests for data changes; include requestor, request date, rationale for change, status, completion date, and cancellation reason
- ☑ Maintain documentation of decisions made with the data
  - o Develop a method to document how data was used to make a decision

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Documentation
- ☑ Maintain the documentation that describes the data, how it flows, and how it is used for decision making, including:
  - o Risk Data Streams *(see sample in the Appendices)*
  - o Value Cost Chain diagrams (VCC's) *(see sample in the Appendices)*
- ☑ Maintain any other data-related documentation

Always
- ☑ Keep the data up to standard through the Quality Assurance Process
- ☑ Be a continuous reminder to data creators and data users that data is used for decision making, that data quality matters and that changes to data or data procedures must be managed by the Data Owner.   Use the employee section of this handbook to communicate this message
- ☑ Take responsibility for employee transitions (i.e. new data creators, new data users, and especially transitions from one Data Owner to another)

Every subject area should have:
- ☑ An owner who is responsible for data quality
- ☑ Documentation on decisions made with the data
  - o Highlights how data is used in decision making
- ☑ A Quality Assurance process (validation checks, internal and external audits to validate the data collected is appropriate for its intended use, spot checks, etc.)
  - o Cost/benefit benchmarks for data quality
  - o Feedback loop – a process for providing positive feedback for meeting data quality expectations
- ☑ A data documentation manual
  - o A reference manual and/or guidance documents for data collectors and data users
- ☑ Standardized report templates
  - o A guide to building reports which promotes a consistent look and feel to all reports generated from a specific subject area
- ☑ A guide to the types of data which can be extracted from the subject area
- ☑ Initial and ongoing training programs for collectors and users

C.2   What is a Quality Assurance Process?

A quality assurance process is an ongoing set of activities that ensure the Data Quality Standards. Quality Assurance management is the responsibility of the Data Owner.

What Data is Involved?

Critical Data

All data is not created equal.   Some data is necessary for day-to-day tracking and decision making, but has limited use after a short period of time (e.g. the status of an invoice after it is paid). Other data is critical for making strategic decisions about OCFA programs, priorities, and resources over an extended period of time (e.g. fluctuations in the number of emergency medical calls per fire station per year).

Since all data is not created equal, the Data Owner must understand what data is critical for decision making and must adhere strictly to the Data Quality Standards for this data.

High Risk Data
Some data is at high risk of error by its very nature. This checklist helps Data Owners identify data that is at high risk of failing to meet the Data Quality Standards. Data that falls into one or more of these categories may be at high risk and may need more attention than other data.

- ☑ High volume
- ☑ Technical complexity
- ☑ Interpretation complexity
- ☑ Insufficient knowledge, skills, or experience of data creators or users
- ☑ Insufficient time available for data entry or data quality checking
- ☑ Insufficient funding available for data entry or data quality procedures
- ☑ Weaknesses in data processes and procedures
- ☑ Weaknesses in databases or software systems
- ☑ Data is received from external sources
- ☑ Inconsistencies/fallacies in the ways the data is used
- ☑ *Other factors*

Once critical and/or high risk data is identified, the fail points for this data can be evaluated. All data owners must understand which data within their subject areas is "high risk" data.

What are Fail Points?

The quality of data can be affected at any of the potential points of failure illustrated in the diagram below.

Quality Assurance
Points of Failure

Data Creators   Data Users

Acquisition	Creation	Transmission	Maintenance	Storage	Application	Disposal
Getting the Data	Entering the Data	Sending the Data	Changing the Data	Saving the Data	Using the Data	Deleting the Data

Begin of Life Cycle   **End of Life Cycle**

The tool below is a useful guide for identifying specific points of failure in a subject area. Use this tool by considering each of the questions for all critical or high risk data.   This process will be most effective if data creators and data users are jointly involved in the discussion.

Quality Assurance Points of Failure Tool

Acquisition — *Getting the Data*

Acquisition Failures
- Gather data from best source?
- Collect right information?
- Right people involved?
- Appropriate level of effort?
- Efficiently?
- Using effective tools?
- Without redundancy?
- Appropriate level of training and effort?
- Good collection form?

Creation — *Entering the Data*

Creation Failures
- Database design supports decisions?
- Correctly translates data?
- Relevant fields and flow?
- Automated entry verification?
- Is extraneous data required?
- Data entry supported?
- Training?
- Documentation?
- User-friendly?
- Appropriate security levels set?

