

GEMISIS

SHAPING THE FUTURE OF EMS



**GEORGIA EMERGENCY MEDICAL SERVICES
INFORMATION SYSTEM
STRATEGIC PLAN
2004 — 2007**



GEMSIS

SHAPING THE FUTURE OF EMS IN GEORGIA

GEORGIA DEPARTMENT OF HUMAN RESOURCES
DIVISION OF PUBLIC HEALTH
OFFICE OF EMERGENCY MEDICAL SERVICES/TRAUMA

Prepared by

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ABSTRACT

GEMSIS – Shaping the Future of EMS in Georgia is a multi-year, strategic plan to enhance the State of Georgia’s Emergency Medical Services (EMS) data collection and analysis operating capabilities. *GEMSIS* stands for Georgia Emergency Medical Services Information System.

The *GEMSIS* plan defines 10 strategic and operational goals, which develop statewide EMS infrastructure. The document outlines the steps needed to develop a new system for statewide EMS data collection, analysis and reporting to support these goals. The *GEMSIS* goals encompass such things as the collection, analysis and publication of statewide EMS/EMSC baseline data, the linkage of EMS data with other public health data sources, using data to drive CQI (Continuous Quality Improvement), EMS/EMSC research, the uniform administration of EMS rules and regulations, and a standard method to characterize EMS system developmental maturity. *GEMSIS* goals were a direct result of planning inputs from a statewide EMS stakeholders’ group. *GEMSIS* directly integrates EMSC issues into its primary mission.

The *GEMSIS – Shaping the Future of EMS in Georgia* plan development was funded by a U. S. Department of Health and Human Services, Health Resources and Services Administration, Emergency Medical Services for Children Partnership Grant (EMSCP). Additional information about the *GEMSIS* project is contained in the Year 1 EMSCP Grant Report.

PREFACE



The State Office of EMS/Trauma is primarily a regulatory function; however, improving statewide emergency preparedness including EMS, bioterrorism, and trauma requires the development of new ways to collect, link, and analyze EMS operating data. The GEMSIS strategic plan directly supports these efforts.

R. David Bean, Director – OEMS/T
(Pictured Left)

The purpose of GEMSIS is to develop an effective and efficient statewide infrastructure, data collection, reporting, evaluation and quality improvement initiative that focuses on emergency medical services as an integrated component of the overall healthcare system... The specific analysis of outcomes for children in the EMS system is a fundamental part of the GEMSIS effort. (GEMSIS Kickoff Meeting – 2003)



Ej Dailey, Deputy Director – OEMS/T
(Pictured Right)

A Message from The State Office Of EMS/Trauma

GEMSIS – Shaping the Future of EMS in Georgia is a comprehensive strategic plan that provides a roadmap for development and execution of statewide EMS, EMSC, and trauma systems-related activities over a several-year period; *GEMSIS* describes where EMS in Georgia is headed and why.

The objectives of this document are to:

1. Provide a framework for presenting the goals, objectives and concepts of the *GEMSIS* Plan that will enable its understanding, adoption and implementation.
2. Inform the reader concerning important information pertaining to the strategic vision supporting the development of statewide EMS, EMSC, and trauma data collection and reporting systems over the next three to five years.

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3. Provide the operational guidelines and action steps necessary to strategically evolve the EMS/Trauma data reporting systems that are currently in place, in a manner avoiding technological obsolescence.
4. Provide the planning information necessary to insure the alignment of people, processes and technology with near-term and long-term statewide needs and operating goals.
5. Explain the strategic benefits to be accrued from breaking with past modes of operating and adopting a new coherent vision based upon the adoption of technology standards.

Information technology is one of the most critical tools for taking EMS to the “next level” as a public health entity. Data and information permeate every aspect of EMS. But information technology (IT), though critical, is still just a tool. The building of state infrastructure must also recognize the interaction of people and the integration of fundamentally sound administrative processes for its effective utilization. Specifically, five principles are outlined to guide future EMS information technology infrastructure development: (1) web-based standards and utilization of exiting portal framework(s) for application deployment, (2) administrative self-service, (3) standardization on commercially available software (where possible), (4) movement from client-server based networking to cooperative processing, and (5) avoidance of device dependent applications and operations. Related strategic guidelines are also discussed.

In an economy of reduced public spending, state government offices face increasing pressure to find ways to define and improve their performance. The appropriate and cost-effective use of information technology is an essential part of regulatory strategy. While many methods and techniques may be applied, success for state agencies can be illusive. “Trial and error” process may be expensive, result in miss-set expectations, and ultimately require stepping backwards in order to go forwards. To prevent poor outcomes, a new kind of information technology road map is needed which can provide both explanation and guidance—*GEMSIS* provides this roadmap. With appropriate management and stakeholder support, *GEMSIS* provides a framework that

can minimize costs and maximize benefit for each dollar to be spent on the deployment of information technology supporting EMS.

GEMSIS Funding through EMSCP

The development of *GEMSIS – Shaping the Future of EMS in Georgia* was accomplished through funding provided by the U. S. Department of Health and Human Services Health Resources and Services Administration, Emergency Medical Services for Children Partnership (EMSCP) grant program. The Georgia Office of EMS/Trauma was awarded the EMSCP grant in March 2003.

The EMSCP program is a federally funded grant initiative designed to reduce child and youth disability and death due to severe illness or injury. The first EMSC legislation was passed in 1984. At present, all 50 states and U. S. territories have received funding through the EMSC program. The EMSC program is jointly administered by the U. S. Department of Health and Human Services through the Health Resources and Services Administration’s Maternal and Child Health Bureau and the U. S. Department of Transportation’s National Highway Traffic Safety Administration.

On behalf of the State of Georgia, Office of EMS/Trauma, we gratefully acknowledge the ability to participate in the HRSA 03-070 Emergency Medical Services for Children Partnership Grants (EMSCP).

Focused Attention on Children

Georgia’s children require focused attention to improve their health and outcome status. In prior years, other aspects of EMSC programs have addressed initiatives relating to local and regional assessments identified training/educational needs for the medical community and supported regional activities to implement programs in local communities. Despite the progress made and in order to evolve further, a systematic comprehensive EMS information system is needed with linkages to other databases. *GEMSIS* has become an umbrella term recognizing that data can drive system improvements relative to overall prevention, pre-hospital care, and trauma care for children, as well as all citizens, residents, and visitors of the State of Georgia.

System-wide Improvements Sought

We are excited about the vision and concepts set forth in this plan. We are equally excited, however, about the tangible implementation progress that is currently being made on a statewide basis. 2004 represents a major milestone in the publication and utilization of EMS and Trauma data to drive system-wide improvement. *GEMSIS* is the start of this statewide journey. The overall goal is improved public health, prevention, prehospital care, and increasing control over shaping the future of EMS in Georgia.

Document Organization

This document has been organized to support *GEMSIS* plan communication needs as well as support the ongoing work-in-process associated with the statewide EMS initiatives. *Shaping the Future of EMS in Georgia* is best understood if sequentially read; however, each section of the plan stands on its own as a substantive contribution to statewide planning. The net result is a document that can endure change and provide the needed roadmap for plan completion.

From this Preface, the organization of the document is explained. Additionally, important acknowledgements of stakeholder activities and contributions are outlined.

The Executive Summary provides an executive level understanding of the plan goals, associated activities, expected outcomes, and the overall vision associated with the *GEMSIS* computer applications and the strategic objectives contained in the document *Shaping the Future of EMS in Georgia*.

The Introduction provides a snap shot of Georgia EMS from an evolutionary perspective. From this point forward, the document discusses each goal of the *GEMSIS* Plan on a goal-by-goal basis.

GEMSIS goals have a good deal of complexity associated with them. Each goal contains a statement regarding the specific outcomes being sought. Each goal has an outline of the operational steps needed for goal attainment. And each goal has one or more discussions of implementation considerations or guidelines. Each of these areas is the result of extensive stakeholder discussion and input.

The development of the *GEMSIS* plan required the creation or review of numerous other documents. The most significant of these documents are included as appendices to this publication.

ACKNOWLEDGEMENTS

No planning exercise of this scope, complexity or magnitude could have been completed without the hard work and selfless contributions of numerous persons. No attempt to recognize or thank all of those who participated in the development of *GEMSIS* is adequate. Many who provided the benefits of their thoughts and experience will remain unnamed; however, all who participated and those who are taking the plan forward are playing a strategic role in shaping the future of EMS in Georgia.

GEMSIS Stakeholders' Committees

Three Stakeholder Committees comprised of EMS professionals representing all of the ten EMS Regions of the state participated in *GEMSIS* plan development. These committees were: Infrastructure, Data, and Reporting. Each of these committees had specific deliverables within broad areas of responsibility. The inputs from each committee represented the summarization of years of EMS/Trauma and EMSC experience. The areas of infrastructure, data, and reporting can be conceptualized as interlocking spheres of knowledge that when integrated provide coherence to statewide EMS activities.

Infrastructure Committee

Kirby Butler, Chairperson

Members Present: Kelly Buddenhagen, Debbie Carver, George Conley, David Herrin, Stephen Phillips, Richard Roberts, Robert Vick, Billy Watson



The Georgia EMS Information System (*GEMSIS*) infrastructure is the basic system component that comprises the technology used, the people involved and the processes that support the activities of EMS.

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The Infrastructure Committee was charged with an exhaustive examination of the statewide infrastructure needed to support the initiatives that collectively comprise the ten objectives described in the *GEMSIS* plan.

Change does not come easy. Needs must be recognized, there must be the development of a common vision, and potential strategies must be examined relative to barriers, available resources, and other environmental constraints.

Partnerships must be inclusive; they must seek diversified perspectives and encourage participation. Many share the job of improving statewide infrastructure. None can be left behind.

Data Committee

Jeannie Riner, Chairperson

Members Present: David Cartee, Indrani Dasgupta, Janie Crowe, Russ McGee, Linda Avery, Linda Wright, Denise Yeager,



The primary areas of responsibility for the Data Committee included the comprehensive examination of statewide data needs. A new, electronically oriented, comprehensive data set needed to be defined. Of key importance were the questions: (a) What data is missing and should be collected? (b) From a strategic viewpoint, how should the data contained within the PCR (Patient Care Report) be revised to meet programmatic goals? (c) How can accuracy be improved? and (d) How should PCR data be integrated with other data sets? A number of corollary questions were also considered including standardized definitions, indicators, benchmarks, examination of the NHTSA and NEMSIS data sets, data storage, accessibility and retention. The key strategic goal was to insure that Georgia will be postured to have the data needed to provide a mechanism for improving EMS services, enhancing the overall quality of patient care to achieve less death and disability, and less cost.

Reporting Committee

Ernie Doss, Chairperson
Acting Chairperson, Dusty Rhodes

Members Present: Linda Avery, Janie Crowe, Sam Cunningham, Darrell Enfinger, Steven Folden, David Loftin, Lawanna Mercer-Cobb, Richard Lambeth, Wes Simonds, Denise Yeager

Also pictured: Fred Grant, Principal Investigator, standing.



Working in concert with the Infrastructure and Data Committee was the Reporting Committee. The Reporting Committee had a number of strategic planning assignments and was challenged to suggest strategy in several areas including: (a) the definition of needed reports, (b) the development of concepts related to making the collected data meaningful, (c) the specifics needed to support CQI goals including the reports and metrics which can result in statewide systemic improvements, (d) the examination of cost measures – specific metrics or rules of thumb that can raise awareness and communicate the cost/benefit of EMS data collection and reporting, and (e) the examination and recommendations for the reporting mechanism(s) needed to ensure feedback in the EMS system.

Thank you to all Committee Members, Guests, and Other Participants

All three committees completed their assigned work. To all who participated:
Thank you!

EXECUTIVE SUMMARY

Background

GEMSIS – Shaping the Future of EMS in Georgia is a multi-year, strategic plan to build essential infrastructure to support EMS (Emergency Medical Services) data collection and analysis operating capabilities. *GEMSIS* stands for Georgia Emergency Medical Services Information System.

The *GEMSIS – Shaping the Future of EMS in Georgia* plan development was funded by a U. S. Department of Health and Human Services, Health Resources and Services Administration, Emergency Medical Services for Children Partnership Grant.

Three Stakeholder Committees comprised of EMS professionals representing all of the ten EMS Regions of the state participated in the *GEMSIS* plan development. These committees were: Infrastructure, Data, and Reporting. Each of these committees had specific deliverables within broad areas of responsibility. The inputs from each committee represented the summarization of years of EMS/Trauma and EMSC experience.

GEMSIS uses five principles to guide future information technology planning: (1) web-based standards and utilization of exiting portal framework(s) for application deployment, (2) web-based information and administrative self-service, (3) the use and standardization on commercially available software (where possible), (4) movement from client-server based networking to cooperative processing, and (5) avoidance of device dependent applications and operations.

Building infrastructure is more than just designing computer applications; it is about integrating people, processes and technology to create valued-added information and services to support the Georgia Office of EMS/Trauma's (OEMS/T) core regulatory mission.

GEMSIS contains 10 strategic operating objectives. In order to support these 10 strategic objectives, new professionally developed (web-based) EMS computer applications are needed. In addition to computer applications, the architecture supporting OEMS/T operations must also be thoroughly revised.

GEMSIS System Description

The *GEMSIS* system is primarily a web-based, pre-hospital emergency data collection, analysis and reporting system. *GEMSIS* is also an EMS information portal which provides content, information, transactions and services that provide value added information enhancing statewide emergency preparedness. The *GEMSIS* database will integrate information across the entire Georgia emergency medical community, whether in the ambulance, local EMS providers, county public health districts, or Regional EMS offices. This aggregated information will be available for analysis, reporting and exportation using a combination of pre-defined reports and OLAP (CUBE) technologies. A professionally constructed Microsoft compliant architecture is to provide this foundation. To access the *GEMSIS* application, the client workstations will need only Internet access through a web browser.¹

GEMSIS replaces the obsolete Georgia PCR/Scantron program. By accessing *GEMSIS* functions through the Internet, Regional EMS and EMS service providers will be able to satisfy reporting requirements easily, without major technical investments and without having to learn complex new technology. Data from *GEMSIS* will be used to support EMS policy compliance. It will also feed (based upon user definable criteria) other public health and emergency preparedness applications including such things as syndromic surveillance, linkages to trauma data, bioterrorism preparedness systems health alert networks (HANs) and similar areas.

With an advanced architecture supporting several data exchange options, the *GEMSIS* system will aggregate information from ambulance services throughout the state for analysis and reporting purposes. The *GEMSIS* applications will be scalable to serve a high volume of users limited only by hardware capabilities. It will support the electronic transport of information to the Georgia Patient Care Report EMS data repository. The system is targeted to be HIPAA compliant and sensitive to medical data security issues. The *GEMSIS* application will meet and exceed state and federal data privacy requirements.

¹ At the time of this writing, the lowest end recommended connection speed is 56 Kbps using a dialup modem, cellular phone or PDA. Standard connection speed would be 128 Kbps – 1.5 MB via ISDN, cable, or DSL. High-end connection would be T1 at 1.5-4 MB.

Executive Summary of GEMSIS Objectives

| Strategic Area | Objective | Infrastructure Development |
|--|---|---|
| 1. EMS Strategy Development. | Establish the strategy, organizational structure, standard operating procedures, and funding necessary for the implementation and maintenance of a statewide EMS data collection, evaluation and improvement process. | <ul style="list-style-type: none"> - Documented baseline of organizational capabilities. - Organization development plan. - Publication of strategic principles. - Information based strategies for regulatory improvement. |
| 2. Comprehensive EMS Data Collection. | Establish a comprehensive data collection system capable of gathering, integrating, and reporting pertinent, timely and accurate data from all state EMS system participants, and provide data linkages with other state and federal agencies and organizations as appropriate. | <ul style="list-style-type: none"> - Investigation of purchased software that will support PCR data collection, analysis, syndromic surveillance, BT, emergency preparedness and/or other related EMS functions. - Develop an evolved data collection model and methods (to support vendor selection). - Movement from data collection to data analysis emphasis. - Movement from paper-based to electronic data collection. - Standardization of electronic data to conform to national standards (NEMSIS). - Use of information to support uniform regulation. - Use of information to support enforcement regulation and audits. - Use of information as an input into Public Health syndromic surveillance. |
| 3. Published EMS Information Baseline. | Establish a mechanism(s) to ensure feedback of data reports to all contributing agencies while maintaining confidentiality and security of data. This process will include a mechanism for prehospital personnel to receive timely feedback on the diagnosis and disposition of their patients. | <ul style="list-style-type: none"> - Documented methods for cleaning and analyzing data. - Publication of aggregated data for system-wide use. - Publication of information to enable public and stakeholders understanding of policy and regulation change impacts. - Publication of information to foster greater emergency management preparedness. |
| 4. Formalized EMS Benchmarks. | Establish standardized definitions, indicators, and | <ul style="list-style-type: none"> - Initially a focus on all levels of EMS initial certification. |

Shaping the Future of EMS in Georgia

Executive Summary of GEMSIS Objectives

| Strategic Area | Objective | Infrastructure Development |
|---------------------------------------|--|---|
| | benchmarks. Include all national EMS datasets to facilitate comparative analysis of local EMS system performance, quality of patient care, customer satisfaction, and system cost on a state and national level. | <ul style="list-style-type: none"> - Progression to an improved policy administration of recertification training areas and hours. - Baseline statistics to enable understanding of statewide EMS system operations. - Publication of information to enable public and stakeholders to gauge the cost/benefit impact of statewide EMS practices. |
| 5. Standardized EMS Data Utilization. | Establish a mechanism(s) to ensure data is utilized at the state, local and provider level for continuous quality improvement aimed at improving EMS services and quality of patient care decreasing death and disability, and reducing costs. | <ul style="list-style-type: none"> - Availability of EMS information through a single Internet destination (EMS Portal). - Linkage of EMS data to trauma data. |
| 6. EMS CQI. | Define EMS CQI programmatic needs and goals. Establish communication linkage(s) with EMS training and prevention programs to ensure needs identified through the evaluation process are integrated into the EMS training curriculum and prevention programs. | <ul style="list-style-type: none"> - “CQI in a box” and “how to” training. - Data and tools to assist the local understanding of EMS data. - Availability of EMS information through a single Internet destination (EMS Portal). |
| 7. EMS Training Curriculum Evolution. | Establish system evaluation training for all levels of EMS personnel to ensure proper documentation, data entry, analysis utilization of data and an understanding of the principles of research. | <ul style="list-style-type: none"> - Examination of initial training and certification based upon NREMT examination analysis by site codes. - Focus on uniform recertification policies, continuing education training areas, and statewide medial performance. |
| 8. EMS Research. | Establish agenda, guidelines and support mechanisms for conducting and funding Georgia-relevant EMS research. | <ul style="list-style-type: none"> - Published research agenda based upon Georgia’s specific needs for formalized trauma and PCR data analysis. - Linkages with schools, Regions, and institutions. - Greater integration of EMS information into public |

Executive Summary of GEMSIS Objectives

| Strategic Area | Objective | Infrastructure Development |
|--|--|---|
| 9. Uniform Rules & Regulations Administration. | Ensure immunity for medical control and quality improvement processes and discovery protection for all local and state EMS quality improvement efforts to ensure cooperation and participation of all EMS participants in patient care and EMS service evaluation. | <p>health.</p> <ul style="list-style-type: none"> - Greater awareness, involvement, consistency and uniformity through the formal publication of standard information. - Measurement, discussion and progression. - Availability of EMS regulatory information through a single Internet destination (EMS Portal). |
| 10. EMS Regulatory Operations Review. | Establish a mechanism(s) for the periodic performance evaluation of the state's EMS regulatory agency. | <ul style="list-style-type: none"> - EMS portal framework to act as an integration point for OEMS/T information dissemination. - Web-accessible applications supporting uniform policy administration. - Identification of meaningful comparison models. - Availability and publication of value-added information. |

INTRODUCTION

Background



Linking EMS data to regulatory compliance and EMS system-wide improvement requires a new strategic focus. This strategic focus is based upon the recognition that value-added information must be the foundation for the future of EMS in Georgia.

*Fred Grant
Principal Investigator – Shaping the Future of EMS in Georgia*

Pictured left, Marie Probst, Pat O’Neal, M.D., Indrani Dasgupta and Fred Grant reviewing Georgia’s 2003 NTRAC dataset.

EMS is like the rest of society, it is at the beginning of an upward curve in realizing the power of information technology. Georgia emergency medical care has developed significantly in the past 30 years but its information infrastructure remains primitive. Past efforts have focused upon application development and data collection at the expense of data analysis and establishing linkages to other public health data sources. The need exists for an infrastructure to provide the sustained delivery of meaningful EMS information

In the not-so-distant past, local funeral homes were the primary ambulance providers and patient care did not begin until arrival at a hospital. Little data was formally collected. In the decades since its inception, EMS has grown increasingly sophisticated in recognition that what happens to a sick or injured person before they reach a hospital is of critical importance. It is the scientific analysis of EMS and patient outcome data that has helped to provide these insights.

The Georgia State Office of EMS/Trauma (OEMS/T) has played a strategic role in (a) developing the infrastructure of emergency medical care, (b) fulfilling a legally mandated regulatory role to oversee statewide ambulance services to safeguard the public interest, and (c) providing education and certification of emergency medical personnel. With the rapid introduction of computer technology beginning in the 1990's, the OEMS/T has been increasingly called upon to be an information clearinghouse and provide a unified planning and continuous quality improvement direction for the collection and analysis of

EMS, EMSC and trauma data for both rural and urban areas. It is now generally recognized that the analysis and production of meaningful EMS data is a core function central to supporting EMS regulation and system wide medical improvement. In order for Georgia to fulfill its regulatory mission, new ways to collect and analyze EMS data must be rapidly developed. Infrastructure development is required such that the building blocks can be put into place to support these needed capabilities.

In 2004, the concept of emergency medical services still centers on rapid response, initial treatment, and safe transport of a patient to a health care facility; however, it is now generally recognized that EMS also plays a role in data collection and analysis for prevention, education, planning for improving community health or other areas that result in better and more appropriate uses of acute health care resources. (EMS Agenda for the Future, 2000, p. 5) Additionally, EMS now encompasses an important relationship with bioterrorism preparedness and other threats, which require the mobilization of significant emergency medical resources. All of these areas have operations research and analysis (IT) components.

History of Georgia's EMS development

In the late 1950's, demonstration of the effectiveness of mouth-to-mouth ventilation and closed cardiac massage led to the realization that rapid response of trained persons to cardiac emergencies could help improve outcomes. (DOT, 1999, p. 3) The introduction of these techniques into the public consciousness provided the foundation on which the concepts of EMS and then advanced cardiac life support (ACLS) could be built.

In the early 1970's, at the federal level, Congress passed the Emergency Medical Services Act in 1974. This act established the necessity for managing EMS communications, transportation and certain related public health functions. Concurrently, the Georgia General Assembly recognized that EMS was a substantial matter of importance to the people of the State of Georgia. Through legislation, which ultimately became known as Title 31, Chapter 11 of the Official Code of Georgia Annotated—the Georgia legislature established the functions in law that are administered by the OEMS/T.

The first statewide EMS plan for Georgia was prepared in 1974. During this period through the 1990's, a number of substantial accomplishments were noted as the office evolved education, training, EMSC and public health related functions. This evolution coincided with the progression of federal legislation, state government stakeholder interactions, as well as through the activities of a professional and dedicated staff.

In 1996, a group of representatives from private and public emergency medical services, the OEMS/T, and the ten affiliated district EMS offices was convened as a State EMS Planning Task Force for the purpose of determining the long range goals of Georgia's EMS system and to create a new State EMS plan. This group was charged with the responsibility of examining "where we are now" vs. "where do we want to go". Once these goals were developed, the committee was then charged with the responsibility of determining a path of "least resistance" for attaining this direction. These efforts resulted in the publication of the State EMS Plan, dated 1998.

In 2002, because of rapidly changing technology, advances in medicine and public health, a new effort was needed to update the statewide strategic vision.

GEMSIS Plan Development – 2003

In March 2003, under the direction and guidance of the Department of Human Resources, Division of Public Health, the Office of Emergency Medical Services and EMS constituents from around the state embarked upon an aggressive and unprecedented statewide EMS planning process. This planning process was entitled: *GEMSIS – Shaping the Future of EMS in Georgia*.

The impetus for the *GEMSIS* project was multifaceted. Since 1996, the EMS profession in Georgia, as well as across the nation, has undergone rapid change. In order to meet the growing needs of the EMS profession, while being ever mindful of the mandate to protect the health and welfare of the children and citizens of Georgia, it is mandatory to have in place a new plan to guide state EMS development. It was also recognized that the new statewide planning development needed to have a consensus building process utilizing multi-disciplinary, stakeholder committees.

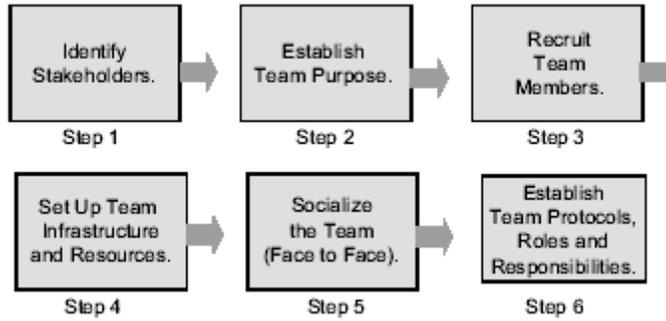
A comprehensive program evaluation was needed to posture Georgia for the 21st Century. A plan was needed to integrate EMSC and trauma issues into data collection, analysis and reporting. It was also recognized that each EMS provider must share in the responsibility for evaluating the effectiveness of services provided to adult and pediatric patients of medical or trauma related emergencies. A statewide EMS system should be able to definitively indicate that impact has been made to all patient groups served by the system. EMS system managers must be able to evaluate resource utilization, scope of service, patient outcomes, and the effectiveness of operational policies, procedures and protocols. And it was recognized that an effective EMS system evaluates itself against pre-established standards and objectives, so that improvements in service, particularly direct patient care, can occur. These requirements are part of an ongoing quality assurance system designed to review system performance. The evaluation process should be educational and ongoing. Quality assurance reviews should occur at all phases of EMS system management, so that needed policy changes or treatment protocol revisions can be made.

Creating a Common Vision

GEMSIS followed a six-step process to establish its stakeholders' committees. This six-step process is illustrated in Table 1, *GEMSIS Committee Formation*, below.

The first phase of the *GEMSIS* planning project was the creation of a common vision among EMS constituency groups, and the development of strategic goals. To begin the process, the State and Regional Offices of Emergency Medical Services and Trauma identified key multi-disciplinary stakeholders to determine the most important deficiencies of the present data collection/EMS information system.

Table 1: GEMSIS Committee Formation



The analysis of the current data-information system was conducted through a SWOT (identifying strengths, weaknesses, opportunities and threats) analysis. Subcommittees pertaining to Infrastructure, Data Collection and System Reports were established to review and devise a consensus implementation strategy to correct current weaknesses and threats, and expand on strengths and opportunities. The SWOT Analysis produced the initial goals and objectives that were refined for consideration and inclusion in this plan.

Summary of GEMSIS Goals

The *GEMSIS* mission is to develop an effective and efficient statewide EMS data collection, evaluation, reporting and quality improvement system that focuses on emergency medical services/trauma as an integrated component of the overall healthcare system and specifically recognizes and integrates the needs of Emergency Medical Services for Children.

Table 2, Summary of GEMSIS Programmatic Goals, provides a concise overview of the core outcomes sought by the *GEMSIS* initiative. Supporting these goals are more detailed objectives and action steps that are precursors to this outcome-based plan. These action steps are found in the applicable sections of the plan.

Table 2: Summary of GEMISIS Programmatic Goals

| Strategic Area | Objective |
|--|---|
| 1. EMS Strategy Development. | Establish the strategy, organizational structure, standard operating procedures, and funding necessary for the implementation and maintenance of a statewide EMS data collection, evaluation and improvement process. |
| 2. Comprehensive EMS Data Collection. | Establish a comprehensive data collection system capable of gathering, integrating, and reporting pertinent, timely and accurate data from all state EMS system participants, and provide data linkages with other state and federal agencies and organizations as appropriate. |
| 3. Published EMS Information Baseline. | Establish a mechanism(s) to ensure feedback of data reports to all contributing agencies while maintaining confidentiality and security of data. This process will include a mechanism for prehospital personnel to receive timely feedback on the diagnosis and disposition of their patients. |
| 4. Formalized EMS Benchmarks. | Establish standardized definitions, indicators, and benchmarks, include the consideration of all national EMS datasets to facilitate comparative analysis of local EMS system performance, quality of patient care, customer satisfaction, and system cost on a state and national level. |
| 5. Standardized EMS Data Utilization. | Establish a mechanism(s) to ensure data is utilized at the state, local and provider level for continuous quality improvement aimed at improving EMS services and quality of patient care decreasing death and disability, and reducing costs. |
| 6. EMS CQI. | Define EMS CQI programmatic needs and goals. Establish communication linkage(s) with EMS training and prevention programs to ensure needs identified through the evaluation process are integrated into the EMS training curriculum and prevention programs. |
| 7. EMS Training Curriculum Evolution. | Establish system evaluation training for all levels of EMS personnel to ensure proper documentation, data entry, analysis utilization of data and an understanding of the principles of research. |
| 8. EMS Research. | Establish agenda, guidelines and support mechanisms for conducting and funding Georgia-relevant EMS research. |
| 9. Uniform Rules & Regulations Administration. | Ensure immunity for medical control and quality improvement processes and discovery protection for all local and state EMS quality improvement efforts to ensure cooperation and participation of all EMS participants in patient care and EMS service evaluation. |
| 10. EMS Regulatory Operations Review. | Establish a mechanism(s) for the periodic performance evaluation of the state's EMS regulatory agency. |

A key consideration for *Shaping the Future of EMS in Georgia* is the integration of EMSC issues into the overall strategic planning activities of statewide data collection and information system development. The specific details of this integration are found in numerous discussions within the document.

Summary of Stakeholder Inputs

Key messages from the Stakeholder Committees were as follows:

1. Georgia's EMS, EMSC, and trauma systems need to rapidly evolve.
2. Technology is a key component, but people and process considerations cannot be neglected.
3. The selection and use of appropriate standards to drive technology selection(s) needs to be a key focus area.
4. More efficient, more accurate and less costly data collection methods are needed.
5. Easy access to meaningful information for local, regional, and statewide geographies is essential.

A key finding of the stakeholder committee "current situation" assessment was that a statewide EMS system should be able to evaluate resource utilization, scope of service, patient outcomes, and the effectiveness of operational policies, procedures and protocols based upon geographic considerations. The predominant stakeholders' view was that an effective EMS system must be able to evaluate itself against pre-established standards and objectives, so that improvements in direct patient care and service can occur. *GEMSIS* stakeholders indicated that information from the OEMS/T should help establish these standards and establish a model for programs that support an on-going quality improvement process (CQI) designed to incrementally strengthen EMS system performance. Because of variations in local and regional circumstances, it was suggested that a continuum of efforts might be needed to implement locally and regionally responsive programs. Accordingly, the need to support different approaches is recognized in the *GEMSIS* plan.

Another major outcome of Year 1 activities involved characterizations of the technology supporting EMS in Georgia today. Year 1 *GEMSIS* planning activities saw a consensus emerge that the technology in use by Georgia today has generally become misaligned with the needs, expectations, and operational objectives of constituent groups. Again, an analysis of local and regional needs indicated that a "one size fits all" approach might not be effective. A continuum of capabilities may need to be integrated.

Integration of GEMSIS to the EMS Agenda for the Future

The *EMS Agenda for the Future (1996)* proposes the continued development of 14 EMS attributes. These attributes are summarized in *Table 3, GEMSIS Recognition of EMS Agenda for the Future*. As shown in Table 3, *GEMSIS* charts the continued development of these key areas.

Table 3: GEMSIS Recognition of EMS Agenda for the Future

| EMS Agenda for the Future | GEMSIS Goals |
|--------------------------------|---|
| Integration of Health Services | Goals 1, 2, & 4 contain linkages to ensure that the care provided by EMS does not occur in isolation, and that positive effects are enhanced by linkage with other community health resources. |
| EMS Research | Goal 8 activities are directly tied to determining the efficacy, effectiveness, and efficiency of emergency medical care. |
| Legislation & Regulation | Goals 1 & 10 specifically recognize that legislation, rules and regulations are central to the provision of EMS on the public’s behalf. |
| System Finance | All <i>GEMSIS</i> goals support the efficient provisioning of EMS services and financial viability of EMS. |
| Human Resources | Goals 7 & 10 acknowledge that quality EMS care requires qualified, competent, and compassionate people and that human assets can never be undervalued. |
| Medical Direction | Goals 4, 5, 6, 7 and 8 acknowledge that medical direction involves granting authority and accepting responsibility for the care provided by EMS and includes participation in all aspects of EMS to ensure maintenance of accepted standards of medical practice. Quality medical direction is an essential process to provide optimal care for EMS patients. |
| Education Systems | Goals 6, 7, 8 recognize that as EMS continues to evolve, the need for high quality education for EMS personnel increases. |
| Public Education | In Georgia, public education as a component of health promotion is a responsibility of every health-care provider and institution. |
| Prevention | Goals 1, 2, 3, 5 & 8 acknowledge prevention as an |

Table 3: GEMSIS Recognition of EMS Agenda for the Future

| EMS Agenda for the Future | GEMSIS Goals |
|----------------------------------|---|
| | opportunity to realize significant reductions in human morbidity and mortality. |
| Public Access | The focus on public access is the ability to secure prompt and appropriate EMS care regardless of socioeconomic status, age, or special need. This goal underlies the essential mission of OEMS/T. |
| Communication Systems | All <i>GEMSIS</i> goals support this objective. Communication—in the broadest sense—steers all organizations including EMS. It provides the transfer of information that enables decisions to be made. |
| Clinical Care | Same as Public Access, above. |
| Information Systems | Goal 2. The raw material for information is data. Information systems collect and arrange data to service particular purposes. |
| Evaluation | Goals 1, 3, 4, 6 & 10 explicitly recognize that evaluation is the essential process of assessing the quality and effects of EMS, so that strategies for continuous improvement can be designed and implemented. |

Integration of EMSC Needs

The integration of EMSC considerations was also a key input into the *GEMSIS* strategic plan. Table 4, *GEMSIS/EMSC Goal Integration*, summarizes how EMSC needs are integrated into *GEMSIS* operations. More detailed information regarding this integration can be found in the *EMSCP Year 1 Grant Report – 2003*.

Table 4: GEMSIS/EMSC Goal Integration

| GEMSIS Goals (Abbreviated Format) | EMSC Integration Principle |
|--|---|
| 1. Strategy, organizational structure, SOP, and funding for EMS data collection, evaluation and improvement processes... | Operations Research & Analysis support will come from an organization internal to EMS chartered to insure the EMSCP grant mission is supported. |
| 2. Comprehensive data collection system and data linkages with other state and federal agencies and | Achieving predefined EMS/EMSC data collection and analysis goals will be a key |

Table 4: GEMSIS/EMSC Goal Integration

| GEMSIS Goals (Abbreviated Format) | EMSC Integration Principle |
|--|--|
| organizations, as appropriate... | organizational performance indicator. |
| 3. Standardized definitions, indicators, and benchmarks, to include consideration of all national EMS datasets... | Further phased implementation/compliance to NEMSIS, NHTSA, and other relevant datasets. Probabilistic linkages (CODES) with NTRAC and other programs. Migration from paper-based to electronic-based data entry. |
| 4. Mechanism(s) to ensure feedback of data reports to contributing agencies while maintaining confidentiality... | Specific analysis and publication of EMS/EMSC data on a predefined timetable. |
| 5. Mechanism(s) to ensure data is utilized at the state, local and provider level for continuous quality improvement... | State and regionally defined CQI goals relative to training and performance initiatives. |
| 6. Communication linkages with EMS training and prevention programs to ensure the evaluation processes are integrated... | Specific analysis of state and regional EMSC programmatic needs. |
| 7. System training for all levels of EMS personnel to ensure proper documentation, data entry, analysis utilization of data... | Migration from paper-based to electronic-based data entry. Development of “EMS/EMSC Data Collection and Uses” training principles and supporting materials. |
| 8. Guidelines for conducting and funding state supported or state required EMS research... | Inclusion of EMSC topical areas into annual research agenda. |
| 9. Immunity for medical control and quality improvement processes... | Recommendations to be provided to statewide EMS councils. |
| 10. Mechanism(s) for the periodic performance evaluation of the state’s EMS regulatory agency... | Phased implementation of Key Performance Indicators (KPIs) based upon data analysis and reporting including EMSC information. |

Phased Implementation

The expectations and outcomes associated with *GEMSIS - Shaping the Future of EMS in Georgia* should be understood within the context of a phased program process. Some efforts have dependencies and require careful sequencing. Other efforts are a matter of management discipline, funding, and focused resource deployment. And yet other efforts proceed concurrently over a several year period. A phased implementation schedule will be developed in 2005.

Implementation Responsibility

The Department of Human Resources, Division of Public Health, Office of Emergency Medical Services/Trauma will retain the overall administration of the *GEMSIS* implementation process and the statewide stakeholders group will provide oversight of the project.

OEMS/T will also retain coordination of the funding for the strategic plan implementation that has been awarded by the Health and Human Services Administration, Maternal Child Health-Emergency Medical Services for Children Program.

The timeline to begin the assessment of core process outcomes begins in January 2005 with the first of five *GEMSIS* meetings and will be completed by December 2005.

Cost/Benefit Analysis is Essential

Within Georgia state government, pressures to reduce or eliminate costs are real and require the utmost in careful planning; cost/benefit analysis is an essential consideration. New or innovative ways of providing EMS related governmental services or overcoming organizational limitations must be continuously examined. Greater efficiency, the evolution of services, an expanded role in education and research along with the introduction of better technology to drive the elimination of cost should be seen as the necessary investments for taking a more strategic view of the programs and services the OEMS/T provides to state citizens. These considerations are the heart of the *GEMSIS* strategic goals. The ability to produce, understand and communicate EMS information is the strategic capability sought by the *GEMSIS* plan. Accurate and timely EMS/EMSC information—especially when linked with other public health data sources will be of substantial benefit to the State of Georgia.

Timetable & Risks

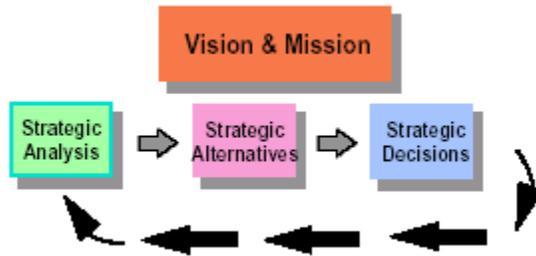
GEMSIS is an ambitious plan with clear priorities for infrastructure improvement. Some elements of the *GEMSIS* plan will become tangible in 2004. This includes the publication of baseline data, the ability to share information over the State of Georgia “backbone” computer network and a foundation for web-based information dissemination. The

provisions for web-based content, information, applications, and other services will become increasingly visible over a several year time frame. Most elements of the *GEMSIS* plan can be completed within a three-year period.² The specific risks and hazards to *GEMSIS* plan implementation are discussed in the later chapters of this document. The potential for lack of continuity of senior management support, organizational stability, funding, and the ability of resources to provide focused attention are all identified risk factors.

² Note a separate MS Project document containing the *GEMSIS* Implementation Timetable sets forth the specific timeframes and the milestone guideposts for attaining *GEMSIS* objectives.

GOAL 1: EMS STRATEGY DEVELOPMENT

Strategic Objective



Establish the strategy, organizational structure, standard operating procedures, and funding necessary for the implementation and maintenance of a statewide EMS data collection, evaluation and improvement process.

Action Steps

1. Strategic analysis of EMS systems and organization.
 - a. Establish and document strategic OD (Organizational Development) and IT (Information Technology) performance baselines.
 - b. Determine target areas for future strategic organizational development that can be accomplished in a 3 to 5 year window.
 - c. Switch operational focus from tactical to strategic needs.
 - d. Identify, establish and adopt principles for strategic IT development. (See five strategic principles discussion.)
 - e. Identify risks and hazards.
2. Develop the mechanisms for integrating and sustaining long-term improvements in organizational operating capacity.
 - a. Incorporate *GEMSIS* goals into OEMS/T operations.
 - b. Align people/process/technology to operating goals.
 - c. Establish KPIs (Key Performance Indicators).
3. Develop standard materials that explain the operations and goals of the OEMS/T.
4. Develop mechanisms for more formally and efficiently communicating OEMS/T activities, goals, and accomplishments on a recurring periodic basis.
 - a. Newsletter.
 - b. Website.

- c. Uniform activity reporting which showcases areas of organizational excellence.
5. Publish (*GEMSIS*) strategic plan.
 - a. Communicate plan vision.
 - b. Execute to plan parameters.
 - c. Use stakeholders to provide ongoing input.
 - d. Use planning principles to establish new relationships.
 - e. Recognize tangible accomplishments.
6. Use *GEMSIS* information to expand linkages within statewide environment.
 - a. Share experiences and lessons learned.
 - b. Learn from the experiences of others.
 - c. Expand stakeholder base.
7. Sustain the development of strategic thinking based upon the identification and use of programmatic standards.
8. Develop an RFI (Request for information) and RFP (Request for proposal) for the vendor provided areas of *GEMSIS*.

Planning Considerations

The Georgia Office of Emergency Medical Services/Trauma (OEMS/T) is an important part of Georgia's overall health care system. In order to proceed with the *GEMSIS* plan development, baseline information needed to be developed. This baseline data was developed concurrently with *GEMSIS* plan development. Accordingly, it is noted that some Action Steps have already been completed so that strategic dependencies and constraints would be known. In connection with this work, an organizational overview of OEMS/T is available as a separate document. This document also reviews OEMS/T functions, organization, and operating goals and objectives as an organizational baseline. Within the context of this baseline, it should be noted that the OEMS/T is part of the Department of Human Resources, Division of Public Health, Sub-division of the Environmental Health and Injury Prevention Branch.

The OEMS/T requires the organizational capacity to draw upon internal and external resources to prescribe, to regulate behavior, to analyze data, and to disseminate information and appropriately interact with its stakeholder environment(s).³

OEMS/T Organizational Purview

While each state has control of its own EMS system, independent of the federal government, the National Highway Traffic Safety Administration (NHTSA) has provided a set of recommended standards called the *Technical Assistance Program Assessment Standards*. In conformance with these standards, each state must have laws, regulations, policies and procedures that govern its EMS system.

NHTSA prescribed standards are to insure that (a) the public has access to the EMS system through a communications mechanism (e.g., 911, e-911), (b) patients are provided with safe, reliable transportation by ground or air ambulance, (c) EMS personnel are appropriately educated and in-turn provide public education on the prevention of injury, (d) EMS has appropriate medical direction, (e) each state develops a system of specialized care for trauma patients; and (f) each state has a quality improvement program for the continuous evaluation and upgrading of the system. (GAO, 1999, p. 6) Accordingly, the OEMS/T must organizationally be able to plan, prescribe, react and evolve in response to the internal and external forces that may manifest themselves in each of these areas.⁴ The *GEMSIS* plan directly supports the development of the information needed to support the OEMS/T core regulatory mission. Without *GEMSIS* data and analysis OEMS/T will continue to lack the infrastructure and data to support uniform statewide regulation. Additionally, the public and stakeholder communities currently lack the information needed to understand the breadth of scope of EMS regulatory operations and/or the cost/benefit of regulatory activities including the impact of proposed regulatory changes. *GEMSIS* develops “mission critical” infrastructure for Georgia EMS.

³ It is noted that the OEMS/T currently has a number of open positions.

⁴ It is noted that the OEMS/T does not have any authority to oversee NHTSA item (a) communications. While the *GEMSIS* plan activities identified a strategic need to link these functions, this linkage is beyond the scope of OEMS/T operations.

Methods to Overcome Constraints

Small, lean organizations such as OEMS/T, which have large responsibilities, need to leverage virtually every resource in their internal and external environments to be effective. The methods available to OEMS/T include:

1. Relationship building.
2. Selection and use of appropriate technologies to extend organizational capacity.
3. Operating goal alignment/re-alignment with stakeholders.
4. Elimination of non-valuated administrative work.
5. Strategic vs. tactical approaches to problem solving.

Each of these approaches manifests itself in some way in the *GEMSIS* plan.

Strategic Organizational Development

OEMS/T desires to be more responsive to statewide stakeholders but is constrained by staffing and budget limitations. As outlined in the EMS organizational baseline, it is not possible for OEMS/T to increase its core budget or FTE (Full time employee) headcount. It can, however, use technology principles to strategically innovate, and seek to better align itself with statewide stakeholder needs within the constraints of its operating budget⁵.

Stakeholders indicated that *GEMSIS* needed to identify and adopt technologies that will drive success over the long-term. As a result of this strategic focus, five planning principles emerged for consideration.

Five Planning Principles

Gartner (2003)⁶ indicates that certain technologies will be driving enterprise application development over the next decade; these technologies will also be driving

⁵ OEMS/T conducted an organizational development (OD) review and has published an organizational baseline document. A copy of this document is available upon request.

⁶ The Gartner Group is generally recognized as the foremost authority for IT strategic planning in the world. An EMS IT Planning Supplement was created in 2003. This document contains a more detailed discussion of these planning principles and their implications. A concept document relative to the *GEMSIS* EMS Portal has been developed to illustrate the vision of having a single Internet destination become an organizing point for statewide EMS data collection, applications, and information. This document is available upon request.

organizational success in provisioning information services. Gartner (2003) indicates that organizations are moving rapidly to web-based standards and the utilization of portals to provide information and applications. Additionally, there is a definite trend toward what has been termed “administrative self-service”. While specialized hardware and software may have driven application planning in the past, the trend now is away from any specific IT device dependencies. For many EMS organizations, these planning premises represent a departure from past methods and may not be well understood.

Table 5: GEMSIS Planning Principles

| Planning Principle | Factors Driving Organization Success |
|--------------------|---|
| 1. | Web-based standards and computer systems that utilize portal framework(s) for application deployment. |
| 2. | Administrative self-service applications, which enable the public and stakeholders access to information they need when they need it. |
| 3. | Standardization on commercially available software or professionally developed “industrial strength” software vs. home grown applications. |
| 4. | Movement from client-server based networking to information sharing, universal methods of information access and web-based cooperative processing (web services). |
| 5. | Avoidance of device dependent or hardware dependent applications. |

EMS Technology Planning

An analysis of statewide EMS operations reveals that the selection of information technology (IT) has historically been based upon what’s available in the marketplace rather than analyzing strategic EMS information needs. A hardware or marketplace focus leads to the selection of inappropriate technology, unmaintainable applications, and

failed projects due to end-user rejection and/or short life expectancies of application systems. Organizations that are consistently challenged to “do more with less” require more sophisticated planning approaches.

Broad Categories of Need

Discussions with Georgia’s EMS regions have identified broad categories of hardware limitations as well as broad categories of information needs. Basic issues in such areas as technical support, staffing, training and computer equipment are considered to be the day-to-day challenges of the local EMS program managers.