Transmission — *Sending the Data*

Transmission Failures
- Is data sent to the correct locations?
- Is it timely?
- Is data translated and/or grouped appropriately?
- Is imported data clean? Appropriately routed?
- Is data transmitted securely?
- Is data transmission checked for errors?

Maintenance — *Changing the Data*

Maintenance Failures
- Appropriate security levels set?
- Is data quality checked by someone other than data creator?
- Are there established data maintenance processes?
- How will maintenance failures be identified/ reported?
- Appropriate impact analysis for system changes to legacy data?

Storage — *Saving the Data*

Storage Failures
- Is it available? When needed? In useful format?
- Retrieved from necessary locations?
- Is data backed up and retrievable?

Application — *Using the Data*

Application Failures
- Is it used for the intended purpose?
- Are the right questions being asked for this data set?
- Limits known?
- Are the right people involved?
- Is the data interpreted correctly?
- Is application system designed appropriately?
- Have new findings resulting from use of data been shared with appropriate persons within OCFA?

Disposal — *Deleting the Data*

Disposal Failures
- Have established data retention policies been verified?
- Have established litigation extension policies been verified?

What Activities are Involved?

In addition to identifying points of failure, the activities that a Data Owner uses to ensure quality may vary by subject area.   Some of the common activities are outlined below.

Understanding

☑ Ensure decision making and other requirements of data users are known and understood

Performance

☑ Define performance measurements for the data (e.g. 95% of records created are error free and available within 24 hours)

☑ Ensure that data creators and data users are aware of the performance requirements and can view the actual performance measurements on a regular basis

☑ Ensure adequate resources are available to achieve performance measurement goals

Processes

☑ Ensure flow of data and data processes are well designed within the subject area and across other subject areas

☑ Ensure flow of data and data processes are well implemented. Use check-offs, summary reports, audit reports, exception reports, and any other tools available for validating key steps in the process are working effectively and that the data is reasonable

☑ Ensure data flow and data processes are well documented and well communicated to data creators and data users

☑ Eliminate redundant data by identifying a single point of entry and single Data Owner for all data fields

Data Entry

☑ Ensure that data creators understand the importance of the data and how it is used, and that they are motivated to collect data according to the Data Quality Standards

☑ Compare policy and procedures with instructions given to data creators (e.g. data collection forms and data entry codes). Identify and resolve flaws and discrepancies

☑ Automate data entry wherever possible

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Training and Tools

- ☑ Ensure that data creators are knowledgeable, trained, and qualified for assigned tasks

- ☑ Ensure that data creators have access to help at the time of data entry so that they are not forced to create incomplete or inaccurate data

- ☑ Develop and maintain a data dictionary (i.e. a list of the data fields, what they mean, and how they are used) and guidelines for data creation and use

- ☑ Ensure that data creators and users have access to the dictionary and guidelines

Data Validation

- ☑ Validate data entry with intermittent checking

- ☑ Verify calculations and conditional data processes (e.g. data or processes that are required only when specific conditions occur)

- ☑ Ensure ongoing consistency by comparing data to previous time frames, to external standards for data, or to similar groups of data

- ☑ Ensure that only authorized employees are able to update the data

Data Use

- ☑ Ensure data is appropriately displayed, analyzed, and reported

Continuous Improvement

- ☑ Create a feedback process allowing data creators and data users to identify data problems and recommend data improvements

Note: The following worksheet may be useful for considering and planning quality assurance activities: Data Quality Checklist.

*This worksheet was obtained from the East Sussex Strategic Partnership website.
The online link is www.essp.org.uk/essp/pdf/Data%20quality%20checklist%20template.xls*

Quality Assurance is…

As a result of a Quality Assurance process, a Data Owner can provide concrete evidence that the data in an assigned subject area:

- ☑ Meets the Data Quality Standards

- ☑ Is good data that will enable good decision making

C.3   What Happens when Change is Proposed?

Proposed changes to a database or data procedure can be the result of a quality assurance discovery, may be received from a data creator or user, or from a potentially new user of the data.

> **When are Data Owners involved?**
>
> Data Owners must be involved whenever there is a proposed addition, revision, or discontinuation of any of the following within an assigned subject area:
>
> - ☑ Data
> - ☑ Database
> - ☑ Data entry procedure
> - ☑ Output report
> - ☑ Data transmission
> - ☑ Data management roles and responsibilities
> - ☑ Data documentation

This includes involvement whenever a new database or tracking system is developed that pertains to an assigned subject area. For example, if a data creator or data user wants to change the way data is entered, even a change as small as adding a new code to a list of codes, the Data Owner must be involved in order to ensure that there is no negative impact on other data users or decision makers.