Coordination with the OEMS/T organization on technical matters varies upon these conditions and is differentially manifested in the internal environment and moderated by culture. As a relatively small organization, the OEMS/T needs to be utilizing technology which it can support and which in turn will extend or make more productive its limited resources. Web-based (Internet) applications are now a well-proven technology, which can act as an enabler. Various portions of the *GEMSIS* plan outline how the Internet can become an enabler for statewide EMS.

People/Process/Technology

In designing governmental services, the three considerations of people, policy and technology must be balanced. It is critical to create a support service that can (a) scale in terms of numbers of users, (b) provide uniform policy enforcement and (c) be easy to use. This support service should provide for universal access. Intuitive use and reliability are absolutely essential. Several additional documents supplement *GEMSIS* planning considerations and suggest the conceptual mechanisms by which these objectives can be accomplished. These documents are available upon request.

More Accuracy with Reduced Costs

A movement away from paper-based data collection methods is needed. It is believed that web-based and other electronic data collection methods will provide more accuracy and greater operational efficiency. When employees or the public are able to perform their jobs more efficiently, access services or resolve relatively simple and

common problems on their own, using only a standard web browser, a governmental agency can expect to reduce or eliminate transaction costs. The elimination of postage alone often offers an acceptable ROI (return on investment).

By implementing web-based (Internet accessible) self-service oriented solutions, the OEMS/T can free their limited technical and subject matter resources to focus on higher-value, more strategic issues. With web self-service supported through a portal, Regional EMS personnel can obtain this information from virtually any location in the state—including a provider's place of business. Rural providers could enter PCR data or transmit aggregated PCR data files. And, certain types of information and reports could be made available for general distribution.

Summary

In summary, this section discussed the foundational strategic considerations that support *GEMSIS* goal attainment. In order to arrive at a destination, an organization must know where it is starting. Much of the work associated with Goal 1 has been accomplished as part of documenting baseline information. The OD and IT baseline information that has been developed is provided in the appendices to support explanations regarding the importance of the *GEMSIS* vision to OEMS/T multi-year operating objectives. Technology, organizational structure, standard operating procedures, and funding necessary for the implementation and maintenance of a statewide EMS data collection, evaluation and improvement process are all key inputs into the *GEMSIS* plan.

Remaining Action Steps from Goal 1 include publishing the final *GEMSIS* strategic plan, communicating the plan vision, executing to plan parameters, using stakeholders to provide on-going input, using the planning principles contained in this document to establish new relationships and the recognition and celebration of tangible accomplishments as they occur.

The format, volume and quality of the *GEMSIS* plan are designed to communicate detail, substance, quality and purpose. By sharing the *GEMSIS* document, information linkages can be expanded to the statewide environment. The formality and detailed discussions associated with the *GEMSIS* plan are designed to sustain the development of

strategic thinking based upon the identification and use of the plan as a programmatic standard.

GOAL 2: COMPREHENSIVE EMS DATA COLLECTION

Strategic Objective



Establish a comprehensive data collection system capable of gathering, integrating, and reporting pertinent, timely and accurate data from all state EMS system participants, and provide data linkages with other state and federal agencies and organizations as appropriate.

Pictured left is the Scantron hardware currently used to collect data from EMS Patient Care Reports. The OEMS/T urgently seeks to replace this technology and move to all electronic data collection.

Action Steps

1. Assess statewide EMS data collection methods.
 - a. Develop methods to clear the EMS Regional backlog of PCR's, which require data entry.
 - b. Develop methods of assistance to “mass scan” historical data.
 - c. Reconcile PCR data by providers within EMS Region.
 - d. Establish a deadline for the collection of historical PCR data.
 - e. Consolidate and reconcile PCR data from 2000 – 2003.
 - f. Survey equipment & software available supporting EMS Regions.
 - g. Replace or earmark for replacement all unserviceable equipment.
2. Evaluate feasibility of using web technology to collect PCR information.
 - a. Conduct/evaluate web-based PCR pilot.
 - b. Publish the requirements for electronic data collection.
3. Publish the policies and procedures for the aggregation and analysis of electronic PCR data.
 - a. Publish strategy for universal reporting of data based upon a reduced data set.

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- b. Publish strategy for obtaining additional data based upon reduced data set.
 - c. Publish strategy for utilizing a reduced data set for EMS regulatory compliance.
4. Attend and become active in NEMSIS related activities.
 - a. Assess status and viability of current NEMSIS tools.
 - b. Develop a time-phase plan to assume the integration of NEMSIS into Georgia's GEMSIS system architecture.
5. Correct deficiencies in the Georgia PCR data model.
6. Correct deficiencies in the Georgia trauma data model.
7. Take steps to conform the Georgia PCR data model to NEMSIS for national reporting purposes.
8. Define and establish mechanism(s) for the sharing of information between the OEMS/T and EMS Regions.
 - a. Enhance the Skyland GroupWise Server hardware/software to permit information sharing over the State of Georgia computer network "back bone".
 - b. Establish an EMS portal or central web-access point.
 - c. Migrate sharable information to a common web-based access point.
 - d. Migrate/convert existing applications for web-based access.
 - e. Develop all new data collection requirements, specifications and applications as "web-capable".
9. Summarize requirements to support the evaluation and selection of purchased software.
10. Support the Department of Human Resources/Division of Public Health (DHR/DPH) need for EMS syndromic data.
11. Investigate purchased software that will support PCR data collection, analysis, syndromic surveillance, probabilistic data linking, BT (Bio-terrorism), emergency preparedness and/or other related EMS functions.

EMS/EMSC Data Planning Considerations

Systems for data collection and information management have developed slowly within EMS. These systems have historically lacked conformance to generally accepted IT development standards. The lack of “product and process” standards has reduced data collection consistency and maintainability.

The main source of data for EMS/EMSC comes from Patient Care Reports (PCRs). Georgia’s program to exhaustively collect PCR data has had mixed results. A preliminary analysis of Georgia PCR data collection has been completed as a separate document and outlines the data received and available in the State Office by year. It is noted that the PCR reconciliation process for 2000 – 2003 is ongoing.

The purpose of collecting EMS data is to evaluate the emergency medical care of individuals with illnesses and injuries in an effort to improve care access and reduce morbidity and mortality.

The lack of universal access to data collection systems that produce data, which are valid, reliable, and accurate, is a significant barrier to coordinating statewide EMS system evaluations, including outcomes analysis.

An overall lack of integration between EMS, health care providers and community resources severely limits the ability to share useful data.

Research efforts are hindered by underdeveloped information systems. Without corrective measures and standards for improvement, the data derived from existing information systems may be inadequate for research purposes.

Addressing Data Collection Problems

The best electronic data available for Georgia is from 2000. In the year 2000, the OEMS/T received data from approximately 670,000 PCRs. It is estimated that these data represented about 60-80% of statewide EMS calls.

Collection of PCR data has suffered from three problems: (a) lack of technology, (b) lack of training, and (c) lack of enforcement capability.

A key outcome of the *GEMISIS* stakeholders’ meetings was the recognition that Georgia must aggressively work to correct this situation in 2004 and 2005. Possession of this data is needed by the OEMS/T in order to satisfy environmental informational

demands. Additionally, Georgia needs to be NEMSIS compliant going into the 2006-2007 timeframe.

Paper-based Scanning Challenges

Active interaction with the Stakeholder’s groups revealed a good number of challenges with current “paper-based” methods of PCR data collection. The consensus view is that this method is slow and error prone. At the same time, however, representatives from across the state also recognized that in rural areas, PCR scanning is the only method of data collection in use. Changing from this method of data collection cannot happen overnight; there must be a proven migration path to other methods. A review of the PCR forms reviewed at the state office, for example, revealed that some original forms are often illegible; the data recorded are sometimes incomplete, and errors in coding data are sometimes present on the source documents themselves.

| <i>Table 6: Current & Future View of PCR Data Collection</i> | | | |
|---|--|--|--|
| DATA COLLECTION APPLICATION | CURRENT FUNCTION ARCHITECTURE & OPERATIONS | FUTURE VISION STRATEGY & PRIORITY | WORK REQUIRED TO WEB-ENABLE & PLACE ON A PORTAL |
| <p>GAPCR – PATIENT CARE TRIP REPORTS – SCANTRON PROGRAM</p> <p>Ver. 3.0.8, desktop, MS Access, is wholly supported by State EMS Office. Deployed to the 10 EMS Regions and in use by approx 31 services. Provides EMS PCR records in accordance with OCGA 31-11 & Chapter 290-5-30 Rules & Regulations.</p> | <ul style="list-style-type: none"> - SCANTRON technology is rapidly aging and needs to be phased out over the next three years. - Regions can run some standard reports on a stand-alone basis but training is needed. Equipment and software differences cause ongoing problems. Information and CQI approaches lack uniformity. - The OEMS/T receives PCR data either on CD or disc, email, or un-scanned paper (Scantron Forms). | <ul style="list-style-type: none"> - A web-based PCR data collection system needs to be deployed on a pilot basis. - Basic data entry and collection needs should be supported from an EMS portal. - Providers/Regions should be able to run meaningful reports from the web. - Providers should be able to submit electronic data on a monthly basis. The EMS portal will receive electronic data directly. - The State’s IT groups will support and maintain web framework. | <ul style="list-style-type: none"> - The web-based PCR data collection should be integrated into a portal framework that supports EMS/EMSC informational needs. - Basic reporting needs to be supported from portal. - The PCR data needs to be accessible in a manner that supports EMS/EMSC local and regional needs using OLAP technology. - EMS CUBE will enable PCR data analysis. - CQI efforts need to be supported by centralized informational |

| <i>Table 6: Current & Future View of PCR Data Collection</i> | | | |
|--|---|---|---|
| DATA COLLECTION APPLICATION | CURRENT FUNCTION ARCHITECTURE & OPERATIONS | FUTURE VISION STRATEGY & PRIORITY | WORK REQUIRED TO WEB-ENABLE & PLACE ON A PORTAL |
| | | - OEMS/T personnel will focus on analysis and information production. | - delivery. - PCR data needs to be available in a manner that supports syndromic surveillance. |

Scarcity of Staff and Distance are Problems

Beyond technical support for PCR data collection--support for PCR data collection is generally recognized by stakeholders to be understaffed--the scarcity of regional staff and the distances traveled within Georgia EMS Regions were the most frequently mentioned major impediments to providing more accurate PCR data collection. Scarcity of staff and distance forces organizations to partner with local community resources to perform their missions. A key strategic planning outcome is the recognition that technology can play a role in leveraging scarce resources. Appropriate technology, which is Internet accessible, can help close the gaps that physical distance creates.

Stakeholder Guidance Sought

The Stakeholder Data Committee was charged with examining the costs associated with the three data collection methods. Assignments were made to gather specific cost data including start-up and annual costs for small, medium, and large services who currently are using paper and electronic methods of data collection. Included in the data to be collected are items such as: number of units run by the service and number of calls run per year. Cost data was to include: all initial cost associated with hardware and software, salary of individual(s) to manage system/data, annual maintenance charges, and any replacement costs. Additional key questions and areas of inquiry are indicated below.

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1. Are the costs associated with these methods anticipated to change over the next three to five years? Yes, especially in terms of hardware expense.
2. What are the main barriers that keep all services from moving to electronic data collection or more paperless types of operations?
 - a. The initial start-up cost for moving to electronic might be too high for rural or smaller services. One of the solutions discussed was to train someone to build basic PCs or buy the parts and get it built in one of the technical schools where they usually build them for free, and would cost less or distribute surplus PCs to these smaller Services. At the time of this writing, the Data Committee was waiting on maintenance cost from the Regions for software and Paper-based data collection modes.
 - b. Another barrier that the Stakeholders recognized was resistance to change. One of the solutions was maybe to educate the users on the advantages of the electronic data collection.
 - c. Confidence in the vendor was another issue. Whether they would get continued IT support, or the stability of the software vendor and whether the data extract created by the software would be compliant with the State Office of EMS Data Extract. The EMS service providers need to make sure the software extract is compliant with the state office before ever using it.
3. With the Web-based system, the problem was what type of Internet connection was available in the rural area if any and the cost of the Internet access. Is the cost associated with DSL or Cable prohibitive for most rural services? No. It is believed that this is moving towards universal acceptance. Availability is probably the bigger issue. In terms of cost, the possibility of maintaining one versus multiple station lines and the possibility of wireless links are probably all increasingly in the reach of most (non-volunteer) services. It was noted that web and all electronic start-up costs can be assisted or defrayed through DOAS surplus equipment availability for municipality based services, Tech/University continuing education courses/classes to learn how to build your own

Shaping the Future of EMS in Georgia

system, subcontracting with schools that provide training programs in this to build for the service, and grant searches/applications to fund these purchases. Eventually a GIS lat/long code could be adopted using the electronic reporting.

The Stakeholder committee recommended how revisions to data sets could be implemented. They recommend going electronic, whether at the service level with laptop/desktop generated reports or web-based reporting for those services unable to/not interested in being electronic. It would also be necessary to implement a “go live” date. Education is also going to be a key component in this, as well as enforcement mechanisms for non-compliance.

The Stakeholders reviewed a number of other issues generally related to data collection, data analysis and reporting.

1. What training is required to implement this data set revision? Implementing training programs in the schools for new graduates as well as with current medics is required to build awareness and infrastructure. Statewide training would be necessary. The Stakeholder recommendation is to tie it to recertification in such a way that it would be mandatory for medics to comply. This way there is accountability and would allow us to feel that the data has a better chance of being “clean”. The Stakeholders indicated a belief that an on-line course with a short exam would be adequate or a mail-out with recertification materials of a CD that would include a short exam that would be completed at the end of the training and submitted with recertification documents. The Stakeholders recommended more active involvement of the medical directors with notification to them that this is going on and advise them on what they can do to reinforce these issues.
2. When should the revised data set become effective in GA? The Stakeholders recommended no more than a three-year implementation period. The Stakeholders indicated a recommended start date would be January 2007.
3. Recommendations on the EMS grid versus zip code on the PCR. The Stakeholders indicated a final recommendation, based upon advisement from

the DHR Injury Prevention Section that zip code be adopted. The Stakeholders indicated that this sufficiently targets location information. The Stakeholders indicated that the EMS grid was not realistic at this point, based on past failures.

4. Recommendations on the fundamental data set. The Stakeholders indicated that the NHTSA/NEMSIS data set was reviewed against Georgia's current data set and while they recognized that some of the definitions should be aligned more consistently with the national data set, it was felt that this is more information than is necessary.
5. Recommendations on electronic reporting. The Stakeholders felt that going to electronic reporting would allow us the flexibility to enable data revisions as needed much easier. Some members felt that the At Patient Time, Time 1st Defib/Extrication, Unit Number, Medic 1 Type, and Medic 2 Type should be included in the extract going to the regional offices. Some indicated that these would be important to track response times and use of personnel especially with the emergence of EMT-B's and that time at patient may be useful when looking at survival outcomes. Some Stakeholders indicated that the current data set and extracts were fine with the exception that Georgia considers the longer-term data mechanisms and needs for linking and analysis. Additionally, other Stakeholders indicated that while the current data set was fine a focus should be better placed on getting the medics to do complete and accurate reporting. DHR/DPH Injury Prevention Section submitted that they would find it useful to have access to the following elements for linkage (data not currently collected in the paper process due to the fact that they are hand written) Incident Location, Transported to, Patient name, Zip Code, City and State of Residence. Injury Prevention Section also provided a list of current elements needed to perform the data linkages and analysis. The list contained personal elements such as age, gender, race, DOB, Patient ID Number, and event elements including location (EMS Grid using zip code) and times. Injury Prevention also indicated a desire to have access to pre-existing

condition, location type, environmental cases, Glasgow Coma Scale, injury site and type, and safety equipment as some of the elements for analysis.

6. Recommendations regarding the most important EMS-C initiatives for GA over the next three to five years.
 - a. The Stakeholders indicated the key goal to reduce child and youth mortality and morbidity sustained due to severe illness or trauma, ensuring that pediatric patients receive the best care in the prehospital setting, the integration of pediatric services in the EMS system with optimal resources, and ensuring that the entire spectrum of EMS care is provided to pediatrics and adults alike.
 - b. On the question of what data are required to support the emerging trends for EMS-C in Georgia? The Stakeholders noted that some of the needed data are recorded on the PCR; however, they have not been methodically analyzed at the state or regional level. The specific data elements that may help trend analysis include such things as DOB (Date of Birth), Environment Cause, Matrix for Injuries, Incident Location, and Pre-existing Conditions. The Stakeholders advised that the State Office needs to dedicate staff to do this type of analysis.
 - c. On the question of what training or curriculum changes may be needed to support the collection of EMS-C data? The Stakeholders felt that due to the importance of this issue, it should be included in recertification. The Stakeholders indicated that this could be implemented in an electronic fashion, similar to the recommendations for training for the new data set and collection. The importance of these elements could be emphasized in (future) curriculum revisions in the area of EMS operations. Accordingly, the state office should develop materials that suggest the needed changes and deliver the needed messages—regarding the importance of EMS data collection.
 - d. Do the data needs of the state relative to EMS-C vary by region or urban versus rural? What information or data would benefit EMS-C in the various localities or regions? The Stakeholders indicated that the

needs did not vary, but that follow-up to identified needs, implementation of training, and outcomes should be done.

- e. What data is the best way for the State Office to quantify the benefits associated with EMS-C programs? The Stakeholders indicated that the linkage is very important so that outcome data may be studied. The more variables that Georgia can collect that can be analyzed and linked, the more beneficial the information.
7. The Stakeholders were asked to discuss and advise on the Health and Human Services Data Revision Recommendations—where to place the EMSVID (EMS vehicle identification) and other related identifying information. The Stakeholder recommendation was that the miscellaneous data element be utilized for this purpose. We felt that the zip code was simply too necessary for data linkage to sacrifice.
8. The Stakeholders were asked to advise their thoughts on the best indicators of customer satisfaction with EMS providers? On this issue Stakeholders had divided opinions. The group that was against state office involvement in customer satisfaction issues felt that there were none. The opinion for state office involvement was basing that on the analysis of patient outcomes, benchmarking, complaints filed by the public, and any compliments received by the regional or state office.
9. What role, if any should the State Office play in measuring customer satisfaction with EMS services? Stakeholders expressed two views. The “against” group felt the state office should have no role. The opinion “for involvement” felt that the state office should make themselves known to the general public, as well as the regional offices which may be more appropriate. (The comparison for this was made with the insurance commissioner.)
10. What should the state recognize as “generally accepted” customer satisfaction indicators? Stakeholders fell into two categories. The “against” view felt there were no indicators needed and that the state office should not be involved. The “for” view felt that the analysis of patient outcomes, standard

benchmarking, and correspondence with the public regarding care received should be the indicator.

11. What Baldrige CQI categories should be applied to EMS data collection and management? The Baldrige categories were examined and the sub-committee feels that the following should be applied:

- a. Leadership--education of leadership and management in QI theories, strategies, and benefits.
- b. Information and Analysis.
 - i. Are EMS services timely?
 - ii. Do providers adhere to protocols?
 - iii. Level of patient/stakeholder satisfaction.
 - iv. Performance compared with similar systems (benchmarking).
 - v. Evaluation to determine whether data and information being used in planning and operations.
 - vi. Do all workforce members understand and use the available data?
 - vii. Have the QI efforts been successful at increasing performance?
 - viii. Are changes in one critical performance area affecting other areas?

The Stakeholders were asked to discuss and advise on CQI guidelines that involved data collection. They also provided input regarding the development of a CQI program around PCR data and how such a program could be implemented across the state. The results of these discussions—when centered upon data, data formatting, and data reporting—appear in the various other goal sections of this plan.

1. On the question: What is the best way to have a periodic evaluation of statewide EMS data collection programs? Stakeholders recommend error reports at the regional and state levels, that they be required quarterly, reports for verification of receipt of data and quantity, 911 log reports to compare against service reported 911 calls, and provider reports of calls logged.
2. Regarding the mechanisms the OEMS/T should use to evaluate the collection of data in the regions, it was believed that timelines for submission of

data/reports from the region offices should be developed (the transition from paper to all electronic reporting should take care of a lot of these issues), the movement of data through correct channels (local-region-state), and evaluation of regional follow-up on problems/issues at the service level.

3. On the question: Can data be used to provide a better programmatic linkage between EMS training and prevention programs to ensure that needs are identified? The Stakeholders indicated that *GEMISIS* should play a critical role in this linkage through the establishment of the critical data set and development of standardized systems reports that utilize the data elements to identify needs at the local and regional level.

NEMSIS Participation Essential

Since the early 1970s, various factors have contributed to the development of EMS information systems and databases. However, in the Georgia EMS Regions statewide, EMS systems vary in their ability to collect patient and systems data and to put this data to use. No standard (vendor-based) means currently exists to easily link disparate EMS databases to allow the uniform analysis of data at a local, state, and national level. For this reason, the National Association of State EMS Directors (NASEMSD) is working with its federal partners at the National Highway Traffic Safety Administration (NHTSA) and the Trauma/EMS Systems program of the Health Resources and Services Administration's (HRSA) Maternal Child Health Bureau to develop a national EMS database. Georgia is a participant in these efforts.

Georgia recognizes that participation in NEMSIS and related activities provides relationships essential to develop a statewide EMS training curricula, CQI program and the development of EMS system indicators. Additionally, Georgia believes that the NEMSIS effort will (a) facilitate research efforts, (b) assist in providing information on fee schedules and reimbursement rates, (c) address resources for disaster and domestic preparedness, and (d) provide valuable information on other issues or areas of need related to EMS care in Georgia.

NEMSIS Business Model

The NEMSIS business model serves to promote the collection and use of EMS data at three levels. It is important to understand that information collection at the national level requires data to be provided by each state. Accordingly, Georgia must have a coherent strategy for accomplishing this task. It is also important to understand that EMS data must come from the local EMS service providers within that state. The NEMIS model accordingly supports a mechanism for data to be collected upstream at both the local and state levels. It also provides an electronic mechanism for this data to be moved from each of these levels. The NEMSIS model also supports technical and data management.

Georgia must become completely familiar with the NEMSIS model and its components. To obtain local EMS data, Georgia must be able to support EMS systems that do not have the resources to develop or purchase one on their own. Georgia has just recently completed a web-based pilot to prove the feasibility of this concept.

The NEMSIS model calls for the development of two EMS software data entry and reporting tools. For local EMS systems that do not have access to a state EMS data entry system, a very basic freestanding data entry application is to be created. OEMS/T needs to attend the NEMSIS meetings and assess the current status of NEMSIS software. It is also noted that, in theory, the NEMSIS model supports the free distribution of some of this software. It is believed that the original intent of NEMSIS was to develop software that could be used by any local EMS system. It is believed that NEMSIS software was intended to allow for data collection and basic reporting of the 65 National EMS data elements with an export function based on the NHTSA XML schema to allow data to be electronically submitted to the state. Georgia needs to determine how this will operate. In connection with this, it is the recommendation of this plan that Georgia OEMS/T become active in the NEMSIS project in the 2004 time frame and assess how to best take advantage of NEMSIS related materials and products.

The second software application planned by NEMSIS is a data entry and reporting tool, which will include the full NHTSA Version 2.0 dataset. According to NHTSA, both of these applications would be “open source” meaning that EMS systems could receive

these data collection and reporting applications. Georgia must develop a plan to understand and support the distribution of this software, if this proves to be the case.

Support for Syndromic Surveillance

To facilitate rapid detection of a future bio-terrorist attack, an increasing number of public health departments are investing in new surveillance systems that target the early manifestations of bioterrorism-related disease. OEMS/T believes that the GEMSIS system should supply one of the several data sources that public health needs to accomplish surveillance activities. This source of data is the Georgia EMS Patient Care Reports (PCRs).

Other sources of data should come from other systems as selected by epidemiologic needs. The web platform, and long-term agreement and adherence to identified standards (HRSA, NEMESIS, CDC, etc.) should play a role in the functional integration. In the first iteration, GEMSIS should provide a web-platform for providing surveillance as described below.