Data Owners must assert themselves into all of these situations in order to maintain the Data Quality Standards and ensure that their subject area data enable decision makers to make good decisions.

The checklist on the following page must be used whenever changes occur.

What happens when a Data Owner is involved?

The following checklist must be used whenever a Data Owner is involved in a change to an assigned subject area.   This checklist is based on best practices related to Data Quality. The checklist ensures that the best possible solutions are discussed, that change is positive for everyone affected, and that there are no unexpected negative consequences.

Coordination
- ☑ Did the data creators meet with the data users and the Data Owner(s) all at once?
- ☑ Did they discuss this change together?
- ☑ Is the data collected anywhere else? Were these Data Owners involved?
- ☑ Were all affected levels of staffing involved in the discussion (e.g. data entry staff, supervisors, Data Owners) so that all relevant information and ideas are on the table at the same time in one place?
- ☑ Have all of the data and all of the procedures that will be affected by this change been clearly identified?   Refer to the What are Fail Points? diagram in this handbook for an overview of the steps.
- ☑ Have all of the decisions that will be affected, refined, or impacted by this change been clearly identified?
- ☑ Will the Data Quality Standards be met for all data users after this change occurs?
- ☑ Is there buy-in from the data creators?
- ☑ Is there buy-in from the data users?

Analysis
- ☑ How will the proposed change impact decisions made using the data?
- ☑ Has the impact on prior data been evaluated?
- ☑ Has the impact on historical reporting been evaluated?
- ☑ Has the impact on other subject areas and procedures been evaluated?
- ☑ Have all data creators and users accepted these impacts?
- ☑ Have the overall costs and effort of the change been evaluated?
- ☑ Is the benefit worth the cost and effort?
- ☑ Is the proposed change doable?

Planning
- ☑ Is there a plan in place that outlines all of the steps involved in making this change, including training and documentation? See the Planning Tool in this handbook.
- ☑ Can all of the steps in the plan be committed to before the plan is launched?
- ☑ Are all the resources with the necessary skill sets available for coordination and implementation?

What happens when a Data Owner doesn't get Involved?

If Data Owners do not develop and maintain **quality assurance procedures** for their critical data, poor data will probably lead to poor decisions at OCFA.

If Data Owners do not get involved when there are **proposed changes** to the data or data procedures, poor data will probably lead to poor decisions at OCFA.

C.4 Tools and Diagrams

This section contains three tools for Data Owners:

- The **Planning Tool** is a planning checklist to be used when there are proposed changes to subject areas or data procedures
- The **Steps for Ensuring Data Quality** diagram is a quick reference guide for all of the activities involved in maintaining quality data. Data Owners are encouraged to print and post this page and refer to it on a regular basis
- The **OCFA Data Flows** diagram is useful for communicating to data creators and data users how their data flows into a larger picture that affects all OCFA activities and operations

Planning Tool

The diagram below is a checklist for identifying the activities necessary for a successful change to a subject area or data procedure.   Each activity listed in the diagram should be considered as to whether it is necessary and/or will contribute to a positive outcome (e.g. identifying specific **deliverables** and **assumptions** for a proposed change can result in clearer expectations and better communication).