It is envisioned that the GEMSIS system will permit authorized public health representatives to have secure, web access to Georgia PCR data. Additionally, authorized public health representatives should be able to work with EMS to set surveillance criteria and thresholds and to obtain EMS reports by specifying a date range, certain geographic parameters including such things as destination code, zip code, county, EMS (public health) region as well as cause of injury and provider impression as it is coded on the PCRs.

The limitations of utilizing PCR information as a single source are becoming known. Because PCR data is not currently reported on a real-time basis throughout the state, its ability to be the leading predictor is not certain. Discussions internal to the Georgia Department of Public Health (DHR/DPH), indicate that PCR data may, however, be a valuable indicator of duration and also provide other useful data. In the longer-term, however, as these data become more available and more accurate, the value of EMS data when considered with other data help provide a better composite picture of the scale of disease events.

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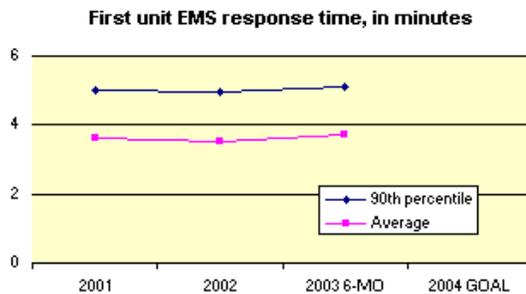
The ability to provide an accurate analysis of PCR data supporting public health needs is an essential function of the GEMSIS system baseline. In summary, the GEMSIS system must be able to initially provide public health access to EMS data and in the longer-term evolve to more closely conform to public health needs.

Investigation of Vendor Software

Summarization of requirements to support the evaluation and selection of purchased software needs to be conducted. Investigation of purchased software that will support PCR data collection, analysis, syndromic surveillance, BT (Bio-terrorism), emergency preparedness and/or other related EMS functions has not been accomplished in any disciplined sense. Accomplishing this analysis will mark a major milestone in Georgia's understanding of long-term data collection needs.

GOAL 3: PUBLISHED EMS INFORMATION BASELINE.

Strategic Objectives



Establish a mechanism(s) to ensure feedback of data reports to all contributing agencies while maintaining confidentiality and security of data. This process will include a mechanism for prehospital personnel to receive timely feedback on the diagnosis and disposition of their patients.

Action Steps

1. Collect, reconcile, and analyze Georgia Trauma data from 2003.
2. Develop a draft outline of Georgia trauma publication for approval.
3. Identify and document missing trauma data elements.
4. Document a standard, repeatable methodology for “cleaning” NTRAC data.
5. Participate in the National Trauma Data Bank (NTDB).
6. Develop a Plan for the evolution of trauma data collection.
7. Identify and support data requirement for trauma system evolution (see table this section.)
8. Collect and reconcile Georgia PCR data from 2000 – 2003.
9. Develop and publish Georgia PCR data cleaning methodology.
10. Establish a data link between Georgia PCR data and other public health data sources.
11. Submit outline of Georgia PCR publication for approval.
12. Analyze and publish Georgia PCR data for 2000 – 2003.
13. Develop mechanisms for the dissemination of meaningful EMS data.
14. Develop the relationships needed to sustain meaningful data analysis and utilization.

Planning Principles

GEMSIS stakeholders have indicated that OEMS/T needs to strategically position itself to provide EMS information for local, regional and statewide use.

In their discussion of organizational power, Child & McGrath (2001) indicate that one of the most profound shifts in the economy is the shift from power derived from possession of tangible assets and inputs to power derived from possession of knowledge and information. (p. 1140) It is premised that organizations that cannot make this shift will lose power.

Publication of Trauma Data

The OEMS/T is currently examining its first complete data set for statewide trauma system participants. This data was collected in 2003. Table 3, Summary of *GEMSIS* Trauma Program Activities sets forth the objectives and linkages between *GEMSIS* support of the state trauma system development. These linkages include the development of infrastructure for trauma data analysis and publication.

Table 7: Summary of GEMSIS Trauma Program Activities

| Area | Current State | Future State & Actions |
|---|---|---|
| General Program Administration, Policy & Procedures | <ul style="list-style-type: none"> ▪ Program is improved and more formalized then several years ago. It is increasingly more important and more visible within the big picture. ▪ There is a high desire by stakeholders and participants to “leap forward”. ▪ No procedural documentation. ▪ Backlog of administrative-related projects. ▪ Some forms being revised. ▪ Forms are inconsistent and lack standardization. ▪ Persistent and/or unresolved operating issues. ▪ Inconsistent activity reporting. Activity reporting does not support tracking of programmatic goals ▪ Contracts only when \$ involved. | <ul style="list-style-type: none"> ▪ A program worthy of national recognition. ▪ Published policies. ▪ Standardized and uniform application, inspection and renewal policies. ▪ Standardized forms. ▪ Improved and simplified record keeping. Less paper and more electronic records. ▪ Participation contract that can easily be amended to support grants. ▪ Mechanism for the rapid identification of issues before they become persistent. ▪ Document an operational baseline. ▪ Rapid development and publication of policies and procedures that can serve a framework for program operations. ▪ Establish a realistic timeline for activities, which tie to the plan and the Grants. |

Table 7: Summary of GEMSIS Trauma Program Activities

| Area | Current State | Future State & Actions |
|--|---|--|
| Interactions | <ul style="list-style-type: none"> ▪ Meetings have been improving but still lack a consistent, pre-planned programmatic focus including educational component. ▪ Meeting minutes represent an inconsistent record of activities. ▪ Agendas focus on issues of “power centers” vs. systematic statewide programs. ▪ Group efforts oriented on seeking consensus positions. ▪ No programmatic synergies between EMS, EMSC & Trauma. | <ul style="list-style-type: none"> ▪ Pre-planned agendas consistent with trauma plan. ▪ Pre-planned educational content. ▪ Revised operating procedures. ▪ New operating procedures (Trauma and Ambulance Inspection areas are priority). ▪ Implementation of HHS recommendations. ▪ Group efforts oriented on state trauma system improvement. ▪ Programmatic “cross-overs” between functional areas. ▪ Survey of participation membership to establish perception baseline. ▪ 24 week focus to reverse/change group perception of program effectiveness and program membership benefits. Resurvey at end of 24 weeks (Aug 2004). ▪ Identification of unique “information niche” that program should fill. ▪ Assistance for the better structuring of meetings, and other planned interactions, publication of minutes, etc. |
| Technology & Data Collection | <ul style="list-style-type: none"> ▪ Several changes in data collection systems over past several years. ▪ Lack of historical data to perform analysis. ▪ Lack of cost data to support planned programmatic objectives. ▪ NTRACs working in sub-optimal fashion and needing manual work in order to maintain. (Note this was corrected Oct 2003 as an ORAS priority.) ▪ No data linkage of EMS and trauma data. ▪ Systems efforts are not driven by value-added information—they are driven by data collection. ▪ Underlying data problems with definition of trauma, and the niche where information can provide value. | <ul style="list-style-type: none"> ▪ Stable and well understood data collection procedures. ▪ Published data strategy. Data strategy alignment with goals and EMS data needs. ▪ Historical data, which can support analysis and publication. ▪ Statistical analysis of GA PCR data from 2000 – 2003. ▪ Publication of official statewide estimates of selected EMS statistics. ▪ Production of recognized, value-added information. ▪ Web availability of information. ▪ Stabilize data collection program. ▪ Resolve persistent NTRAC problems that have been resulting in manual efforts. ▪ Link EMS and Trauma Systems ▪ Seek/obtain State Medical Director guidance on which data should be published and why. ▪ Align data elements to programmatic needs, especially in the area of trauma costs per State Medical Director’s guidance. ▪ Publish and then sustain publication efforts. ▪ Conduct outreach activities to inform and make statewide environment aware of informational resources. |
| Trauma Plan & Programmatic Information | <ul style="list-style-type: none"> ▪ The State “promised information but nothing has been produced”. ▪ No standardized information available to explain the program and programmatic goals. | <ul style="list-style-type: none"> ▪ Updated Trauma Coordinator’s Resource Manual. ▪ Published materials on State trauma program goals and objectives... including plan, standard PowerPoint, and Fact Sheet. |

Table 7: Summary of GEMSIS Trauma Program Activities

| Area | Current State | Future State & Actions |
|--|---|---|
| | <ul style="list-style-type: none"> ▪ Trauma Coordinator Resource Manual is out-of-date. ▪ Information has not been adequately aggregated and reviewed for reporting. ▪ No publications. | <ul style="list-style-type: none"> ▪ Published characterization of statewide trauma program based upon NTRAC data summarization and analysis. ▪ Published characterization of EMS and NTRAC data based upon probabilistic linkages. ▪ Published research agenda. ▪ Thorough review, revision, and reorganization of all materials in the Resource Manual. ▪ Enhanced communications, more frequent and more qualitative communications. ▪ Review and characterize programmatic information. ▪ Determine themes consistent with statewide planning goals and publish Quarterly newsletter. ▪ Showcase activities of all trauma system participants |
| <p>Program linkages and task force activities. CQI/Training alignment.</p> | <ul style="list-style-type: none"> ▪ No written CQI plan. ▪ Understood but undocumented CQI initiatives. ▪ No consistent programmatic reporting of CQI efforts. ▪ Trauma system membership capabilities are “under channelized” i.e., each one probably does something well—this needs to be shared. ▪ EMS Regional support and participation is inconsistent. | <ul style="list-style-type: none"> ▪ Three year CQI plan with published annual emphasis. ▪ Uniform Regional participation. ▪ Programmatic reporting of CQI efforts. ▪ Focused and disciplined management of limited resources to obtain operational alignment of plans with activities. |
| <p>Trauma Grant Administration</p> | <ul style="list-style-type: none"> ▪ Open and overdue programmatic activities. (3 key evaluation items still open from year one. 4 additional evaluation items open in year two. ▪ Grant funds unspent need to be carried over. | <ul style="list-style-type: none"> ▪ Grant funds re-encumbered. ▪ Grant timeline created and disseminated. ▪ Activities brought back on schedule. ▪ Write letter(s) to extend Grant funds. ▪ Create timeline for Grant program activities. ▪ Complete all overdue activities on a priority basis. |

Publication of EMS PCR Data

Georgia is currently holding approximately four years of PCR data. This data must be methodically cleaned and processed utilizing standard, repeatable methodologies.

OEMS/T needs to publish its specific philosophy and methodology towards the cleaning and organizing complex EMS data. This publication should set out a fully reproducible footprint of each stage of the data preparation process as well as a final

analysis product. It is believed that OEMS/T's approach underlying this process will represent a significant contribution to the overall Georgia public health methodology of data preparation because the outcomes will be able to be reproduced each year that data is to be prepared.

Public Education Essential

The publication of EMS operating information to educate the public is an essential activity for the OEMS/T. A great deal of what the public knows about Georgia's EMS system originates from the media. The media does not educate the public regarding the totality of functions that EMS provides in Georgia.

OEMS/T has data, which, if processed into information and published, could benefit the public at large. Education, with all its various dimensions, is the linchpin for health promotion. As a component of health promotion, published information facilitates the development of knowledge.

GEMSIS recognizes that OEMS/T should collaborate with other health resources and agencies to determine public education needs. Such assessments will enable development of education programs with specific objectives appropriate for the community.

Data Analysis and Cleaning Required

The cleaning and preparation of EMS data represents an expensive and time-consuming endeavor. Experience has shown that cost is increased substantially when processing steps are lost or undocumented. The presence of standardized data preparation files as part of an archived data collection will not only enhance the efficiency of Georgia's EMS research process, but it will also add ongoing value to the linkage of this data with other data sources.

During the period 2004 – 2006, OEMS/T proposes to accomplish three specific tasks.

1. Completion of a revised PCR data model and completion of the PCR data methodological documentation.

2. Assemble a representative collection of harmonized longitudinal files from PCR analysis that will help contribute to the ongoing longitudinal study use.
3. Annotation of the central methodological and organizational issues operationalized by the analysis of statewide PCR data. This task will provide a set of clear guidelines for the use of the associated data processes to aid researchers in the use of the PCR files for research. More generically, the annotated guidelines will document the value of the OEMS/T “clean process methodology” as a systematic approach with applications to the organization and management of any set of complex data.
4. Exploration of the mechanisms under which the principles and organizational structures of PCR data methodology could be applied to other secondary data collections that share a similar complex longitudinal structure.

Edit & Imputation - Special Processing Methods Required

Georgia PCR data is believed to be subject to several types of errors (sampling and non-sampling). For the purposes of discussion, all limitations and sources of error in the aggregated PCR data and estimates need to be documented and generally understood. Sources of non-sampling error include the following:

1. EMS respondent inability or unwillingness to provide correct information.
2. EMS respondent inability to recall information.
3. Data element definitional difficulties. Errors made in data collection, such as recording and coding data.
4. Differences in the interpretation of PCR fields or questions.
5. Errors made in processing the data.
6. Errors made in estimating values for missing data.
7. Inability to obtain information about all cases.
8. Failure to represent all localities (under-coverage).

Cleaning Methodology

OEMS/T will need to develop a standard, repeatable method of PCR data cleaning. OEMS/T proposed to use the following traditional methods of cleaning dirty data:

1. Parsing.
2. Field standardization.
3. Casing and general data format consistency.
4. Conversion to standard format(s).
5. Matching against PCR data validation tables -- exact matches and wild card.
6. Consolidation (enhancement and merging).
7. Removal of duplicates.

On-line Analytical Processing (OLAP Cube)

After data cleaning, initial analysis and publication, Georgia believes that OLAP (on-line analytical processing) methods may offer a potential mechanism for permitting EMS information sharing. OLAP is becoming more and more accepted as an important tool for strategic decision support for other more labor-intensive DP methods of data analysis.

Accordingly, after the clean-up and initial publication of data, Georgia intends to use OLAP tools to support the need for on-going historical information analysis.

Currently there is no standard mechanism for supporting EMS data analysis or policy decision support functions. OEMS/T believes that a general-purpose OLAP tool (MS Data Analyzer) can be adapted to reduce the complexity and time frame in implementing such a solution.

Most OLAP systems are built around a multi-dimensional data model that enables the end-users to “slice and dice” the data in various ways. The most often used concept for multi-dimensional modeling is the star-schema.⁷ There are two basic components of

⁷ Most of the OLAP technologies in the market place today are based on some variation of the star-schema. Despite its wide adoption, star-schema has shown significant limitations in dealing with ever growing complexity and volume of data. Most of the issues stem from the assumption that all key elements can be grouped into hierarchical, normalized relationships and security—the ability to limit seeing certain types of data detail.

the star-schema. The first is to separate all data elements involved in an analytical context into two groups. One group consists of numerical elements, or generally referred to as EMS demographics and performance metrics. These are numeric values that various aggregation rules can be applied, such as summary (totaling), average, percentage, etc. The other group consists of label elements that are used to slice and dice the metrics. The numeric values are either segregated by some combination of the key elements, or filtered by certain values of the key elements. Another component of the star-schema is to organize all key elements into hierarchical structures. These hierarchies, or dimensions, form the various drill paths that assist an end-user to access the information stored in an OLAP system. This concept is commonly used in entity relationship modeling, where an entity-oriented view is crucial to ensure the integrity of the model. OEMS/T proposed to use this basic strategy in its initial implementation of OLAP capability.

Publication of EMS PCR Data

Georgia plans that the first consolidated analysis of PCR data will begin in the summer of 2004 and complete before the year's end. This analysis of data will cover the years 2000 - 2003. A *GEMSIS* plan deliverable already in work is a "mock-up" of this first publication.

The initial emphasis of published data will be for an aggregated (descriptive) understanding of EMS operations on a statewide basis. The publication of statewide PCR data will also showcase EMS operations by EMS Regions.

Examination of Barriers to the Production of Information

A strategic analysis of the statewide EMS environment has been accomplished and exists as a separate document from this plan. Elements of the *GEMSIS* plan discuss the organizational and technical requirements to produce EMS information. The production of information will require the focusing on strategic and analytical tasks vs. the administrative IT workload.

Rural EMS/EMSC Support

EMS/EMSC information is needed specific to local circumstances—much of Georgia is rural in nature. Through the Stakeholder’s meetings it became apparent that rural EMS, including employees, providers and others working remotely, currently do not have adequate access to information. A “universal access” solution is required so that authorized persons can gain continuous access to state resources.

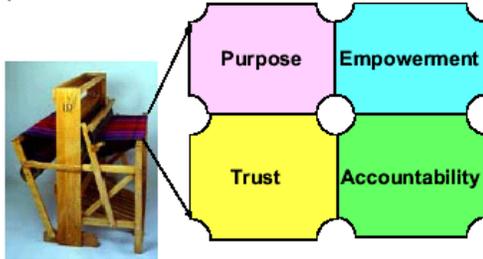
HIPPA Considerations

The Health Insurance Portability and Accountability Act of 1996 (HIPAA) does pose a limitation on the ability to produce some types of information, however, the OEMS/T is in-step with accommodating these changes. In general, HIPAA requires additional security measures for medical record information, including medical records held by EMS agencies. Research review is permitted under these regulations, but HIPAA prevents a complete linkage of data throughout the components of the statewide health care system. Because this physical data linkage does not today exist, techniques have been developed to use probabilistic data matching. With appropriate software, a probabilistic matching approach can link a high percentage of records in different databases. OEMS/T needs to develop the technical infrastructure to support probabilistic linking in 2004-2005.

Portal-based self-service solutions enable improvements to security management as well as policy standardization relative to security policies related to password length, password expiration, and password history, etc.

GOAL 4: FORMALIZED EMS BENCHMARKING

Strategic Objectives



Establish standardized definitions, indicators, and benchmarks, include the consideration of all national EMS datasets to facilitate comparative analysis of local EMS system performance, quality of patient care, customer satisfaction, and system cost on a state and national level.

Purpose, Empowerment, Trust & Accountability are the four cornerstones of meaningful benchmarking.

Action Steps

1. Analyze output and information from *GEMSIS* Goal 3.
2. Determine target areas for benchmarking consistent with core regulator functions.
 - a. Greater uniformity and consistency across state.
 - b. Less non-value added administrative activities.
3. Align benchmarking with policy administration, education, data collection and analysis objectives.
4. Develop and document benchmarking goal statements using the four cornerstones of meaningful benchmarking above.
5. Publish benchmark data in connection with the second year iteration of Goal 3 of this plan. Insure focus on the specific recognition of EMSC related benchmarking needs and considerations.

EMS Benchmarking Indicators Defined

According to the Joint Commission on Accreditation of Healthcare Organizations (JCAHO, 2003) an indicator is "a quantitative performance measure...a tool that can be used to monitor performance and direct attention to potential performance issues that may require more intensive review within an organization." Indicators may be related to structures (people, places, things), processes (activities occurring in a system), and

outcomes (the results of the structures and activities within a system). All three types of indicators (structure, process, and outcome) are all related and dependent upon each other. Changes in structure may affect the process and the outcome. Likewise, changes in the process may affect the structure and outcome. Indicators, in short, are a way to simplify information so that data can be digested more efficiently and in a meaningful way. For Georgia, initial CQI activities are designed to support the improvement of core regulatory functions with a focus on education and field practice.

More than Response Time

When the public thinks of EMS indicators, response time is usually the first metric that comes to mind. Response time can be an important measure for some medical conditions; however, it is an indicator that needs to be carefully addressed as Georgia proceeds forward.⁸ Response time is important; however, according to the various *GEMSIS* stakeholders' committees it is not necessarily the first benchmark indicator of choice on a statewide basis.

Some systems are setting response interval performance standards as a way of measuring EMS quality. This is a complex undertaking that entails considering medical and patient care issues, financial, political and social factors and the public's perceived need levels. Georgia currently does not have the infrastructure, data, quality of data, or capability to set meaningful response time benchmarks. *GEMSIS* will begin a series of activities that build some of the needed capabilities to research and understand the complexities of response time; however, response time is not an initial focus, per se.⁹

⁸ According to the National Association of EMS Physicians, there is little evidence linking improved response intervals to improved survival in critical trauma and there is no literature suggesting that rapid response intervals improve outcome for non-critical patients. (Bailey & Sweeney, 2003, p. 397 as retrieved from <http://www.naemsp.org/publications-pec.asp>)

⁹ It is noted that response interval goals will vary from community to community. Medical necessity and community expectations must be weighed against logistics and resources. Predetermined EMS response interval performance standards can only be developed using a broad-based consensus process that realistically assesses the resources and attributes of the community. And, ultimately, response interval performance standards should be driven by community medical considerations with vital input from EMS professionals, physicians, EMS providers, dispatchers and local government.

EMS Indicators

Properly developed EMS System Indicators have four traits or cornerstone concepts: Purpose, Empowerment, Trust, and Accountability. As part of *GEMSIS*, statewide EMS system indicators must be developed and adopted. These indicators should be developed through a statewide consensus process and supported by the analysis of existing statewide PCR data.

While the OEMS/T will develop some meaningful indicators at a strategic level, most benchmarking will occur at the local level. The role of OEMS/T must be to provide the education, tools, and encouragement to EMS organizations to develop their own locally meaningful indicators based upon their analysis of specific needs.

In order to assist EMS organizations with developing indicators, instructions on standardized indicator development will be developed and made available utilizing web tools. These tools will also tie with the availability of data and reporting capabilities. While it is not the intent of the OEMS/T to provide in-depth education on such things as statistical measures of central tendency, measures of dispersion, process analysis trending, causation benchmarking and best practices, the OEMS/T can facilitate access to materials which can support these efforts.

What measurements will be defined? Results and measurements of indicators should be presented to the users of the information in a formal process and on a regularly scheduled basis. Each presentation of data should include the purpose, objectives, references, benchmarks, measurements, and indicator detail sheet for clarification of data. The indicator information should be displayed to evaluators in a format that is most appropriate for the speed and ease of interpretation.

EMS systems should have a structured process for making decisions. The following is a general outline of the steps in a structured process for evaluation and decision-making.

1. Identify the objectives of evaluation.
2. Present indicators and related EMS information.
3. Compare performance with goals or benchmarks.
4. Discuss performance with peers/colleagues.
5. Determine whether improvement or further evaluation is required.

6. Establish a plan based upon decision.

Once valid information has been presented and reliability evaluated, the decision to take action to solve a problem requires a structured approach that is adaptable and applied to each situation as it is identified. There are many standardized and well-developed quality/performance improvement programs, which may be used during this phase.

OEMS/T believes that in all cases, each EMS Region needs to be able to choose an improvement method that is systematic and based upon local objective evidence. The approach to improvement should also be team oriented and be done in a way that does not overwhelm participants due to the process size and complexity.

In this sense OEMS/T believes that “small wins” are the basis for the larger wins. Accordingly, OEMS/T believes that initial improvement projects be simple and based upon a strong consensus within the EMS Region that the program (whatever it is) will benefit all.

It is noted that the availability of resources can vary greatly between urban and rural agencies. It is understood that one EMS Region may need to handle multiple projects, however, simple, singular approaches will be favored.

While there are many approaches to CQI within an EMS system, OEMS/T plans to initially choose a standardized approach and use the same process each time a project is undertaken. (See *GEMISIS* Goal 6.)

The following are the current proposed components of a standardized improvement process:

1. Establish criteria for measurement and evaluation.
2. Evaluate information.
3. Make a decision to take action to improve.
4. Establish criteria for improvement.
5. Establish an improvement plan.
6. Measure the results of the improvement plan.

EMS Performance Measurement Guidelines

EMS leadership is responsible for the creation of strategies, systems, and methods for achieving excellence in health care, stimulating innovation, and building knowledge and capabilities. Patient-focused performance is the key component in determining system effectiveness. The delivery of patient care must be system-focused and by its nature will then become patient-oriented. In the context of EMS system performance, this would include the patient's perception of the continuum of care from the prehospital to the hospital.