This diagram also indicates the sequence in which the activities typically occur. For example, understanding the complete picture of "what will be done" in the **Requirements Phase** is critical before moving into the "how it will be done" activities in the **Design Phase**.
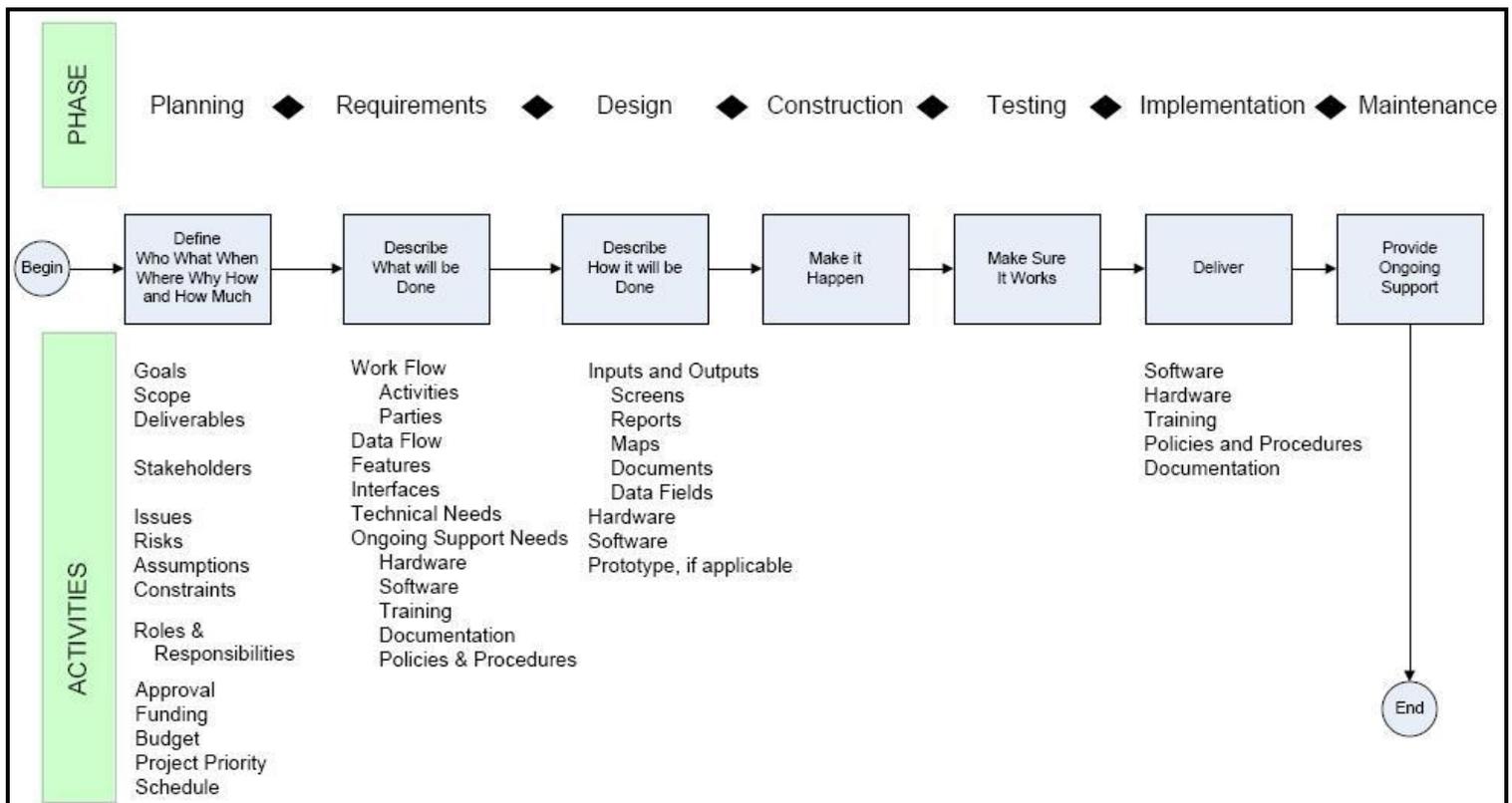
Some of the activities that are frequently overlooked during the planning effort, but are usually more time-consuming than anticipated, are listed below.   These activities should nearly always be incorporated into the plan.

Critical Activities

- ☑ Identify Stakeholders
    - o Identify data creators, data users, decision makers, and/or other affected persons either within or outside of OCFA
- ☑ Proactive Communication
    - o Notify affected employees and customers in advance
    - o Keep them informed of progress
    - o Notify affected employees and customers at completion
- ☑ Involve Information Technology Department in technology decisions
- ☑ Testing
    - o For data creators
    - o For data users
    - o For decision makers
- ☑ Training
    - o For data creators
    - o For data users
    - o For decision makers
- ☑ Documentation changes
    - o Software documentation
    - o Process documentation
    - o Quality assurance documentation
    - o Policies and procedures
    - o Other Guidelines

The diagram on the following page, "Steps for Ensuring Data Quality," provides a summary of the goals and methods of the Data Owner when changes are proposed and made within an assigned subject area. (Permission to re-publish "Steps for Ensuring Data Quality" was granted by Kathy at EST Solutions Group on May 4, 2009.)