Fostering Organizational Learning

Within the context of OEMS/T statewide programs, “organizational learning” refers to continuous improvement of existing approaches and processes and adaptation to change, leading to new goals and/or approaches. OEMS/T and EMS Regional Offices, through well-defined objectives, should foster an environment for personal and organizational learning. From a statewide strategic perspective, the specific goals for EMS should include education, training, and opportunities of continuing growth, which will allow EMS professionals to participate and contribute to a changing health care environment.

The *GEMSIS* plan puts forth a belief that the measurement of certain aspects of EMS prehospital care, when properly analyzed can produce information which will (a) influence the outcome(s) of assessments and patient care, (b) improve statewide operational guidelines, and (c) drive overall systemic regulatory improvements. Under the *GEMSIS* approach, learning is directed not only toward better EMS delivery, but also toward being more responsive, adaptive and efficient by recognizing and focusing on personal and organizational learning.¹⁰

GEMSIS can provide information, which can permit organizations to be more effective in professional staff development as well as information, which can affect the overall quality of prehospital care within the state.

¹⁰ Remember the principle: “What gets measured gets done.”

The information that *GEMSIS* can provide is key to understanding the present and planning for the future. OEMS/T can make available data, information and materials, which provide mechanisms to keep pace and anticipate regulatory changes in EMS healthcare delivery and technology developments.

An effective EMS system depends upon the measurement and analysis of performance. Critical data and information about key processes, outputs and results are a key component. Performance measurement areas may include patient outcomes, patient care and operational guidelines, staff, cost, and customer satisfaction and others. Analysis of data along with knowledge and input from statewide stakeholders can support systemic operational improvement.

Data and its analysis support the review of overall field performance, improving outcomes, improving operations and comparing processes with similar organizations, with performance “best practice” benchmarks or comparison of the agency performance with itself and its own past practice. A major consideration in performance improvement involves the selection and use of performance measures or indicators. *GEMSIS* recognizes that this must be accomplished based upon both the meaningful analysis of data as well as direction from stakeholders.

The Georgia EMS system has a responsibility to the public it serves to foster improved community health. Basic expectations of an EMS organization include ethical practice and protection of public health, safety, and the environment. For Georgia, initial CQI activities supporting the improvement of core regulatory functions including education and field practice will result in measurable systemic improvements.

GEMSIS Focus Areas: Basic Proficiency, Scope of Practice, and Licensing

EMS system participants must perform to a minimal level of proficiency within their scope of practice. This level of proficiency must be maintained for licensing and continuing practice purposes.

From a public health perspective, EMS system participants should also share in efforts in community wellness and injury prevention. Focus on result-oriented performance measurements need to be an outcome of data analysis. OEMS/T believes that data analysis can provide important insights in several areas: (a) focus on key results

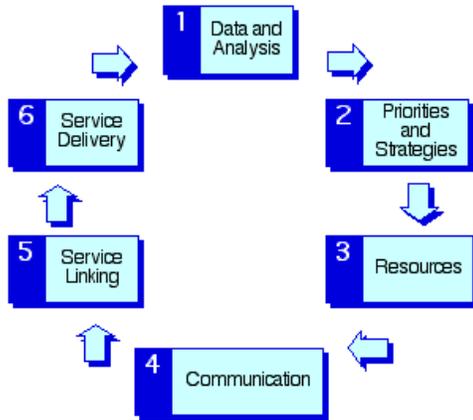
that create the value of EMS to the community served, (b) focus on what is important to the whole system, (c) identification of areas where performance improvement has clear benefits, and (d) identification of areas where future problems may be prevented.

EMS CQI efforts should seek to provide a forthright response to areas where information or practice change may be needed to maintain public awareness, safety and confidence.

There must be a continued investment to produce a high quality product. It is not enough to develop new programs and techniques of measurement and control. The stakeholders must commit to a course of constant evaluation and improvement that is non-punitive, valued, and continuous. The objective to establish standardized definitions, indicators, and benchmarks, include the consideration of all national EMS datasets to facilitate comparative analysis of local EMS system performance, quality of patient care, customer satisfaction, and system cost on a state and national level is one that requires continuous activity and re-evaluation.

GOAL 5: STANDARDIZED DATA UTILIZATION

Strategic Objective



Establish a mechanism(s) to ensure data is utilized at the state, local and provider level for continuous quality improvement aimed at improving EMS services and quality of patient care decreasing death and disability, and reducing costs.

Left: Under the GEMSIS approach, standardized data utilization is conceptualized as a 6-step process. This six step process provides the context for EMS Regional Offices to understand how to support implementation of the Action Steps supporting Goal 5: Standardized Data Utilization.

Action Steps

1. Standardized data utilization should be based upon the collection, reconciliation, analysis and publication of data. Accordingly, EMS Regional Offices must play a key role in collecting and aggregating the data from the EMS Service Providers in their geographic areas. For OEMS/T, Step 4, Communication --the publication of EMS and trauma data is a key initial priority. This provides a foundation for service linking (regulatory examination) and overall improvement based upon data.
2. Clean and analyze the 2003 NTRAC trauma dataset.
3. “Mock-up” outline of Georgia trauma publication for approval.
4. Identify and document missing trauma data elements.
5. Develop a plan for the evolution of trauma data collection.
6. Identify and support data requirement for trauma system evolution (see table this section.)
7. Involve Regional EMS in the Trauma program (Step 4, Communication).
8. Collect and reconcile Georgia PCR data from 2000 – 2003.
9. Develop and publish Georgia PCR data cleaning methodology.

10. Establish a link between Georgia PCR data and other public health data sources.
11. “Mock-up” outline of Georgia PCR publication for approval.
12. Analyze and publish Georgia PCR data for 2000 – 2003.
13. Involve Regional EMS in the EMS in Georgia 2004 publication development.
(Step 4, Communication).
14. Develop mechanisms for the dissemination of meaningful EMS data as part of
Step 5, Service Linkage.
15. Submit data to NTDB.
16. Repeat the cycle in 2005 - 2006.

Planning Considerations

The establishment of mechanisms to ensure data is utilized at the state, local and provider level for continuous quality improvement is a basic six-step process model. The *GEMISIS* focus in 2004-2005 is largely aimed at steps 1 through 4. Steps 1-4 provide and communicate the information needed to raise awareness of EMS areas, which may hold potential for improving quality of patient care, decreasing death and disability, or improving system-wide cost/benefit.

Table 8, below summarizes some of the specific actions that will foster integration and institutional change.

It is noted that EMSCP goals are specific integrating mechanisms for the development of strategic capacity on a system-wide basis. The significance of these mechanisms is that they institutionalize the operational components needed to drive and sustain improvements in care and outcomes. The selection of EMSCP goals has a cost basis. By providing EMS intervention to populations under the age of 19, Georgia may be able to drive long-term cost savings based upon targeted practice interventions.

Table 8: EMSCP Planning Integration

| EMSCP Programmatic Goals (Abbreviated Format) | Integration Principles |
|---|---|
| <p>1. Integration of EMSC issues into the overall strategic planning activities of a statewide data collection and information system to include evaluating existing and potential infrastructure, collection tools and methods, and types of reports and methods of dissemination.</p> | <ul style="list-style-type: none"> - Revisions to OEMS/T organizational goals. Creation of an EMS Operations Research & Analysis Section (ORAS). - Development of EMS Stakeholder’s Committees. New relationships and linkages. - Development of revised and new operating procedures and standards to support the collection, analysis and dissemination of EMS/EMSC data. Identification of EMS scope of practice issues. - Revisions to multi-year strategic plans and operating goals to integrate EMS/EMSC data analysis as a core activity function. - Implementation of a formal, pre-planned total quality improvement initiative driven by EMS/EMSC data. - New or revised operating procedures relative to EMS/EMSC data collection, analysis, publication, evaluation and improvement processes. |
| <p>2. Establishment of capacity at the local level for varying collection and submission mechanisms or tools to enhance the timely information that is reliable and readily accessible for analysis.</p> | <ul style="list-style-type: none"> - Standardized definitions, indicators, and benchmarks, to include consideration of all national EMS datasets. - Establishment of a vision and publication of a plan to drive the development of a comprehensive data collection system with data linkages with other state and federal agencies and organizations, as appropriate. - Definition of hardware/software requirements to achieve predefined EMSC data collection and analysis goals. |
| <p>3. Establishment of an integrated EMS information system that includes electronic collection and transmission, storage and analysis of EMS data and linkage to other databases for specific analysis of outcomes for children in the EMS system.</p> | <ul style="list-style-type: none"> - Mechanism(s) to accept and integrate electronic data collection. - Mechanisms(s) to ensure feedback of data reports to contributing agencies while maintaining confidentiality. - Specific analysis and publication of data on a predefined timetable. |

Specifically, Table 8 indicates that the Georgia Office of EMS/Trauma (OEMS/T) formally incorporated the grant-related EMSCP goals into its 2003-2005 operating objectives. In connection with this, the Operations Research & Analysis Section (ORAS) was created and was mandated to play a central role in coordinating and carrying out EMSCP grant-related activities. The direct incorporation of EMSC goals and the establishment of the ORAS (Operations Research & Analysis Section) are but several of the integrating mechanisms that are improving EMS state infrastructure. These infrastructure improvements will continue to have persistence after the EMSCP grant activities are completed.

Tangible Capability

GEMSIS - Shaping the Future of EMS in Georgia is about the establishment of tangible capability on a system-wide basis, which will result in sustained improvements in care and outcomes. Despite the progress made in the development of an Emergency Medical Services for Children system, gaps in timely access to care and data driven treatment guidelines, protocols and prevention activities remain. Based upon numerous inputs from across the state, it is believed that a phased, systematic and comprehensive approach to EMS data collection which provides “ground floor” integration of the relevant EMSC considerations can close these gaps. The processes of closing these gaps through new or revised relationships of people, process, and technology is outlined in the next section.

One of the important features of the *GEMSIS* vision is its ability to potentially be linked to external databases, making it possible to do, in part, the following:

1. Describe intermediate and long term outcomes in prehospital populations.
2. Evaluate the effectiveness of EMS care in specific populations.
3. Perform cost/impact effectiveness studies. (See Research Agenda 2004-2006).
4. Evaluate programs and policies.
5. Support or evaluate legislation impacting EMS relative to various Georgia populations.

6. Define target populations or groups at risk—particularly populations under the age of 19, in order to plan interventions.

In the longer term, one key aspect of building infrastructure in Georgia is the building of connections and linkages between organizations. At the time of this writing, it is believed that the *GEMSIS* strategies could be used as an “organizing mechanism” to collect the coalitional relationships being developed under the emergency preparedness umbrella to create an enduring EMS infrastructure. This infrastructure requires the formalization of people, process, and technology. With specific regard to technology, the exchange and sharing of data on a formalized, periodic basis would not only enhance communication and understanding, but provide the context for directed operational improvement.

Examples of external data sources that could be used to achieve the above are:

1. Hospital discharge data and NTRACS Trauma registry data shared with university and hospital-based programs.
2. Statewide Integrated Traffic Records System.
3. Georgia Poison Control Center data.
4. Death Certificates analysis- statewide death file linkage.
5. Worker's Compensation – exploration of this linkage for two purposes (a) EMS professional on the job injury studies and (b) on the job patient outcome studies.
6. Immunization registries—a focus on BT (Bio-terrorism) issues impacting Georgia.

Stakeholder Input

The Reporting Committee has worked on a number of strategic discussions related to standardized data utilization through data reporting. In particular, they examined parts of the six step process model that has emerged from the *GEMSIS* planning meetings.

1. What reporting mechanism(s) are needed to support Step 4, Communication, and ensure feedback? The Committee discussed a number of items, but as a whole it was felt that an annual, OEMS/T published, EMS report would be the best method for soliciting feedback from the various user groups within the State. This feedback would then be used to guide and develop the service linkages and then promote the examination of additional reporting tools.
2. How should the reports be published? The Committee felt that some type of “corporate style” annual report should be published for public consumption. Additionally, it was felt that this information should also be made available in non-editable electronic format (such as pdf) and should also be available in a web format. This wide variety of formats should ensure the widest possible distribution. The Committee felt that, wherever possible, caution should be taken with electronically distributed reports. Safeguards should be put into place to prevent adulteration.
3. Where should the reports be available from?
 - a. Primary source – Regional EMS Offices.
 - b. Secondary source – State EMS Office.
 - c. The reasoning behind this is two fold, first is customer service and the second is marketing our regional offices. This goes hand-in-hand with the current business strategy within the State government today – move things out of Atlanta and to the people of Georgia.
4. With what frequency should the data be published? There was considerable discussion on this point. The Stakeholders felt that the minimum this information should be refreshed and published is annually. There is an expectation within the EMS community that such reports would be published

within a reasonable timeline. The Stakeholders discussed the benefits of working toward a shorter publication time, such as quarterly before the end of Year 3. These discussions produced no clear consensus. Stakeholders also indicated the importance of not creating projects or expectations that would be destined to fail, because the ambition was greater than the ability.

5. What data if reported (communicated in Step 4) would provide a mechanism for improving EMS services, quality of patient care, less death and disability, and/or less cost? The Stakeholders made the following recommendations for CQI elements in order of priority:
 - a. Cardiac arrests as compared to ROSC (return of spontaneous circulation). It was noted that cardiac arrest survivability in Georgia has been called into question after the USA Today article earlier this year. This information would let us know where we stand and where we need to go.
 - b. Trauma as compared to type of destination. Trauma would be defined by “Trauma Score”. The Stakeholders felt that as an on-going part of our trauma system development we needed to get some hard numbers on trauma patients and which facilities they were being transported to on a primary basis.
 - c. Pediatric patients as compared to the nature of illness and/or injury. The Stakeholders felt that we needed hard numbers on the number of children that were being seen by EMS and the types of illnesses and/or injuries reported. This information could then be used by the EMSC in developing or re-developing the EMSC plan.
 - d. Call type as compared to EMS training. The Stakeholders felt that we needed to take a hard look at the number of calls by type and compare those numbers to training. The reasoning would be to look for areas with wide disparity, e.g. 15% of calls for Peds, as compared to 2% of training time. Additionally, the types of calls would be helpful in the development of future training courses.

- e. Reported Medical Control. The PCR lists four types of Medical Control available to EMS personnel. How is Medical Control to be used in the field? The answer to this question would allow for additional study on clinical efficacy.
 - f. No transports as reported by time of day and day of week. There have been some concerns expressed by several of the Medical Directors across the State that they believe no transports are increasing. This would establish a baseline and give us a point from which to start looking into this issue. (Note: these are listed in our order of priority.)
6. Are any changes to the Rules and Regulations necessary? The Stakeholders as a whole could not readily think of any existing or proposed EMS Rules or Regulations that would effect reporting. However, the Stakeholders recommended that the OEMS/T needs to thoroughly research DHR policy and develop a policy for the *GEMISIS* as a guide to current and future developers/users on the requirements for publishing State owned data.
7. What reporting and confidentiality issues should the OEMS/T be aware of? The obvious answer is HIPAA. However, the Stakeholders also discussed a number of what we felt were related issues:
- a. Provider concerns of proprietary information. A number of counties in the State bid out their ambulance services. How, what and when data becomes available could (will) be an issue in future bids.
 - b. Marketable value. All publicly available data eventually has a marketable value. There are a number of companies that are collecting public data for resale to the public.
 - c. Predatory uses. This goes hand-in-hand with a., above.
8. What is the role of reporting with regard to training? The Stakeholders felt that our future training programs (both initial and on-going) would be driven by the results of our reporting.

GOAL 6: EMS CQI

Strategic Objectives



Establish system evaluation training for all levels of EMS personnel to ensure proper documentation, data entry, analysis utilization of data and an understanding of the principles of research.

Action Steps

1. Develop three specific areas for statewide CQI for implementation in the 2004 – 2006 timeframe.
 - a. Implement the operational improvements associated with the Health and Human Services (HHS) compliance project. This directly supports the objective of proper EMS trip reporting and PCR documentation.
 - b. Present three to five additional CQI ideas to the Stakeholders for selection. Note: one of the three areas must specifically relate to EMSC and be drawn from an analysis of NTRAC trauma data or PCR data or a combination of both.
 - c. Develop an educational CQI process based upon the analysis of NREMT test areas.
2. Develop specific concept, implementation, and train-the-trainer materials.
3. Publish baseline data for comparison purposes.
4. Deploy the CQI plan utilizing both classroom train-the-trainer and a distance learning or web-based approach to extend staff and to support rural areas.
5. Implement and monitor programmatic areas.

Planning Considerations

It is noted that Goal 6, Continuous Quality Improvement (CQI) should be closely coordinated with the activities of Goal 5 as well as other *GEMSIS* goals.

CQI for Georgia EMS has been conceptualized by the Stakeholder's committee as a peer-based process that conducts a clinical review of selected functional areas over some time period. The initiation of statewide CQI should be based upon the specific analysis of PCR data, NTRAC data and NREMT professional certification test scores.

CQI seeks to understand processes and revise them using data about the processes themselves. CQI sees "problems" as opportunities for improvement.

In this plan, the OEMS/T CQI process involves the development of a topic specific approach to statewide improvement. Each topic will be sufficiently narrow that it is accomplishable. A project-by-project approach to systematically improving quality through small increments is believed to be more effective for the circumstances presented by the current Regional organization. Incrementalism will be used as a tool to overcome inertia to maintain the status quo."

In the backdrop of clinically based CQI, OEMS/T is undertaking several other initiatives for incremental improvement of the statewide system. These efforts are designed to show incremental improvements in the core regulatory administration and provide value-added information through data analysis and publication, and foster the greater availability of information through value-added informational channels (i.e., the Internet).

A key thrust of the core regulatory function program(s) is to seek greater uniformity through the identification of "islands of excellence" and the elimination of activities that do not add value to administrative processes. Non-value activities are considered "waste" under CQI and are candidates for elimination.

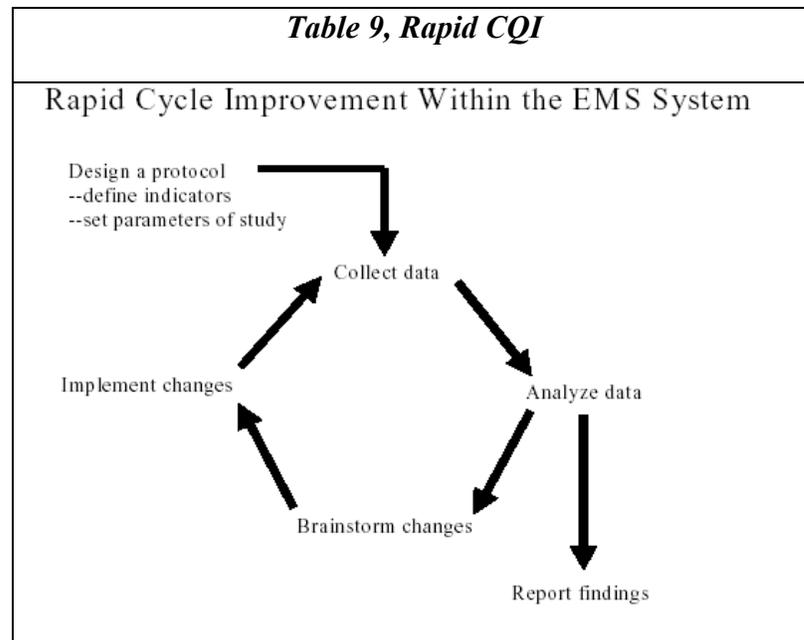
Quality improvement is not a singular activity. It is not a static process. Rather, it is a group of on-going processes or activities that are linked together by teams or groups of people all directed towards a common goal. The program must define "quality" and also take into consideration where the system wants to go from a regulatory or compliance perspective.

Distance Learning to Support CQI

In these days of fiscal uncertainty, it is pragmatic to consider those areas, which will have an impact on the way OEMS/T meets its core mission goals without compromising budgetary constraints. It is believed that web-based value-added information and services including “distance learning” techniques have a high potential for Georgia.

CQI efforts must realistically consider all system resources, which include personnel, facilities, equipment, and financing. Some of the variables of these resources include communication, topography, bureaucracy, financial, education and expectation. One of the most important variables that is often neglected is that of what the general public expects or in some cases, demands of us as a public agency. Internet-based methods and distance learning can be harnessed by OEMS/T to meet expectations by defining a baseline definition of quality for an EMS system and providing materials that support these initiatives.

Georgia’s incremental approach to CQI leads itself to Internet and distance education methods by requiring a narrow and well-defined focus area, methodology and end-user measurable outcome. Without this definition there can be no directed goal or quality improvement effort.



Based on strict confidentiality and a shared commitment to excellent prehospital care, the Internet-based distribution of CQI materials supports both urban and rural parts of the state. Urban areas fully expect and anticipate that materials should be made available over the Internet. Rural areas find that the ability to receive and access materials provides a basis for initial CQI engagement of a type concomitant with statewide improvement efforts.

The initial analysis of data reveals potential areas for improvement of the EMS system, suggests training opportunities, highlights outstanding clinical performance, audits compliance with treatment protocols, and reviews specific illnesses or injuries along with their associated treatments.

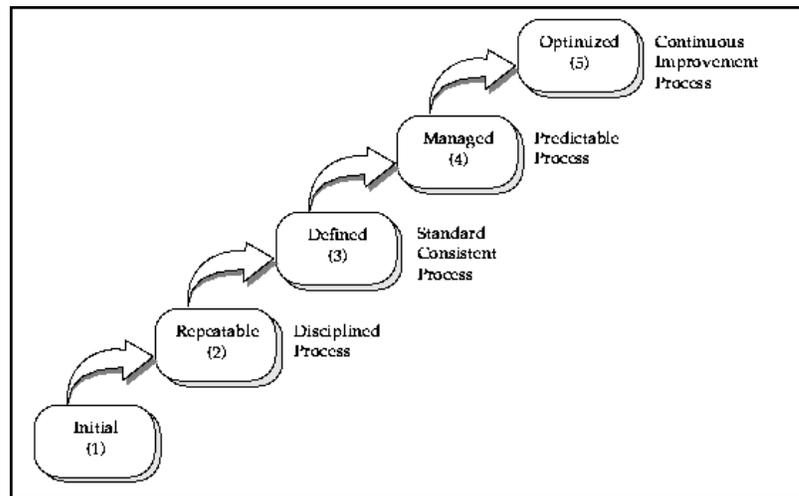
As indicated in Table 9, Rapid CQI, these efforts will contribute to the success and rapid cycle improvement of Georgia's emergency medical services through a systematic process of review, analysis and improvement.

Incremental Improvements

GEMSIS continuous process improvement is based on a rapid improvement model (every 8-12 months) driven by the implementation of many small (incremental) steps rather than revolutionary innovation. As shown in Table 10, EMS CQI Goals, the objective of rapid incremental improvement is to move along a continuum where processes are repeatable, consistent, managed and predictable.

A basic "common sense" approach will be utilized to progressively improve selected processes. The basis of the rapid cycle improvement philosophy is to manage organizational knowledge so that improvements result over relatively short time periods. A goal of this method is to make improvements every time the process cycles so that the process incorporates new knowledge and a higher standard for meeting operating goals. Within *GEMSIS* a five-step process model is to be established with common terminology. The terminology will be phased in terms of "process states" 1 thru 5. These states are described below.

Table 10, EMS CQI Goals



1. **Initial.** Strategic change requires that processes be assessed and characterized as they are initially performed. During this process, baseline information is collected, basic processes are documented (even if they have been performed for some time and generally known by everyone). The goals of this first step are to understand and document what is and is not consistently repeatable. Baseline information is generally collected through observation. The baseline data examines which people are doing what, how they are doing it and why it is being done the way it is, and what the persistent or “unsolvable” problems generally are.
2. **Repeatable.** The first task is to try to obtain greater procedural uniformity and make processes repeatable. Once processes are consistently repeatable, the components of the process can be further defined and analyzed.
3. **Defined.** In this phase, automation is still generally removed from the equation. The level of analysis remains people and process oriented. The reason for this is that it is pointless to automate processes that lack consistency and uniformity.
4. **Managed.** This phase is best characterized as the beginning of using technology to leverage people and processes to make the system more efficient and productive. In this phase, strategic decisions can be made to determine how best to mix people, processes, and technology to accomplish organizational objectives.

The management process is essentially deciding which processes are best optimized by using the various techniques of automation. Key to this phase is the selection of appropriate technology. (See the *GEMSIS* appendices for discussions concerning technology selection and technology alignment.) It is noted that under some circumstances—usually resource or cost limitations, some organizations will be unable to move beyond this phase. Accordingly, emphasis will be strategically placed on stabilizing the progress attained and shifting focus to other areas where process focus is attainable.

5. Optimizing. This phase is characterized by the phased and selective implementation of data processing solutions.

It is noted that trying to skip the stages at which a system should evolve is almost always counter productive. Organizations can institute specific process improvements at any time they choose, even before they are prepared to advance to a level at which the specific practice is recommended; however, organizations should understand that the stability of these improvements will be at greater risk since the foundation for their successful institutionalization has not been completed.¹¹ Processes without the proper foundation may fail at the very point they are needed most—under stress. (CMM, 1999, p. 21) Discussions with EMS senior managers and Stakeholders indicate that education will be a necessary component of CQI program implementation.

Stakeholder Guidance

Stakeholders were asked to provide guidance on what three to five performance improvements *GEMSIS* data could drive over the next several years. Stakeholder recommendations included: timeliness of PCR submissions, completeness, accuracy, implementation of community programs (i.e. EMS-C related), and the ongoing evaluation of the usefulness/appropriateness of collected data elements.

¹¹ A review of the EMS Organizational Baseline reveals that a lack of continuity has produced this effect in statewide EMS. Following this model for building infrastructure will increase the probability of long-term success for EMS improvements over time—particularly in areas of regulation and compliance.

Stakeholders indicated that a number of operational areas could be made more uniform among EMS regions based upon the collection of data. In summary, Stakeholders indicated that: (a) data driven training programs, (b) uniform, regular reporting, and (c) establishment of regional CQI committees to review state generated reports—were all areas of interest.

In discussing what role, if any should the State Office play in measuring customer satisfaction with EMS services, there were two views: Those “against” felt the state office should have no role. Those “for involvement” felt that the state office should make themselves known to the general public, as well as the regional offices (which may be more appropriate). The comparison for this was made with the insurance commissioner.

In discussion of which (Baldrige) CQI categories should be applied to EMS data collection and management, the Baldrige categories were examined and the sub-committee feels that the following should be applied:

1. Leadership.
2. Education of leadership and management in QI theories, strategies, and benefits.
3. Information and Analysis: (1) EMS services timely? (2) Do providers adhere to protocols? (3) Level of patient/stakeholder satisfaction. (4) Performance compared with similar systems (benchmarking). (5) Evaluation to determine whether data and information being used in planning and operations. (6) Do all workforce members understand and use the available data? (7) Have the QI efforts been successful at increasing performance? (8) Are changes in one critical performance area affecting other areas?

In discussing the question: “Do any EMS regions currently have a CQI program revolving around data? If so, in what areas?” there was a positive response. As far as the sub-committee was aware, several EMS Regions are currently running a regional CQI program. EMS Regions 3, 4 and 5 are known to have such a program; however, these programs lack uniformity of approach. Certainly others do exist.

In discussing the question: “Should the state office publish CQI guidelines that involve data collection?” The answer was “Yes”. The state must play an active role in this area including providing education on CQI methods. The state should announce a

consistent agenda. Regions and localities should be encouraged to align their efforts with the state initiatives; however, interpretation of local conditions or needs by medical control should have precedence, as appropriate.

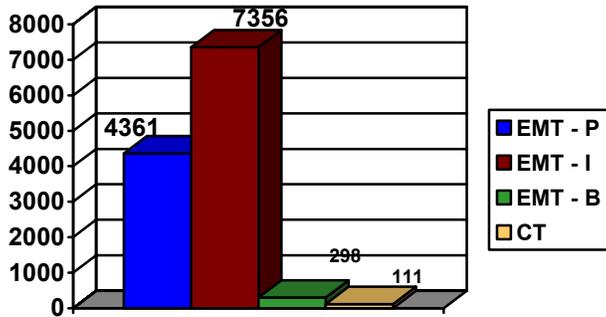
In discussing the question: “Should the state office develop a standard CQI program around data? If so, how should this program be implemented across the state?” The answer was “Yes”. EMS Region-based training and the development/establishment of regional CQI committees should be a primary mechanism for conducting CQI.

In terms of the question: “What three to five performance improvements can *GEMSIS* data drive over the next several years?” Stakeholders recommended the following: timeliness of submission, completeness, accuracy, implementation of community programs (i.e. EMS-C related), and the ongoing evaluation of the usefulness/appropriateness of collected elements.

On the question: What (CQI) operational areas can be made more uniform among EMS regions based upon the collection of data? Stakeholder recommendations were data-driven training programs, uniform, regular reporting, and establishment of regional CQI committees.

GOAL 7: EMS TRAINING CURRICULUM EVOLUTION

Strategic Objectives



Establish communication linkage(s) with EMS training and prevention programs to ensure needs identified through the evaluation process are integrated into the EMS training curriculum and prevention programs.

Pictured left: In 2004, Georgia has 12,126 licensed EMS professionals. 61% EMT-I, 36% EMT-P, 2% EMT-B, and 1% CTs.

Action Steps

1. In a remedial fashion, clean up and selectively improve the OEMS/T EMS Professional Licensing Database Applications during the 2004 recertification cycle.
2. Support the QHAP project migration of the EMS professional certification application to a web-based architecture that will support self-service methods of operation.
3. Migrate the EMS Professional Licensing applications to a secure, State IT maintained application environment.
 - a. The purpose of this is to allow the OEMS/T technical staff to concentrate on the analysis of data and production of information and publications rather than expending time on the development and maintenance of administrative systems.
 - b. This step also reduces the long-term operational risks associated with in-house developed software that represents a critical data resource to the multiple areas of the State of Georgia's emergency preparedness efforts.
4. Restructure the local Skyland EMS IT environment to support the analysis of PCR data, NTRAC trauma data, EMS professional licensing, instructor, and NREMT test result data analysis via data downloads.

Shaping the Future of EMS in Georgia

- a. Use standard Microsoft SQL Data Analyzer functionality to establish user community self-service of common data analysis functions.
- b. Make the “CUBE” analysis of EMS professional data available in a web-deployed environment.
5. Develop a mechanism for supporting continuing educational audits. Support the regional training coordinator’s efforts to improve training reviews consistent with EMS regulatory responsibilities.
6. Develop a technical working relationship with the NREMT such that data can be imported on a quarterly basis for analysis of Georgia testing trends.
7. Document a baseline for 2003 testing by all levels.
8. Develop standardized analysis methods to track system-wide educational progress.
9. Examine the experience of other states regarding EMS levels.
10. Enhance the demographic survey data elements that can be used to characterize EMS professionals in Georgia. (obtain psychosocial characteristics such as educational background, work hours, work organization, practice experience, turnover, burnout, etc.)
11. Establish a working relationship with DTAE and other organizations to develop a coalitional approach to enhancing EMT education in Georgia.
12. Examine the feasibility of conducting an EMS instructor’s census for Georgia.

Planning Considerations

Georgia desires to insure that EMS professionals are adequately prepared to perform work consistent with their scope of practice.

1. Georgia desires to continuously improve its EMS system for the purpose of raising the overall quality of EMS.
 - a. Georgia desires to examine the relative standing of its EMS professionals to national statistics based upon NREMT test results.

- b. Georgia desires to identify areas for improvement involving student preparation, instructor preparation, curriculum alignment, and/or other factors.
2. Georgia desires to identify areas for longer-term strategic consideration, which will establish a foundation for evolving EMS.

2003 NREMT Testing Baseline

At the time of this writing, the ORAS (Operations Research Analysis Section) like many areas had begun initial work to characterize the demographics.

Table 11: EMT- I, IC1, First Time Test Takers – 2003

| Intermediate/85 IC1 | 2003 | 2003 |
|-------------------------------------|-----------------|-------------------|
| EMT – I | IC1 - GA | Natl - IC1 |
| Number of first time testers (n =) | 1163 | 3453 |
| Number who passed (n Pass =) | 794 | 2241 |
| Pass Rate (n Pass % =) | 68.3% | 64.9% |
| Overall Average Score (Mean) | 73% | 72.5% |
| Airway & Breathing | 75.1% | 74.3% |
| Cardiology | 71.5% | 72% |
| Trauma | 73.3% | 73.6% |
| Medical | 67.6% | 65.3% |
| OB/Peds | 71.3% | 70.4% |
| EMS Ops | 78.7% | 79% |

Table 12: EMT- I, IC4, First Time Test Takers – 2003

| Intermediate/85 IC4 | 2003 | 2003 |
|------------------------------------|-----------------|-------------------|
| EMT – I | IC4 - GA | Natl - IC4 |
| Number of first time testers (n =) | 172 | 186 |
| Number who passed (n Pass =) | 89 | 96 |
| Pass Rate (n Pass % =) | 51.7% | 51.6% |

| | | |
|-------------------------------------|-------|-------|
| Overall Average Score (Mean) | 69.9% | 70% |
| Airway & Breathing | 62.7% | 62.8% |
| Cardiology | 67.5% | 67.7% |
| Trauma | 64.3% | 64.3% |
| Medical | 75.1% | 75.2% |
| OB/Peds | 69.2% | 69.3% |
| EMS Ops | 81.7% | 82% |

Table 13: EMT- Paramedic, PC3, First Time Test Takers – 2003

| PC3 | 2003 | 2003 |
|-------------------------------------|----------|------------|
| EMT-P | PC3 - GA | Natl - PC3 |
| Number of first time testers (n =) | 230 | 8655 |
| Number who passed (n Pass =) | 145 | 5514 |
| Pass Rate (n Pass % =) | 63.0% | 63.7% |
| Overall Average Score (Mean) | 76.2% | 75.7% |
| Airway & Breathing | 77.4% | 75.9% |
| Cardiology | 74% | 75.6% |
| Trauma | 76.6% | 75.3% |
| Medical | 69.3% | 69.4% |
| OB/Peds | 78.3% | 77.3% |
| EMS Ops | 82.1% | 81.4% |

Table 14: EMT- Basic, First Time Test Takers – 2003

(Note: GA test version data may have problems)

| EMT – B | BC2-GA | BC4-GA | BC6-GA | NREMT Natl BC2 |
|-------------------------------------|--------|--------|--------|----------------------|
| Number of first time testers (n =) | 132 | 27 | 10 | 15,551 |
| Number who passed (n Pass =) | 97 | 25 | 10 | 10,412 |
| Pass Rate (n Pass % =) | 73.5% | 92.6% | 100.0% | 66.9% |
| Overall Average Score (Mean) | 73.6% | 79.3% | 79.5% | 72.5% |
| Airway & Breathing | 68.3% | 74.6% | 80.8% | 65.6% |

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| | | | | |
|-------------------|--------------|-------|-------|--------------|
| Cardiology | 76.2% | 82.0% | 80.0% | 74.8% |
| Trauma | 71.1% | 78.6% | 76.0% | 70.8% |
| Medical | 71.0% | 74.2% | 78.8% | 68.8% |
| OB/Peds | 70.1% | 77.8% | 74.6% | 71.1% |
| EMS Ops | 85.4% | 88.6% | 86.8% | 84.5% |

As indicated in the tables presented above, trends in test scores can be a valuable mechanism to indicate the ability of students to show minimal professional competency upon entry into the EMS profession in Georgia. This data can also show where teaching is sufficient to support the test standards. It can also show what areas are not adequately covered, resulting in lower than desirable test scores.

Beginning in 2004, Georgia should seek to do an analysis of pass rates based upon site codes. This analysis should be a collaborative effort with DTAE. Further, all involved should view the preliminary analysis of this data in a cautionary manner. The analysis of low pass rates, for example, can be due to a number of factors, including: (a) student preparation, (b) instructor effectiveness, (c) fit of the curriculum to the NREMT test objects, etc. Additionally, low pass rates are not always an indicator of how difficult the material presented is; they can also indicate that the material is not presented in a manner that students readily comprehend; a poor instructor to student ratio, or other systemic factors not initially visible.

The most valuable NREMT data represents the test scores by major test section and by site code. A preliminary analysis of test scores by site code will permit low scoring areas to be identified. The determination of cause and effect, however, cannot be made from the data alone in isolation with other factors.

Working with DTAE and other organizations, it is believed that comparisons between sites vs. state vs. national scores will allow strong training programs to be identified and be adopted by those agencies that have a lower pass-rate.

This committee is not in favor of any “ranking” based upon an analysis of test scores. We feel that this would lead to lowering of standards in favor of a higher ranking. This would in no way benefit the program or the state. It is felt that pass- fail rates

already “rank” themselves.

Georgia EMS Educational CQI – 2004

The NREMT test results can provide some initial basis and objective criteria for measuring system-wide instructional improvement; however, state-wide education will be required regarding the nature of the NREMT criterion-based (competency-based) examination—there are currently many misconceptions regarding these examinations.

There are many statistical techniques that can be used to provide insights in the differential manifestation of test scores on a state-wide basis. In preliminary studies conducted by ORAS, Analysis of Variance (ANOVA) has been successfully used to determine if there are significant differences between sites, the Georgia experience and the National experience.¹²

To determine which groups succeed and why, several methods can be used but they must be able to be understood by the educational community and there must be an acceptance and understanding that this methodology is based upon a description and constructive examination of system-wide efforts.

It is anticipated that significant resistance will be encountered, if educators feel that they are being “rated” or the various training facilities are being “ranked” based upon statistical analysis. It must clearly be explained to all groups that ratings or ranking would be an inappropriate use of statistical technology and would not be scientifically valid.

CQI Methodology Based on Inter-quartile Variance

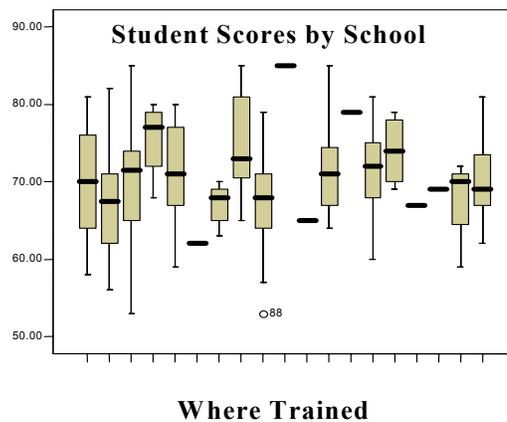
One relatively simple way to avoid resistance is potentially based upon the analysis of inter-quartile variance from a “box plot” analysis of test score distribution data by test site.

¹² In this case, the ANOVA while significant ($p \leq .05$) is inconclusive without further analysis, i.e., what we can say at this point is that there is a significant difference between some groups that cannot be explained by chance alone. As 2004 progresses, additional techniques will be used to construct a picture of what these differences may be.

This method provides a visualization of test score distributions by site that will not permit “ranking” but can reveal elements of potential examination and follow-up on a system-wide basis based upon “banding”. An example of this method is illustrated below.

From the below plot, one can see by the BLACK BAR the MEDIAN SCORE for each facility as well as the range of scores by facility.

Table 15, Educational System Evolution



Under this proposed methodology, the Where Trained information can be discussed on a site-by-site basis. This analysis data cannot be validly used to “rank” schools but can indicate some relative points of meaningful comparison. This data will be considered State of Georgia confidential data.

The methodology will not permit a valid, direct comparison between two sites. Rather, when the box plot data is analyzed (total scores and section scores) the variance characteristics of the box plots can be analyzed to produce general “bands” of schools for further analysis.

This type of analysis also fits into the “islands of excellence” CQI philosophy discussed elsewhere in this plan.

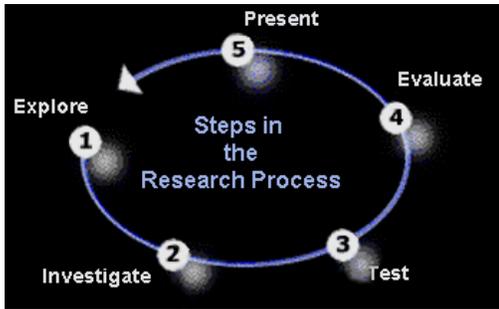
The standard basis for ongoing CQI discussions matrix will be developed that will support the “banded” groupings analysis. In general, the absolute score range by training site (moderated by the number of instructors) may indicate the degree to which sites are

conforming to curriculum, the training site median may be suggestive of instructor effectiveness (moderated by the make-up of the student population) and the left tail outliers will be somewhat indicative regarding the level of academic and test taking preparation of students in the program. People will understand that this will not be an exact methodology, but it will produce a list of things we may wish to consider for improving EMS educational programs.

In summary, there will be no direct comparisons of sites, but a general relative grouping or banding of sites based upon some of these considerations. The grouping or banding will not be disclosed; only a CQI matrix indicator based upon the analysis of inter-quartile box plot characteristics will be published.

GOAL 8: FORMALIZED EMS RESEARCH

Strategic Objectives



Support EMS and Trauma System research through research partnerships between the state and system participants to increase opportunities for federal funding of meaningful research.

Action Steps

1. Based upon the analysis of data, develop a three-year agenda for research.
2. Use EMSDAC as a forum for reviewing research.
3. Support EMS and Trauma System research through research partnerships between the state and system participants to increase opportunities for federal funding of meaningful research.
4. During 2004-2005, work with the rural health constituents to identify funding opportunities for joint research and evaluation projects.
5. Develop an EMS and Trauma System research agenda in partnership with other prehospital and hospital system participants.
6. Integrate the EMS and Trauma System research agenda into the State Prevention Plan.
7. During 2004-2005, identify research opportunities that combine injury prevention and EMS and Trauma system development and develop proposals for project funding.

Planning Considerations

According to Spaite (1999, p. 5) performance of high quality EMS research and information is hindered by five impediments:

1. Paucity of skilled researchers;
2. Inadequate funding;

3. Failure of EMS professionals to understand the importance of conducting EMS research and translating the findings into clinical practice;
4. A lack of integrated information systems that provide for meaningful linkage with patient outcomes; and
5. Logistical problems in obtaining informed consent.

Accordingly, Georgia's research agenda must consider these factors and institutionalize methods to remove these barriers and attain success.

EMS Research is Embryonic

While precise numbers are not yet available, EMS on a nationwide basis treats and transports approximately 25 to 30 million patients per year. In Georgia this number is close to 1 million patients a year. As an important point of entry into the healthcare system, EMS is in a unique position to impact those patients. It is logical to assume that prehospital intervention positively affects patient outcome, but this influence is difficult to quantify.

EMS research is still in an early stage of maturation. A concerted effort to improve the scant scientific knowledge that serves as the basis for EMS practice is now mandatory. Based upon the current collection of 2000-2003 PCR and 2003 trauma data, Georgia should be a participant in furthering EMS research methods and knowledge.

There has been a strong plea for improving the science within the EMS field for a number of years both on a national level and in Georgia. The leaders of the Future of Emergency Medicine Research conference, sponsored by the Emergency Medicine Foundation, the Society for Academic Emergency Medicine, and the Association for Academic Chairs of Emergency Medicine, emphasized the need for individual and program commitment to the process of advancing research in emergency medicine. The conference report (1999) called for the necessary resources to enhance emergency medicine research through training, academia, funding, national support, multi-center research and development of new outcome measures.

The Society for Academic Emergency Medicine EMS Task Force published a paper in 1999 entitled EMS Systems: Foundations for the Future, which called for the specialty of emergency medicine to foster the continued development of EMS

administration, education, and research. The report pointed out, “The benefits of prehospital care never have been demonstrated scientifically in many medical and surgical conditions. The time has come to prove the value of field care and determine the most cost-effective and medically sound treatments.”

Peer Review Journals

Several peer-review medical journals devoted to EMS are now in publication including *Prehospital Emergency Care*. In addition, general emergency medicine journals, including *Annals of Emergency Medicine*, now contain sections devoted to EMS research. There are also subspecialty journals within emergency medicine, such as *Pediatric Emergency Care and the Air Medical Journal*, that publish material related to EMS and effectively reach an audience involved in at least some aspect of prehospital care of patients. The emergence of these journals holds an important position in the history of EMS. Their existence shows that EMS research is valuable to the readers of those publications.

It is believed that Georgia is underrepresented in these publications.

Methodological Constraints and Concerns

Although the science of EMS has advanced, many concerns remain. Most of the problems are not very different than issues with which other fields of medicine have struggled. One methodological concern in EMS research is that the best outcome measures for various study questions are sometimes not clear. While survival may be an appropriate outcome measurement for sudden cardiac arrest, it would not be a meaningful outcome measurement for studies of minor trauma or respiratory distress because almost all patients will survive independent of any EMS intervention. Further, appropriate measurements of pediatric patient outcomes are sometimes different from those that are commonly used for adults. Medical direction is needed to guide the conduct of a research agenda that is most meaningful to Georgia.

EMS care delivery is unusual in that the patients are only under EMS care for a short time. The lack of accurate patient identification presents a major challenge for the investigator wishing to measure outcomes. In addition because of the fragmented nature

of the EMS delivery system, a given EMS agency may care for only a limited number of critically ill patients annually. Thus, the use of standardized data collection, data linkage, and reporting mechanisms are critical to allow patient outcomes to be compiled and meaningfully evaluated.

There are myriad approaches to offering EMS: it may be provided by the fire department, by another agency within the local government, by private entities that provide care within a local geographic area, by volunteer organizations, or by any number of other configurations.

In Georgia, EMS care may also be provided by a variety of personnel, both paid and volunteer, who are trained at various levels of sophistication including first responders, EMT-Basic, EMT-Intermediate, and EMT-Paramedic. Basic level providers, trained in about 110-150 hours, provide services such as first aid, cardiopulmonary resuscitation, and patient stabilization. At the other end of the training spectrum, paramedics, who have acquired up to thousands of hours of training, bring highly sophisticated medical interventions that require critical thinking, such as endotracheal intubation and intravenous medication administration, to patients in the prehospital setting.

That so few EMS interventions have been subjected to outcome studies illustrates the lack of evidence for most prehospital therapies. More research is necessary to provide the evidence upon which EMS practices can be based.

Accurately measuring outcomes is made more challenging by the fact that the patient is delivered by EMS directly to a more comprehensive part of the health care system. Definitive care is seldom delivered in the field, but significant supportive care may take place there. Attribution of ultimate patient outcome to prehospital events is therefore confounded by the impact of interventions received by the patient later in the continuum of care. Measuring the impact of EMS patient care is further complicated by the concentration of specialized medical services such as major trauma care and tertiary pediatrics in a few experienced hospitals. When treating patients with problems such as major trauma, efficient transport to the optimal facility may be the most important prehospital intervention. For these reasons OEMS/T should foster a program of building institutional relationships beyond those currently in place.