Steps for Ensuring Data Quality

Data quality is more than accuracy and reliability. High levels of data quality are achieved when information is valid for the use to which it is applied and when decisionmakers have confidence in and rely upon the data. Implement these steps organization-wide to increase and maintain data quality.

START

6 Are data appropriately analyzed and reported?

- ☑ Disclose all conditions affecting interpretation of the data.
- ☑ Present conclusions fairly within a context for interpretation.
- ☑ Review data with those who have a stake in the results.
- ☑ Ensure analysis techniques meet the requirements for proper use.
- ☑ Protect FERPA confidentiality rights.
- ☑ Publish technical reports or make available files with detailed data for verification.

This student group needs...

5 Are data verified and compared?

- ☑ Run audit reports for review by experts with knowledge of reasonableness.
- ☑ Compare data to past runs, standards, or similar groups.
- ☑ Check data exchanges, crosswalks, and translations for integrity.
- ☑ Verify all calculations and conditional rules.

4 Is process well implemented?

- ☑ Use checklists and signoffs for key steps.
- ☑ Run sample data and verify.
- ☑ Conduct on-site reviews during the process.
- ☑ Ensure problems are reported, documented, corrected, and communicated back to the source of the problem or report.

3 Is process well documented and communicated?

Data

- ☑ Ensure all requirements are available (e.g., computer hardware, software, network, etc.).
- ☑ Provide documentation for data providers and data processors.
- ☑ Provide a data dictionary and format specifications.
- ☑ Provide training and certification for data providers and all new staff.
- ☑ Provide immediate help for data providers.

2 Is process well designed?

- ☑ Review design by peers, agencies, and staff.
- ☑ Preprint all available data. Limit times data are entered.
- ☑ Ensure target dates are reasonable and clear.
- ☑ Use most automated/validated level of data entry possible (e.g., codes in an automated application vs. paper forms).
- ☑ Automate entry verification at the earliest levels (e.g., upon key stroke vs. from printed audit report).
- ☑ Use random checks during production.
- ☑ Run maintenance before all production. Verify off-hour maintenance and staff availability.

1 Are requirements known?

- ☑ Compare policy, regulation, and procedures with instructions given to data providers, collection forms, and code in computer programs.
- ☑ Include data providers and data processors in decisions to establish what is feasible.
- ☑ Ensure all personnel are knowledgeable, certified, and trained for their assigned tasks.
- ☑ Follow an established change-management process.
- ☑ Comply with professional standards for data collection, analysis, and reporting.

The Hierarchy of Data Quality

Data-driven decisions made with confidence

5 Quality
- Comparable data; interpretable beyond local context
- Valid data consistent with construct being described
- Reliable data independent of collector
- Accurate data consistent with definitions

4 Valid
- Accuracy achieved for decision making
- Designation of official data for decision making
- Periodicity established for collection and reporting

3 Official
- Data combined, aggregated, analyzed, summarized
- Data collected by some at some times

2 Available
- Inconsistent forms of measurement
- Data unavailable

1 Data Defined
- Bad data

-1 Invalid

As stages are completed, data quality and usability increase. How do your data measure up?

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OCFA Data Flows

Ultimately, the Data Owner is responsible for the flow of data from an assigned subject area (a data stream) into other subject areas (other data streams) and how this data flows into the pool of data (a data reservoir) that OCFA uses for decision making.