Program to Build Institutional Relationships

Research is a careful, diligent search to discover new facts, test theories and revise present theories. Research takes a methodical approach and tests a hypothesis. Statistical analysis of accumulated data is standard practice. Often, research studies must be granted approval by an Institutional Review Board that considers the medical, scientific and ethical value of the study. In the above example, a research project might consider the nature of educational programs and the impact specific aspects of educational programs have on skill retention and ultimately of field performance of skills. This analysis would include a review of similar research studies and be supported by a theoretical framework. A statewide EMS/Trauma system research agenda does not exist at the current time. There are pockets of related research, both qualitative and quantitative, in the state. Several trauma centers have scientific research programs. Some EMS agencies have participated in published research in peer publications. National coalitions of systems and research professionals, led by agencies like the Centers for Disease Control (CDC), are developing research agendas related to injury and injury control. Developing an EMS and Trauma System agenda that parallels the national direction is a logical approach for an expanding EMS and Trauma System. EMS research can identify the strengths and weaknesses of our EMS system by evaluating:

1. The impact of interventions, medications and equipment on patient outcomes.
2. Expanded scope of practice
3. Different resource allocation models.
4. The benefits of different continuing education activities.
5. Sources of variation in EMS activities.
6. Characteristics of weak and strong systems.
 - a. Identifying a subject or topic and developing a hypothesis.
 - b. Identifying and reviewing current knowledge of the subject.
 - c. Designing the study.
 - d. Writing and submitting a proposal to an Institutional Review Board.
 - e. Performing the study.

- f. Data analysis and interpretation of results.
- g. Sharing the study with the EMS community.

Cost of Injury is Unknown in Georgia

Injury is the leading cause of death for persons in the age group one through 44, as well as the most common cause of hospitalizations for persons under the age of 40. The financial costs of injuries are staggering. On a national scale, injuries cost billions of dollars in health care and social support resources. In 1990, for example, the lifetime costs of all injuries were estimated at \$215 billion annually. These estimates do not include the emotional burden resulting from the loss of a child or loved one, or the toll of severe disability on the injured person and his or her family. Each year over 40,000 people lose their lives on US roads, and approximately 70 percent of those fatalities occur on rural highways.

The National Highway Traffic Safety Administration (NHTSA) is charged with reducing death and injury on the nation's highways. NHTSA has determined that it can best use its limited resources if its efforts are focused on assisting states with the development of integrated EMS programs that include comprehensive systems of trauma care. Accordingly, Georgia EMS should develop more linkages with NHTSA programs as outlined by OEMS/T in a recent appearance before the Governor's Highway Traffic Safety Committee.

GOAL 9: RULES & REGULATIONS ADMINISTRATION

Strategic Objectives



Seek the uniform application of rules and regulations on a statewide basis through a more effective promulgation of information through Internet sources.

Ensure immunity for medical control and EMS quality improvement processes and discovery protection for all local and state EMS quality improvement efforts to ensure cooperation and participation of all EMS participants in patient care and EMS service evaluation.

Action Steps

1. Adopt the new rules and regulations published in draft form by the Office of EMS/Trauma.
2. Provide a mechanism(s) to better share rule, regulation and policy and procedure information through the State of Georgia's computer network
3. Work with state public health to establish a broad coalition of representatives who understand the benefits of improved systemic prehospital care.

Planning Considerations to Support EMS Regulated Components

A state-level EMS agency is required to provide leadership to local jurisdictions. (Mistovich, Hafen & Karren, 2000, p. 3) While this leadership role has been fulfilled in varying ways in the past years, the OEMS/T is under increasing pressure to show value in the area of strategic leadership, continuous quality improvement programs, education, the publication of information, and research support. These quality improvement efforts must be protected. Additionally, the OEMS/T role in the performance of prehospital care is not generally established or formalized in rules and regulations. This role as an "information producer" is increasingly important but not widely understood or appreciated, as the historical role of OEMS/T has been predominately regulatory in nature.

In 2003, the current Georgia EMS system comprises the following regulated components: (a) ground and air ambulance services; (b) EMS personnel, including first responders, emergency care technicians (EMTs), and advanced life support (ALS) Paramedics; (c) AEDs (Automatic Electronic Defibrillators); and, (d) the statewide trauma system. There are also specialized operations and capabilities involving EMSC (EMS for Children). While EMSC is an essential program and the key source of block grant funding, EMSC and rural EMS are not considered regulatory programs. As indicated in the other sections of this plan, the record keeping systems associated with statewide EMS need to be systematically upgraded to support the ability to obtain more universal access to consistent information.

HHS Compliance Application to Provide a Foundation

In July 2003, the Department of Health & Human Services (HHS) conducted several investigations of ambulance service providers in the metropolitan Atlanta, Georgia area regarding allegation of Medicare and Medicaid program fraud. During the course of these investigations, HHS agents discovered a pattern of behavior involving the completion of GA PCR (Patient Care Report) forms that enabled these providers to circumvent Georgia law and fraudulently obtain payment for services. Accordingly, HHS has recommended changes to Georgia (GA) PCR data, PCR rules, regulations and associated systems to prevent future occurrences. The recommended changes extend into the way ambulances are registered and tracked and how data is processed. In connection with this, corollary process changes are needed to improve the identification and authentication of vehicles used in EMS operations in connection with bioterrorism preparedness. The HHS project migrates the Ambulance registration system from a local ACCESS application to a web-accessible, professionally developed and maintained web-based application. It incorporates the ability for authorized users to perform Ambulance licensing and renewal functions as well as record inspection results, and report regional inspection status by providers. The nature of these needs is shown in the table below.

Table 16, Summary of HHS Application Needs

| Future system | Process Notes | Cost/Benefit |
|---|--|--|
| <ul style="list-style-type: none"> <input type="checkbox"/> Project Summary: In 2004, implement the changes needed to support HHS reqs. for ambulance identification through improved EMS administrative systems that can be securely accessed over the web anywhere in the state. <input type="checkbox"/> A mechanism to track EMS vehicle use in compliance with HHS recommendations. <input type="checkbox"/> Permanent metal foil EMSVID on inside driver door. <input type="checkbox"/> VIN to PCR tracking will be accomplished through a 5-digit serial number (EMSVID Vehicle ID). <input type="checkbox"/> Web-based EMS VID administrative application will also track inspection history. <input type="checkbox"/> Annual EMS Inspection Decals on windshield feature date punch-out. <input type="checkbox"/> Exterior number on vehicle will never change. <input type="checkbox"/> Ambulance inspection results and related reports will be available from the web. <input type="checkbox"/> High priority-needed in 2004 to support HHS recommendations. | <ul style="list-style-type: none"> <input type="checkbox"/> One change to how data is recorded on the GAPCR is needed. The GEMSIS Planning Group has been asked to make a recommendation. <input type="checkbox"/> This change uniquely ties the physical asset to every EMS run. <input type="checkbox"/> A back-end MS ACCESS system will tie VIN number to GAPCR records. <input type="checkbox"/> A web-based system will support ambulance identification and inspection. <input type="checkbox"/> The web system will allow immediate and specific identity of vehicle used during a given transport. <input type="checkbox"/> Implements HHS recommendations with minimum cost. <input type="checkbox"/> Closes all loopholes in the system. <input type="checkbox"/> Allows for simultaneous improvement of the system for certification and re-certification. <input type="checkbox"/> Allows for simultaneous improvement of ambulance identification and inspections. Ambulance certification and technician licensing to be validated by OEMS/T when processing and reporting PCR data. | <ul style="list-style-type: none"> <input type="checkbox"/> Ambulance tracking eliminates lost revenue. <input type="checkbox"/> Ambulance tracking w/ PCR reduces cost of investigations. <input type="checkbox"/> Cost of metal foil stickers and single color inspection stickers is less than current system. <input type="checkbox"/> Cost of PCR modification negligible and tied to 2006 introduction of 2006 Revision of GAPCR electronic data standard. <input type="checkbox"/> EMSVID to VIN to be added to MS ACCESS database. <input type="checkbox"/> Uniform inspection processes and centralized record keeping will reduce redundant operations, improve visibility and efficiency. <input type="checkbox"/> Exact vehicle data available through automated means. |

GOAL 10: EMS REGULATORY OPERATIONS REVIEWS

Strategic Objectives



Establish a mechanism(s) for the periodic evaluation of the state's EMS regulatory ability including auditing the capabilities of its regional components.

Action Steps

1. Develop a valid model for Regional EMS evaluations.
2. Develop a valid model for EMS service provider evaluations (facilities/ambulance inspections/EMS data collection) standardized for Georgia use.
3. Establish outcome categories to monitor on a statewide basis. (Note as discussed in a previous section, this needs to be part of the shortened, abbreviated dataset adopted for use within Georgia. The abbreviated dataset should be NEMSIS compliant and contain KPI reporting markers. KPI reporting markers should be summarized on an EMS Regional basis.)
4. Determine and implement uniform core administration effectiveness measures across EMS Regions.
5. Identify “islands of excellence” in Regional EMS operations.
6. Promote “islands of excellence” identified areas for uniform adoption throughout all EMS Regions.
7. Incorporate consumer input into evaluation processes.
8. Find ways to reward and institutionalize EMS organizational learning.

Planning Considerations

Evaluation is the process of assessing the quality and effects of EMS so that strategies for continuous improvement can be designed and implemented. *GEMSIS*

recognizes that EMS systems should be evaluated using both structural and process measures. Process evaluations assess aspects of regulatory administration and its presumed appropriateness, patterns of delivery, complaints, follow-ups on compliance measures, etc. In the past, the reliability of sources for the data required for this analysis has often been questioned. The relative lack of consistently reliable and accurate operations data from central systems has been a clear problem for OEMS/T.

EMS systems evaluation and EMS research both rely on information systems as source of data. Continuous comprehensive evaluation of EMS assesses all aspects of the system. Such evaluations include structural process and outcome measures, and are undertaken with consideration of resource and confidentiality issues. Evaluation is integral to quality improvement systems, risk management and other activities associated with the overall efficiency of regulatory purview. Public satisfaction may also be a factor or focus of EMS evaluation.

In business organizations, there are constant pressures to become more competitive, reduce redundancy, reduce complexity and raise service levels. In government, the challenges are even greater and require a constant discipline to reexamine practices seeking ways to provide more and higher quality services at reduced costs. These efforts must continuously examine and be sensitive to local needs as well as more general statewide initiatives. Initiating improvements to core regulatory efforts—beyond general EMS steering committees (EMSAC/EMSDAC), medical director meetings and other feedback-- yields four perspectives on which OEMS/T should focus— Stakeholder, Financial, Internal Process and Learning & Growth.

1. Stakeholder Perspective. The stakeholder perspective is arguably the most important one for government agencies because achieving a mission does not necessarily equate to fiscal responsibility. Within the context of government, each office must determine whom it serves and how their requirements can best be met. This perspective captures the ability of the organization to provide the needed governmental regulatory services, effective delivery, and overall stakeholder satisfaction.
2. Financial Perspective. For EMS Regions and the central office, the financial perspective relates to managing the (Grant In Aid) budgets to obtain the desired

results at minimal cost or with the greatest efficiency. Returns can be calculated as a combination of savings achieved and reallocation of funds to new projects.

3. **Internal Process Perspective.** The internal process perspective focuses on key processes at which the organization must excel to continue adding value for its stakeholders. In the case of EMS these key processes revolve around core regulatory functions and the production of value-added information and services that contribute to public welfare and which would not be obtainable through the private sector. Reductions in loss of life due to minimal competency, prevention of fraud, and improved prevention are all examples of outcomes associated with well-managed internal process perspective.
4. **Learning & Growth Perspective:** The objectives of the learning & growth perspective provide the foundation to enable the achievement of the other three perspectives. Regional EMS--operating as a mission-based organization--relies heavily on the skills, dedication, and alignment of their staff to achieve their goals. Motivated employees with the right mix of skills and tools, operating in an organizational climate designed for sustaining improvements, are the key ingredients in achieving organizational objectives.

The Georgia Department of Human Resources (DHR) has indicated that state offices within their purview should develop a strategic plan. The *GEMSIS* seeks to represent the key areas for OEMS/T strategic development.

OEMS/T believes that a well-articulated mission and vision, a formal strategic plan, well-defined operational processes, and written formal procedures can be used to drive organizational performance. However, OEMS/T also recognizes that flexibility is also a key to success. While uniformity is sought and desired, based upon replicating an “islands of excellence” (see below discussion) philosophy of organizational learning, there is no “cookie cutter” approach to operational effectiveness.

In this philosophy, the review processes are mechanisms of identifying and sharing “islands of excellence” ideas that will drive an examination of operational practices and at the same time enhances uniformity through the adoption of proven practices. Under the “islands of excellence” approach, uniformity is gradual based upon an incremental approach to excellence that can be useful and beneficial to all agencies.

Guidelines for “Islands of Excellence”

This section outlines some of the “islands of excellence” performance management considerations that have been generally discussed with the Regional EMS Offices.

1. Excellence identification. A methodology or best practice may be simply an idea. Ideas do not necessarily need to be adopted exactly the way it was implemented in another EMS region. Ideas may even share common systems but implementation may be adapted to fit a Region’s particular needs and culture. While the problems that a Region might face are not entirely unique, each Region’s approach to resolving issues and the stakeholders involved may “need” to be different. This must be taken into account when implementing a best practice or methodology or a system of evaluation. Table 17, Strategic Regulatory Operations Review Process, illustrates how OEMS/T utilizes these four inputs to continuously review its effectiveness, mission and vision.

Table 17, Strategic Regulatory Operations Review Process



2. Leadership disbursement. Leadership is a critical element that earmarks successful organizations, both government and commercial. Good leadership recognizes the importance of communication among all stakeholders in the organization and providing a clear definition of responsibilities for every EMS service provider. Cascaded throughout an organization, leadership gives the performance management process a depth and sustainability that survives changes at the top — even those driven by elections and changes in political party leadership. Accountability is a shared responsibility.

Agencies should establish a results-oriented set of measures that balance internal operations with stakeholder and employee needs. The OEMS/T should work together with its regional components to create an easily recognized body of measures, and clearly identify measures that address the concerns of the various groups.

Implementation should tap all available expertise, involving everyone in the process, making the system non-punitive, and providing clear, concise guidance regarding the establishment, monitoring and reporting of measures.

Improving regulatory functionality requires OEMS/T to maintain flexibility by recognizing that performance management is a living process, limiting the number of performance measures, and maintaining a balance between financial and non-financial measures.

Assessment of patient outcomes is part of a comprehensive EMS evaluation process. Ultimate patient outcomes may be insensitive to variation in EMS care. Therefore, intermediate outcome measures which have a closer temporal relationship to EMS care are often utilized. Intermediate patient outcomes can be used to determine the effect of different practices of EMS care. The cost-effectiveness of very few interventions delivered by EMS is known.

Stakeholder Guidance

Stakeholders were asked to advise on several questions including: What is the best way to have a periodic evaluation of statewide EMS data collection programs?

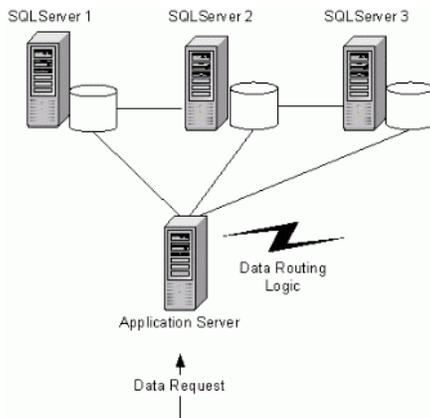
Shaping the Future of EMS in Georgia

In connection with this question, stakeholders recommended “error reports” at the regional and state levels, required quarterly reports for verification of receipt of data and quantity, 911 log reports to compare against service reported 911 calls, and provider reports of calls logged.

Stakeholders were also asked to provide input on what mechanisms the OEMS/T should use to evaluate the collection of data in the regions. In general, a consensus emerged that OEMS/T and its regional components should establish firm timelines for submission of data/reports from the region offices (the transition from paper to all electronic reporting should take care of a lot of these issues), the movement of data through correct channels (local-region-state), and evaluation of regional follow-up on problems/issues at the service level.

GEMSIS APPLICATION ARCHITECTURE

Strategic Objectives



The 10 GEMSIS strategic objectives require that a new technology architecture evolve to the support the OEMS/T. This architecture should be based upon the five principles outlined in the body of the GEMSIS plan. Professionally developed “vendor” software is highly desirable. The architecture should be capable of supporting EMS, public health and emergency preparedness needs.

Action Steps

1. Brief senior management regarding the changes in technical environment complexity, risk management and future operations implications.
 - a. The basic strategy is to utilize technical resources to produce value-added information rather than develop administrative software.
 - b. The value-added information will be consistent with and support the 10 *GEMSIS* strategic objectives.
 - c. Dissemination of the information that is produced is to be made available over the Internet.
 - d. The *GEMSIS* architecture is web-server based but will also make use of the State of Georgia communications network.
2. Establish a mechanism for file sharing utilizing the State of Georgia’s “backbone” communications network.
3. Establish a standard EMS Regional Server set-up, security administration, file administration, file sharing, drive mapping and back-up procedures.
4. Repurpose OEMS/T servers to support revised web-server application deployment architecture.
 - a. Use a new server to establish a MS Web-Server 2003 front-end (root domain) including firewall security and authentication.

- b. Repurpose the BT (Bio-terrorism) server to become the PCR/Trauma Programmatic Server.
- c. Repurpose the “old server” to become the EMS Core Administrative Application Server.
- d. Replace the current GroupWise server. Reconfigure the GroupWise server to have 3 levels of administrative security for EMS shared files.
- e. Repurpose an additional server for back-up and redundancy purposes.
 - i. EMS Server Reconfiguration NetWare Servers
 - ii. Install NW5.1 SP3 on “new” server into a temp_tree
 - iii. Copy data from gdph_dkb32 to the “new” server.
 - iv. Remove gdph_dkb32 from the gdph_tree I
 - v. Install “new” server into gdph_tree as gdph_dkb32 with the same IP address.
 - vi. Create NDS groups and rights per EMS.
 - vii. Work with DHR-IT from other regions to establish connectivity per list from EMS.
- f. Windows 2000/2003 Servers.
 - i. Install Windows Server on the “new” server from “downstairs” as new BT (Bio-terrorism) Server.
 - ii. Partitions and partition size per OEMS/T.
 - iii. Copy BT data to new server. (Note: OEMS/T will also install DB and other software.)
 - iv. Reinstall Windows Server on the “old” BT server using partitioning per EMS. EMS will install software.
 - v. Reinstall Windows Server on the “other” W2K server to be used as Web Server.
 - vi. Copy and backup all data on tape.
 - vii. Install Window 2000/2003.
 - viii. Replace data and copy to “new” BT server.
 - ix. Examine the ability to get authentication to W2K server through NDS for single login.

- x. Examine and resolve security and firewall issues for Domain/DNS information Web Server.
5. Consistently follow the 5 Technology Strategic Guidelines.
6. Establish revised FTP capabilities.
7. Build out the web-enabled QHAP EMT Certification Application. Run from either Georgia.Gov (preferred) or from a dedicated server at Skyland.
8. Build out the web-enabled HHS Compliance Application. Run from either Georgia.Gov (preferred) or from a dedicated server at Skyland.
9. Develop an RFI/RFP for the next generation PCR data collection application/analysis (*GEMSIS* application) system.
10. Work with vendor to conduct a 10-month pilot program based upon out-sourced software.
11. Work with vendor to migrate the application to a State-controlled environment and establish stable operations.

Planning Considerations

The *GEMSIS – Shaping the Future of EMS in Georgia* strategic plan sets forth 10 objectives supporting a statewide EMS system. The vision for the overall *GEMSIS* effort is improved patient care, more uniform EMS regulation, and enhanced emergency preparedness. These objectives all share the need for a common systems foundation or technical architecture. This architecture provides the essential ability to track and analyze EMS patient care trends utilizing PCR data and other EMS (regulatory) operating data. The purpose of this section is to translate or “objectify” the *GEMSIS* objectives into the components of application architecture.

To support EMS, public health and emergency preparedness needs, an improved method is needed for statewide EMS to gather and store statewide PCR data, as well as query and export that data. In order for the system to improve and evolve, value-added information must be accessible in a format, which can be (exported) shared with other services and organizations. Based upon the results of the *GEMSIS* stakeholder committee meetings, it is known that a successful data storage and management system will also provide an adherence to data standards and support CQI through the ability for non-

technical personnel to generate ad hoc reports producing information to support the objective, measurable and justifiable means for performing analysis on critical patient care data, which can make a positive difference in patient outcomes. In the future, PCR information should be made available from a centralized location to support Regional EMS needs.

As Georgia moves toward the future, it is believed that all EMS services will be required to report data in a method and means specified by OEMS/T. The *GEMSIS* system must be capable of supporting this requirement. In connection with this reporting requirement there will be a general expectation that the reported data will result in improved regulation, improved public health, CQI/QA, medical direction, or operations.

In general the following summarizes the needed *GEMSIS* capabilities.

1. The *GEMSIS* system must operate efficiently with all levels/types of Internet connections.
2. The system must collect, analyze and report prehospital emergency medical service patient data.
3. The system must ensure a secure electronic exchange of information between all EMS providers and the state.
4. The system must have the capacity to import the existing OEMS/T central site pre-hospital data. The system, at a minimum, should accept imports from Microsoft Access and ODBC compliant software.
5. The system must be configurable to allow specified entities access to limited parts of the database.
6. The system must be able to accept data from the multi-vendor environment, which exists in the state of Georgia.
7. The system must provide standard reports as well as allowing the user to easily create ad hoc queries. The system must have the capacity to be customized to collect additional data points if needed.
8. On-line Data Dictionary. It is anticipated that *GEMSIS* will be used by non-technical personnel. The *GEMSIS* database must contain a data dictionary defining all the tables and fields for the *GEMSIS* system.

9. XML Data Support. XML file formats will need to be supported in such a manner that they can be imported via the web. It is noted that *GEMSIS* is signed to participate in the NEMSIS initiative and will need to support this nationwide standard for data elements for prehospital data collection. It is anticipated that the revised NHTSA Uniform Pre-Hospital Dataset model must be supported.
10. The system must be HIPAA compliant.
11. The system must leverage EMS operating data on EMS service providers, EMT licensing and equipment licensing and regulation.

The focus of a statewide data collection and management system lies not only in the technical nature of the implementation, but in the development of the people (Regional EMS personnel) and the processes (revised procedures, rules and regulations and standards) associated with statewide EMS.

A key principle for the successful implementation of *GEMSIS* is that technology must be made accessible and useable. The complexity of technology must be harnessed and reduced so that useful, value-added information is available.

An analysis of the *GEMSIS* objectives and requirements indicates that OEMS/T should (1) purchase software and services from an established vendor and (2) establish a pilot program as a cost-efficient basis by which implementation risks can be minimized and the specific features of the *GEMSIS* system can be operationally refined. The notes below outline how a “hosted” pilot could support the development, refinement, and acceptance testing of the *GEMSIS* technical architecture against the 10 program goals.

In order to conduct a pilot of the *GEMSIS* requiring the least amount of time and resource commitment, it is recommended that the vendor host the pilot for an 8-month period and then be responsible for the successful migration of the established functionality to the OEMS/T. Following the migration, *GEMSIS* should operate for approximately three months during which time final acceptance testing will be performed.

As outlined in the previous sections, actual data collection processes should be carried out by selected pilot services. OEMS/T proposes that initially several services would be selected representing the statewide vendor and in-house data collection.

OEMS/T would oversee a pilot whereby the vendor's expertise and resources would be available throughout the pilot program to build-out the needed functionality, offer guidance, support, and generally perform the "heavy lifting" needed to produce the essential automation associated with the *GEMSIS* objectives.

A timeline diagram incorporating the tasks and milestones believed to be associated with the *GEMSIS* pilot and statewide rollout is provided for discussion purposes in this section.

The concept of application hosting is not unproven. During the *GEMSIS* web-pilot, OEMS/T was able to demonstrate that a vendor hosting service can provide a secure environment and successfully support statewide PCR data collection and analysis needs.