Future Environment:
OCFA has a shared stream of data that it uses to improve everything it does:
Fires, Medical & other Emergencies, Education & Enforcement, Public Education, Community Development, Resource Deployment, Employee Training, Employee Safety, Procurement, Human Resources, etc.
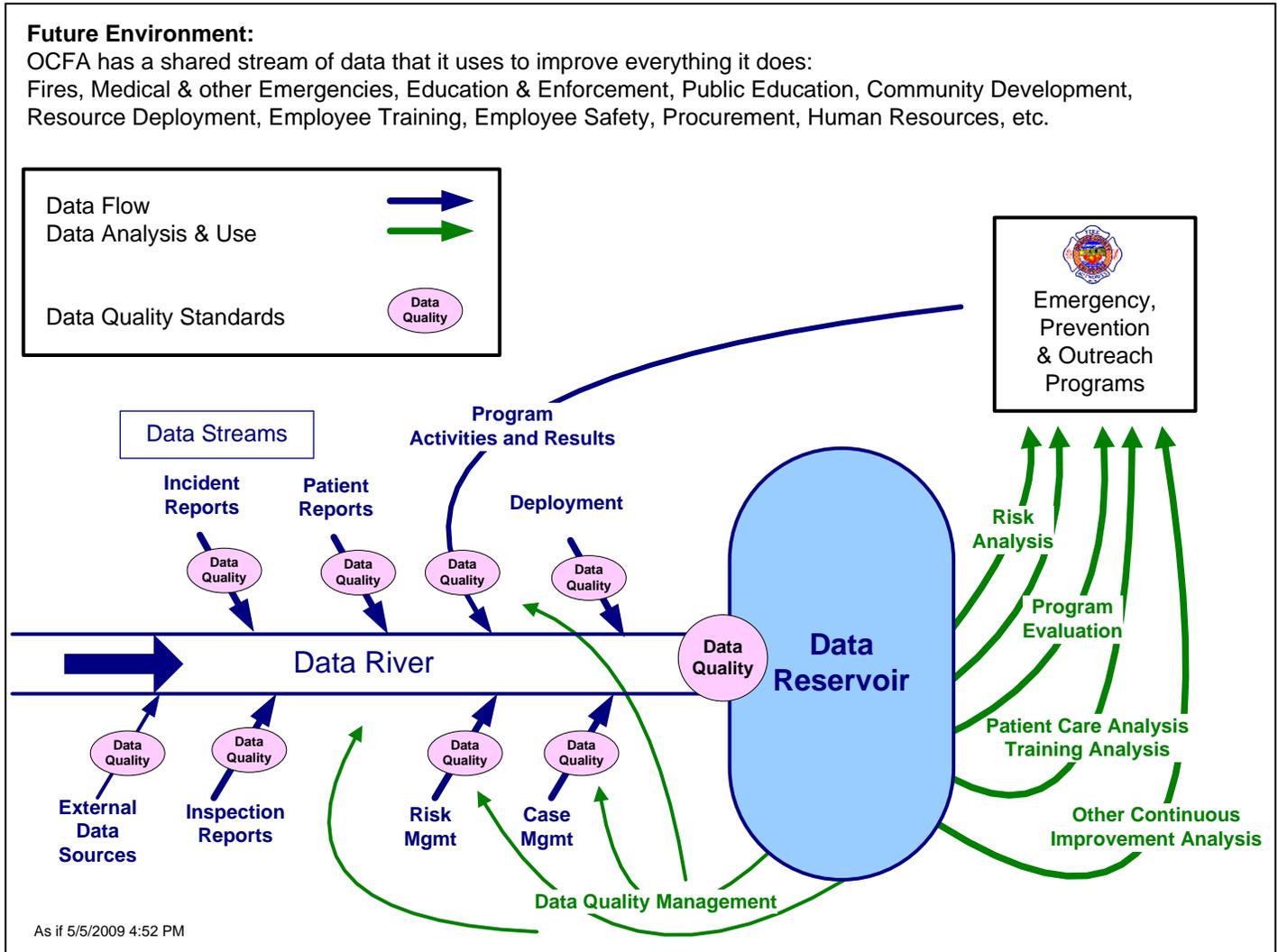
D   Summary

- ☑ Good decision making requires good data
    - ○ Decision makers include not just managers and supervisors, but anyone who is using data to decide what to do or how to do it (e.g. deciding which tasks are the priority of the day based upon a computer report)
- ☑ Data quality matters
- ☑ All employees are responsible for data quality
- ☑ There is a designated Data Owner assigned to each OCFA subject area
- ☑ The Data Owner is responsible and accountable for data quality
- ☑ The Data Owner is the gate keeper for data changes
- ☑ The Data Owner involves data creators and data users in data decisions
- ☑ Decision maker requirements must determine data policies, not vice versa
- ☑ Always keep in mind how the data is used, not just how it is entered

E   Glossary

Data
Data is any information that OCFA creates or uses for decision making. Refer to the
[What is Data?](#) section of this handbook for more information.

Data Creator
A person that creates or updates data in a subject area.

Data Flow
Data Flow describes the path that data travels from the time that it is acquired and
entered into a system until the time that it is disposed of.   For example, a Data
Flow might include the following steps: an interview, writing data on a data sheet,
entering the data into a database, automated transfer to another database,
transformation into summarized information, distribution on a report, long-term
retention, and removal.   Value Cost Chain diagrams are used to show the flow of
data with a defined set of symbols. Data Flow and its quality is the responsibility of
the Data Owner.

Data Owner
A Data Owner is a person that has been assigned overall responsibility for the
quality of data in a specific subject area.   Data Owners maintain the [Data Quality
Standards](#) for their area of responsibility and act as gatekeepers for their data.

Data Procedures
Data procedures are all of the activities, steps, and rules that apply to a set of data.
For example, procedures may include rules for data entry, a set of steps that must
be followed before data is deleted, the data checking that occurs prior to
transferring data to another subject area, an evaluation for accuracy before
submitting reports to customers, etc.   Data Procedures and their quality are the
responsibility of the Data Owner.

Data Quality Management
Data Quality Management is the effort that Data Owners, data creators, and data
users put into maintaining the [Data Quality Standards](#). Data quality management
includes understanding the data and how it is used, evaluating the quality of data,
resolving data quality issues, and being involved in changes to the data or its
procedures in order to ensure continued data quality.

Data Quality Standards
Data Quality Standards are the criteria used to determine if data quality is sufficient
for informed decision making.   The standards for data quality are defined in the
[Data Quality Standards](#) section of this handbook.

Data User
A person that reads, prints, extracts, or otherwise consumes data (e.g. for decision
making).

Proposed Change

A proposed change is a recommended modification to a subject area or related procedures.   The Data Owner must be involved whenever there is a proposed change to data or its procedures.   Examples of changes include:

Subject Area Changes:
New data fields added to a database
Elimination of data fields from a database
Changes to drop-down lists of codes
Changes to the name or length of a field
Changes to calculations

Data Procedure Changes:
Changes to data entry procedures
Changes to how a data field will be used
Changes to how a report will be used
Changes to how data is extracted or summarized for another system

There are many other types of proposed changes that involve Data Owners.

Quality Assurance

Synonym of Data Quality Management

Subject Area

An arbitrarily established grouping of data (i.e. a topic). Subject areas are used to define areas of responsibility that can be assigned to Data Owners. That is, each subject area is assigned to a single Data Owner for management of quality. Examples of subject areas at OCFA include fires, emergency medical services, inspections, and deployment.

Value Cost Chain

A value cost chain is a type of diagram that shows how data flows through the organization, from acquisition to disposal.   These diagrams show the **value** (i.e. the uses of the data), as well as the **cost** (i.e. the effort involved in creating/acquiring the data).   Since these diagrams show how the value is chained to the cost, they provide an overview, and even an assessment, of the cost-to-benefit for a data subject area.

F   References

The following online references were used by the <u>Improve Risk Data Quality</u> team and are recommended for further reading and understanding of Data Quality concepts and methods.

[Data Quality Management Guide (Department of Interior)](#)

[Steps for Ensuring Data Quality](#)

[Improving Data Quality: Why is it so difficult?](#)

[A Hierarchical Approach to Improving Data Quality](#)

[When Good Data Goes Bad](#)

[Some Principles for Good Data Management](#)

G   Documentation Samples

This section of the handbook includes samples of diagrams and tables that Data Owners use to document the data and data processes within their subject areas.

The first diagram is a <u>Risk Data Stream</u>.   It is used to identify how the data within the subject area is used for decision making, especially decisions related to community risks and how best to address those risks.

The second diagram is a <u>Value Cost Chain</u> diagram, or VCC.   VCC's show how the data flows through the organization, from acquisition to disposal.   There is a VCC legend immediately following the sample diagram.

Both of the sample diagrams are from the Emergency Medical Services subject area.

Sample Risk Data Stream

Data Stream	Owner	Goal/Purpose	Relevancy to Risk	Relevancy to User(s)	Frequency of Use (actual/ summary)
Emergency Medical Services (EMS)	EMS	Improve patient care and outcome Meet mandates Identify education & training requirements Identify supply & equipment needs Evaluate effectiveness of policies & procedures Identify resource needs Determine effectiveness of mitigation (patient treatment) efforts Identify risks for intervention (prevention & mitigation) Provide legal protection from litigation	Risk identification: data necessary to identify medical/trauma trends and risks in communities Risk prevention: data necessary to develop programs to prevent injuries/illness and evaluate results of efforts Risk mitigation: data necessary to reduce severity of injury and evaluate results of efforts	Hospital – patient assessment and continuity of care Develop partnerships for data collection, analysis, and prevention programs (e.g. trauma, burn, cardiac and stroke centers) Government – EMS system analysis county, state and national levels EMS – see Goals/Purpose Clerk of Authority – customer satisfaction surveys; continuous quality improvement; respond to subpoenas, patient requests, public records requests; OCFA Board of Directors reports Risk Analysis & Mitigation Evaluation Section – development and evaluation mitigation strategies	By Incident Quarterly – continuous quality improvement Special studies Bi Annual – Medic Stats Daily: 2006: 56,616 incidents

Sample Value Cost Chain

Emergency Medical Services (EMS) Data
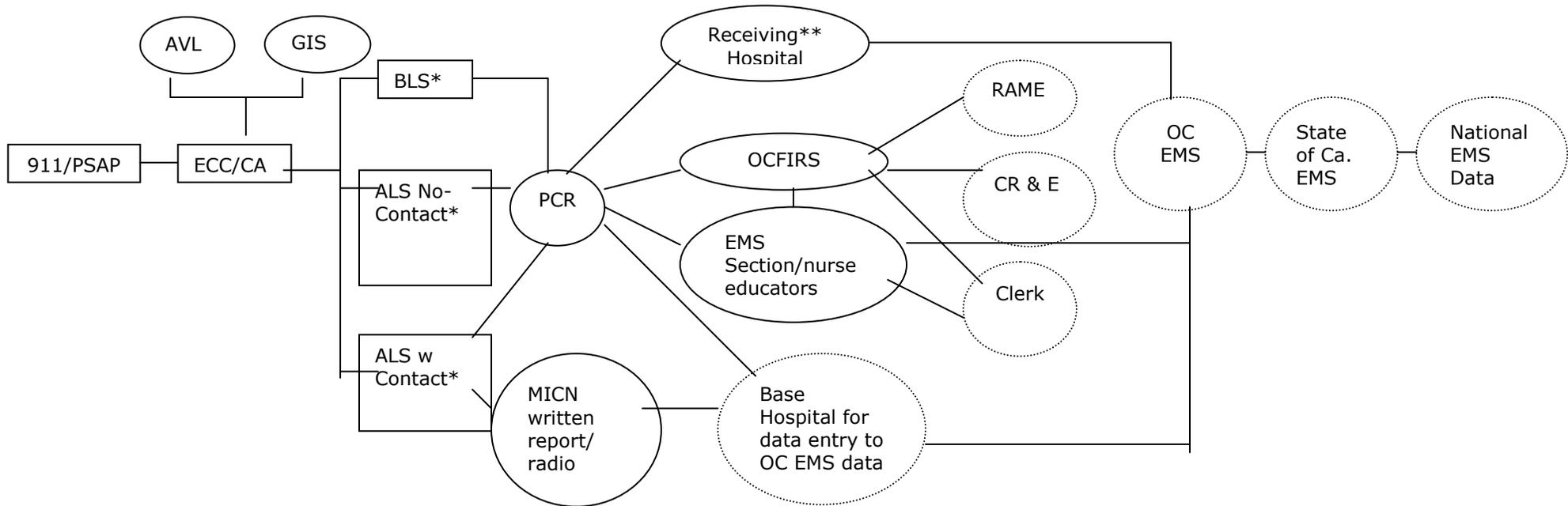
* Patient info: assessment, bystander info, medical records, treatment, response to treatment transport info

** Specialty Center info entered into separate data bases: cardiac, trauma, CVA(expected)

Value Cost Chain Legend

Value Cost Chain (VCC) diagrams show the overall flow of data through its life cycle (from acquisition to disposal). This legend is used for interpreting Value Cost Chain diagrams for each subject area.
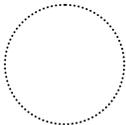
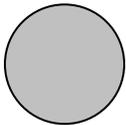**External data source** (data flow from outside OCFA or to an outside agency/entity)
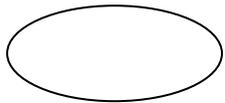
Goal, purpose or performance of data; what the data is used to accomplish (where data is consumed as useful information)
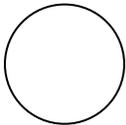
Database of origin (where data is initially entered)

Secondary database or file (where data is moved either by duplication or transformation)

Database of record (final location from where data is drawn for use)

Data Entry (solid): data is entered or re-entered into a database

Data Flow with Transformation (dashes): format modification or data manipulation

Data Flow without transformation (dash, dot): data reentry, bulk updates, redundant loading

Data Flow with unknown transformation (dots)

Data Aggregation (dash, two dots):   summarization, combination of merging of data