It is believed that hosting provides an inexpensive, reliable method of delivering and "building out" the needed functionality to support the 10 strategic objectives. Additionally, application hosting will enable OEMS/T to determine with vendor assistance such things as disk space storage, bandwidth, backup, web support and administrative support needs in a phased and controlled manner. It is believed that the hosting of the initial pilot operations will enable the development of internal EMS expertise and capabilities allowing for actual implementation and usage without the full cost of ownership. Also, it is noted that OEMS/T could also consider the potential option of continuing the hosting environment beyond the pilot program as an outsourced resource until such time as an in-house transition is deemed possible.

Equally important, *GEMSIS* must provide a technology foundation, which can provide assured legal protection through standardized formats for completion and validation of data and proper documentation. *GEMSIS* must also provide data privacy safeguards, and be fully compliant with the standards which address HIPAA requirements.

Pilot Program

It is envisioned that the *GEMSIS* pilot can help establish cost efficiencies through improved analysis and reporting capabilities, which can in turn improve Regional EMS resource allocation effectiveness. The proposed web architecture coupled with

centralization should result in a faster access to EMS information as well as a foundation (which has never existed before) for the delivery of emergency preparedness information.

The *GEMSIS* system needs to be designed to work with the many software packages commonly in use within the state of Georgia. The ability to support the needed interfaces (such as Fire House software, for example) will be a key element of the pilot project effort. (It is noted that Fire House software is not currently compatible with the GA PCR 2000 data format. Additionally, it is not currently compatible with web-based reporting.)

The selected vendor should offer the essential functionality of the *GEMSIS* system from a hosting facility along with their expertise and support as a quickly implemented, well-established prehospital data collection product. This allows for examination and evaluation of a comprehensive initiative without the full scale investment.

An RFI/RFP should be developed which defines and prioritizes the overall objectives of the pilot program. The planned objectives should include primary and secondary levels of importance.

Pilot Objectives

The main objective of the *GEMSIS* pilot program will be to clearly demonstrate over a period of time what the implementation of a statewide data collection system can accomplish including the benefits of EMS regulation, public health, and emergency preparedness. Accordingly, it is envisioned that the *GEMSIS* pilot will include:

1. Creation of Pilot Program Database for collection, reporting, and analysis of Emergency Medical Services prehospital data.
2. Establishment of a Web-based application that is easily accessible with assignable rights and permissions for security.
3. Establishment of a cohesive synergy between the existing Georgia PCR data, the *GEMSIS* pilot database and the collection Web Site, allowing for aggregate data generation and reporting.
4. Support for NEMSIS 2.X data structures in addition to the Georgia PCR data structures.

The Pilot Program can be the basis for an ensuing statewide initiative. The context of the Pilot Program is to provide continuous learning, quality principles, partnership, collaboration and system integration for internal and external environments impacted by relationships with providers and the general public.

The *GEMSIS* pilot will enable the attainment of a number of other strategic objectives. OEMS/T suffers from a lack of personnel and resources to perform its core mission. A key objective of *GEMSIS* is to develop a technology architecture, which will genuinely leverage technology to enable higher organizational performance over time.

In connection with the other objectives, *GEMSIS* should enable OEMS/T to pursue its overall strategic plan through:

1. Web-based architecture and strategy to allow for active management of content, transactions and services.
2. A portal compatible structure to enable accessibility for information by the public.
3. Coordination and collaboration with other agencies or groups.
4. Incorporation of existing data and/or resources.
5. Specific information and productivity considerations for non-technical users.
6. Integration of capabilities to eliminate redundancies.
7. Scalability and flexibility in architecture and technology to allow for growth in user base and expanding requirements as application understanding increases.

Implementation Considerations for GEMSIS Pilot

The below sections outline the elements required to establish a fully integrated *GEMSIS* capability. It is believed that the proposed *GEMSIS* pilot program can have a positive impact on both implementation timeframes and funding. The basis of this impact should be through the hosting model--since it allows for a real time implementation in a hosted environment at a fraction of the cost of a fully implemented system. The *GEMSIS* pilot program should be implemented in a manner that statistical evaluation and support information for further funding justification can be available for presentation and validation.

GEMSIS Pilot Steps

1. Pilot Setup.

- a. The pilot will be setup on the vendor's hosting servers.
- b. PCR data from 2000-2003 will be fully migrated to the hosting environment for reporting purposes.
- c. *GEMSIS* pilot services will be selected by OEMS/T. The vendor will provide training to both the OEMS/T and the selected pilot services.
- d. *GEMSIS* pilot services will be given training and access rights through secure logins.
- e. The *GEMSIS* pilot environment will be available 24 X 7 basis except for pre-scheduled maintenance.
- f. PCR data collection will support both real-time and batched electronic data entry.

2. *GEMSIS* Hosting.

- a. *GEMSIS* applications are to be hosted in a secure data center during their initial development and deployment phases. The hosting center should have standard hardware and software security protections to a level appropriate for the type of data. At the end of the initial development and deployment phases the platform can either remain hosted, be migrated to some element of the State of Georgia for on-going support or operate from the OEMS/T office at Skyland Drive, Atlanta, Georgia.
- b. The physical location of the application is not generally important. The ability for authorized users to securely access the *GEMSIS* system is a fundamental consideration. The only requirement for authorized end-user access to the data will be a standard web browser. The entire functional capabilities of the *GEMSIS* system including the ability to generate reports are to be supported from a web browser.
- c. The vendor will indicate in the RFP/RFI response such things as power supply and power conditioning, normal and peak bandwidth capacity,

security and fail-over locations--all other considerations that should be part of an overall strategy to provide a reliable hosting facility.

- d. The vendor should be able to demonstrate that the hardware is configured to prevent software or data loss due to hardware failure. The vendor should be able to demonstrate recovery from problems within one working day of a catastrophic failure.
 - e. The vendor should anticipate support for the following environments: Microsoft SQL Server 2000 or equivalent.
 - f. *GEMSIS* applications are to be backed up daily allowing for complete recovery of data to the most recent backup.
 - g. Note: the vendor should be prepared to estimate and make recommendations in the following areas: disk space, bandwidth, training needs, help desk support, training materials. The vendor work should be subject to ongoing review. (What is sought is an ongoing dialogue between the OEMS/T and the vendor to simplify and perfect systems operations.)
3. *GEMSIS* Pilot Milestones. As indicated previously, the purpose of the *GEMSIS* pilot is to ensure that the planned objectives and benefits are met, along with offering opportunities for refinement.
- a. A formal, ongoing review process (biweekly) will assure the needed focus on project realization.
 - b. In addition to the review meetings, it is believed that OEMS/T and the vendor should agree in advance on 4 to 6 key operational milestones. These milestones shall be pre-defined with evaluation criteria. Current recommendations for the milestones are as follows:
 1. Kickoff meeting for overall definition of objectives and timeline. The purpose of this meeting will be to establish the joint acceptance criteria for the hosted environment and anticipate the training needs for *GEMSIS* pilot participants.

2. Review of the migration of the 2000-2003 PCR data and initial reporting with recommendations for refinement for the ensuing statewide data reporting initiative(s).
 3. Emergency preparedness and public health data linkages.
 4. Pilot Program Completion. The completion of the Pilot Program will be a major milestone for assessing the overall project success and decision for formal project continuance. As part of this meeting the vendor will be expected to address all of the considerations of successfully migrating the system to OEMS/T. The vendor report should cover such things as future access and reliability in transmission, storage and sharing of prehospital data, ability to support a local, regional and statewide EMS data collection system, Regional EMS report generation, the ability to link data with other state databases, recommended changes on user interfaces to make the system easier to operate and other considerations as deemed necessary.
- c. The end goal is to document the requirements for a successful migration of the *GEMSIS* pilot to incorporate a fully implemented system with all resources under state level ownership and management.

Request for Information/Request for Proposal

Key elements of a successful move towards electronic data collection are the Request for Information and Request for Proposal. It is believed that a well structured RFI will enable OEMS/T to develop inputs from interested parties on the development of the new statewide PCR data collection and reporting system. Information gained from an RFI should be used to assess the potential state of the art regarding the support of the 10 *GEMSIS* strategic objectives.

The intent for the RFI should be to additionally gather the needed information for use in preparing specifications for equipment and services. The specifications developed should become part of a Request for Proposal (RFP) issued by the State of Georgia.

The RFI should specifically seek information from stakeholders who are interested in providing the web-based software, services, technical knowledge, expert advice for the development of a web-based architecture for patient data capture, emergency preparedness and public health related reporting systems.

The contents of the proposal should be arranged in a logical order, a sample of which follows:

1. A statement of the objectives, goals, and tasks to show or demonstrate the responder's view of the nature of the contract.
2. A description of the deliverables to be provided by the responder.
3. Qualifications and company profile. An outline of the responder's background and experience with examples of similar work.
4. A general company overview or data sheet including company background, size, ownership, and number of employees engaged in similar work.
5. Explain any past or outstanding lawsuits related to the responder's past performance under contract.
6. The vendor's project management approach. The vendor's project manager must be available to meet with and provide project status updates to the state project manager and *GEMISIS* stakeholder's committee on a regular basis.
7. A detailed work plan that will identify the major tasks to be accomplished and be used as a scheduling and managing tool, as well as the basis for invoicing.
8. Identification of the level of the state participation in the contract, as well as any other services to be provided by the state, and details of cost allowances for this participation.
9. Background and experience, with emphasis on government work. List the responder's experience providing similar services to other organizations, especially for federal, state, or local government agencies.
10. References of previous customers or clients. At least three (3) references representing the responder's capabilities as they relate to the request for proposal. Include reference or company name, address, name and telephone number of whom to contact, and description of the work completed.

11. Demonstrated knowledge and compliance with appropriate state and federal data privacy requirements, e.g., HIPAA.

GEMSIS Application Description

The *GEMSIS* system is primarily a web-based, prehospital emergency data collection, analysis and reporting system. Having said this, however, *GEMSIS* is also effectively an EMS informational portal which provides content, information, transactions and services that provide value-added information.

GEMSIS should be able to sit under a much larger portal structure and take advantage of centralized directory services.

The *GEMSIS* application and databases will need to integrate information across the entire Georgia emergency medical community, whether in the ambulance, local EMS providers, county public health districts, or Regional EMS offices. This aggregated information will be available for analysis, reporting and exportation using a combination of pre-defined reports and OLAP (CUBE) technologies. A Microsoft compliant architecture is desired. By accessing *GEMSIS* ambulance services should be able to satisfy reporting requirements easily, without major investment and without learning complex new technology. Data from *GEMSIS* will be used to also feed (user definable criteria) other public health and emergency preparedness applications including such things as syndromic surveillance, linkages to trauma data, bioterrorism preparedness systems (HANs) and similar areas.

While supporting several data exchange options, the system will aggregate information from ambulance services throughout the state that have data collection systems in place. The application should be scalable to serve a high volume of users limited only by hardware capabilities. It will support the electronic transport of information to the GA PCR EMS data repository. Additionally, the system is targeted to be HIPAA compliant and sensitive to medical data security issues. The *GEMSIS* application will need to meet and exceed state and federal data privacy requirements. To access the *GEMSIS* application, the client workstations will need only a Web browser.

At the time of this writing, the lowest end recommended connection speed is 56 Kbps using a dialup modem, cellular phone or PDA. Standard connection speed would be

128 Kbps – 1.5 MB via ISDN, cable, or DSL. High-end connection would be T1 at 1.5-4 MB.

GEMSIS is envisioned to be available 24 X 7 to give users access to the system at anytime.

Data Management, Analysis & Reporting

GEMSIS will need to contain (web-based) tools and services that simplify the electronic creation of documents and their subsequent distribution, storage and updating. By establishing a process for services to bring their electronic PCR data and receive information from a central state location, EMS providers and public health subject matter experts can gain access to the content, transactions and services needed for further data analysis and reporting.

Web Accessible Document Repository

OEMS/T is increasingly called upon to be an information clearinghouse; being an information provider is an essential part of its core mission. Accordingly, part of the *GEMSIS* system mission is to provide a user-friendly way to organize documents such as EMS policies, data reports, downloadable information sheets and related items.

Analytics Reporting Engine

GEMSIS must include a tool to support on-line web-based analytics. The database should be able to support data base queries and a tool to allow authorized users to dynamically create, display, and store ad hoc queries.

Administration and user security should be strictly enforced to only allow users to report and view information that they have rights to.

Administration of the EMS data warehouse should enable a system administrator to manage the reporting environment, manage the availability of common standard reports, set up tables and fields to be reported on, and specify the relationship between various tables, etc. The *GEMSIS* system administrator should be able to assign a tiered

level of access to individual data elements so that unauthorized access or viewing is prevented.

It is envisioned that the *GEMSIS* application will employ a series of “groups” or a collection of roles and policies to control application entry and level of access within the system. It is assumed that *GEMSIS* will allow one group to act as “super administrators” and provide for the creation of other groups with various levels of security. Key user groups are currently believed to consist of the following sets:

1. State Office Personnel.
2. Emergency Preparedness & Public Health Personnel.
3. Regional Directors – Access to view all services within their region.
4. Selected provider access.
5. Guests

In general, it would be desirable that permissions or rights to data be governed by the following criteria:

1. State.
2. Region.
3. Service.
4. County.

In order to support “self-service” reporting, on the service level, there may be the need for additional levels of capability. EMS service providers will need to be able to control the importation of data being submitted to the data.

Service providers should have the ability to view their own information and maintain their own up-to-date contact information. Accordingly, EMS services may need the capability to set up their service information from a web-based screen including contact information and other information. Other information may consist of such things as a staff directory, for example.

Run History Reporting

EMS regulatory functions require the ability to tie regulatory and licensing information to EMS run history. EMS run history should allow authorized users to search runs by service provider, EMS ID (vehicle number), PCR/incident number, date, time, etc.

It is envisioned that PCR data and EMS regulatory operating information will enable both State and Regional EMS to run standard and ad hoc reports from the Georgia PCR data warehouse.

In order to effectively implement a statewide EMS data repository, the application must collect data from disparate systems and in multiple formats to ensure the most widely acceptable and cost effective solution.

Online Data Entry

The OEMS/T is investigating the feasibility of supporting data reporting for low volume services—a migration path is needed for some (low volume, rural, volunteer, or that may meet other specified criteria) services that will no longer be able to use scannable trip reports.

The *GEMSIS* web-based PCR data collection pilot demonstrated the feasibility of using the Internet for EMS data collection purposes. Accordingly, a web-based data entry application is envisioned that may allow certain qualified services that do not have an existing field data collection system or use paper run forms to collect data, to enter the PCR incident information directly into the application using a browser.

Importation/Exportation of EMS Provider Data

GEMSIS will potentially require the ability to permit the importing of data in multiple formats. The process of importing data should be designed to be easy and “industrial strength”. After the user posts the data to *GEMSIS*, the *GEMSIS* system should automatically take over the rest of the functions to complete the process.

Exporting data from *GEMSIS* will provide authorized users the ability to obtain a dataset on a self-service basis in a format that can be used to conduct their own analysis

or investigation. It is envisioned that *GEMSIS* will support the exportation of data to such common applications as EXCEL and ACCESS.

GEMSIS Data Validation

GEMSIS should have standard routines that support data validation. Data validation occurs as the data is written to tables in the database based on a set of predefined rules that are set up by the system administrator to include, but is not limited to:

1. Checks for missing fields.
2. Validates numeric fields.
3. Validates date ranges.
4. Required fields.

A standard “data validity” report should be able to be run at any time by choosing an appropriate standard report. The validity report should be able to provide a quick, meaningful snapshot of data quality.

GEMSIS Support for Syndromic Surveillance

OEMS/T believes that the *GEMSIS* system should supply one of the several data sources that public health needs to accomplish surveillance activities; this source of data is the Georgia EMS Patient Care Reports (PCRs). *GEMSIS* should provide a web-platform for providing surveillance information from an analysis of EMS PCR data. The *GEMSIS* system must permit authorized public health representatives to have secure, web access to Georgia PCR data, set surveillance criteria and thresholds and to obtain EMS reports by specifying a date range, certain geographic parameters including such things as destination code, zip code, county, EMS (public health) region as well as cause of injury and provider impression as it is coded on the PCRs.

GEMSIS EMS Public Information Portal

GEMSIS must provide EMS portal functionality. A portal is a website supporting public and private usage. Private usage requires a login for access for content

transactions and services. Through the *GEMSIS* EMS directory, interested parties should be able to gain information regarding an EMS region and EMS providers.

Regional EMS services should have a standardized way to create and maintain their own web sites, directly tying back to centrally maintained statewide information and providing a uniform source of relevant information to their regions. It also serves as a dynamic directory of Services with images, text and objects that are created and edited by the Services themselves or through a central administrator. Site information and user profiles can be edited in real time by end users.

GEMSIS Statewide Implementation

The *GEMSIS* statewide initiative is a strategy to incrementally move toward the collection of pre-determined emergency medical services (EMS) data from all licensed ambulance services in a state.

After testing the project feasibility to electronically submit EMS data from a sample of licensed ambulance services in the *GEMSIS* pilot, statewide implementation should proceed. The statewide initiative is to be installed on a state owned server.

The success of any endeavor is directly proportional to the acceptance level and ease of implementation of the system. Crucial to the education process is the sharing of information. The system can provide for prehospital data collection; however, the acceptance of the system must be obtained at every level of contact. Merely mandating compliance will not necessarily provide acceptance.

The recommended timeline for full statewide implementation of a prehospital data collection system is 12 months after the Pilot Program completion. Please reference the timeline diagram provided in section 12 of this Guide.

Data Collection Sources

During the evaluation of the current state of resources and requirements the other data points that need to be collected and shared were discovered, whether from third party vendors or other state databases.

This phase finalizes the selection of the data sets which will be collected and shared. Communications and definitions will be established with the various other sources to ensure that all technical standards are met and where necessary adjustments made to ensure that requirements are fulfilled.

Working through the State of Georgia Purchasing Department, meetings with third party software vendors should be held to clarify the exact requirements for using *GEMSIS* for data exchange functionality.

Starting Statewide Data Collection

Starting statewide data collection will involve a number of strategies working simultaneously together to achieve a successful implementation. The general steps in accomplishing this are listed below.

1. Phase 1 (Initial Release.) The first phases of the data collection process should start with a phased or pilot roll out of the application.
2. Application Installation. When the decision has been made as to where the application should reside, either on a state owned server or at the *GEMSIS* hosting facility, the process will consist of:
 - a. Setup.
 - b. Installation.
 - c. Testing.
 - d. Customizations and refinements.
3. OEMS/T and EMS Regional Training. Service training on service setup, logging in, and entering runs.
4. Phase 2 (PCR Data Analysis-Sustained program of analysis and publication). Phase 2 involves the bulk of the implementation process. This includes, ongoing training, continued education, analysis of data coming in, and fielding support questions from users that have been getting familiar with the application as well as other vendors for importing data.
5. Training Requirements. Regional EMS in-service training on advanced features like ad hoc reporting, knowledge base, and standard features of the vendor-selected system will be required.

6. OEMS/T should recognize a need for continued education. An on-going program of EMS Regional staff development is desirable.¹³
7. Phase 3 (Mandated Electronic Data Submissions. Target Date January 1, 2007.)
 - a. From a conceptual perspective, Phase 3 marks the end of the initial implementation phase and enters a more mature phase of data collection, analysis and publication.
 - b. From a planning perspective, it should be envisioned that with a stable staff, approximately 24 months of effort will be required to achieve stable operations.
 - c. Services and users must have time to get familiar with the new system. Vendors must have time to revise their data submission and insure that they work successfully.
8. Guidelines should be established to control the effectiveness of the data submissions to insure a successfully growing database and to further insure that any reporting validity based on this data. Recommendation would be for services that are entering through Web-based forms should be required to enter their data by the end of each month for that month. Services that are submitting data via the *GEMSIS* “dataport” (see system diagram) could be allowed to have until the 15th of the following month.
 - a. The *GEMSIS* system could be programmed to provide an analysis of data receipts from EMS providers. The *GEMSIS* system should be able to report the status of data that has been received and data that is missing.
 - b. The *GEMSIS* system could be able to provide EMS Region and statewide trend reports based upon date ranges. Other reporting should also enable county, provider, ad hoc types of aggregators.
 - c. The *GEMSIS* system should fully support OLAP analysis.
9. The vendor supplying the *GEMSIS* system should be prepared to develop and execute an annual software support agreement. Hypothetically, such an agreement could provide the state of Georgia with software “investment protection” as well as ongoing product support. Upgrades to the *GEMSIS*

¹³ It is noted that there is likely insufficient staffing to sustain an effort such as this at this time.

architecture should be pursuant to licensing agreements. These upgrades should be included in the annual support fee. The vendor should also be prepared to provide at no extra cost the following services:

- a. Online problem resolution.
- b. Software documentation updates.

Public Health Portal Integration

In the long-term, the *GEMSIS* Project recognizes the necessity and desirability of utilizing the Georgia State government portal framework. Budget amounts will need to be determined to physically move components of data and applications to this framework.

The below activities have been identified for DHR/DPH IT to perform. The overall cost of these activities needs to be estimated by DHR/DPH IT or by other technical elements of Georgia state government as deemed appropriate..

1. Project initiation & planning – 3%. The initiation of a system (or project) begins when a business need is identified. A Project Manager from IT will be appointed to manage the project. Initial project documentation will be reviewed. The planning approach will be determined. A preliminary project schedule will be developed for the major project phases. IT Planning and Security will review the proposal. A review will be made of the proposed system operations including the resources required to provide the capability on-time and within budget. The exact project resources, activities, schedules, tools, and reviews are defined or confirmed during the project initiation phase.
2. Integration analysis – 12%. An analysis is made of the applications, data and components to be integrated into the portal environment. The integration analysis reviews the functional user requirements developed from the *GEMSIS* Project terms of data, system performance, security, and maintainability requirements for the system in relationship to their integration in the Georgia.gov portal. All requirements are defined to a level of detail sufficient for systems design to

proceed. This step insures that the method of integration along with all functional requirements will be supportable in the Georgia.gov portal framework.

3. Detailed design – 20%. The specific applications are designed during this phase. The operating environment is established, major subsystems and their inputs and outputs are defined, and processes are allocated to resources. Everything requiring user input or approval must be documented and reviewed by the user. The physical characteristics of the system are specified and a detailed design is prepared. Subsystems identified during design are used to create a detailed structure of the system. Each subsystem is partitioned into one or more design units or modules. Detailed logic specifications are prepared for each software module.
4. Programming – 45%. The active server pages (ASP) are created and placed into the portal framework. Applications are linked to these pages. The detailed specifications produced during the design phase are translated into web executable software. Software is unit tested, integrated, and retested in a systematic manner.
5. Acceptance & Volume Testing – 15%. All components are assembled into an environment where they will interact and can be tested for functionality and scalability. The various components of the system are integrated and systematically tested. The user tests the system to ensure that the functional requirements, as defined in the functional requirements document, are satisfied by the developed or modified system. Prior to installing and operating the system in a production environment, the system must also undergo certification and accreditation activities by IT. Accreditation also insures that the system is adequately documented for use. This is accomplished during this phase.
6. Implementation (Roll-out) Phase – 5%. The system is installed and made operational in a production environment. The phase is initiated after the system has been tested and accepted by the user. This phase continues until the system is operating in production in accordance with the defined user requirements.

PROJECT RISK MANAGEMENT

Strategic Objective



“Insanity is doing the same things over and over again and expecting the results to be different each time.”

Albert Einstein

A risk is an unexpected future event that may or may not occur.

Every organization has a mission; the mission of OEMS/T is to reduce the morbidity and mortality associated with prehospital care through regulation, education, and continuous improvement. In this digital era, as organizations use automated information technology (IT) systems to process their information for better support of their missions, risk management plays a critical role in protecting information assets, and therefore its mission, from IT-related risk.

For OEMS/T, risk management boils down in a common sense fashion to: “keep it as simple as possible”.

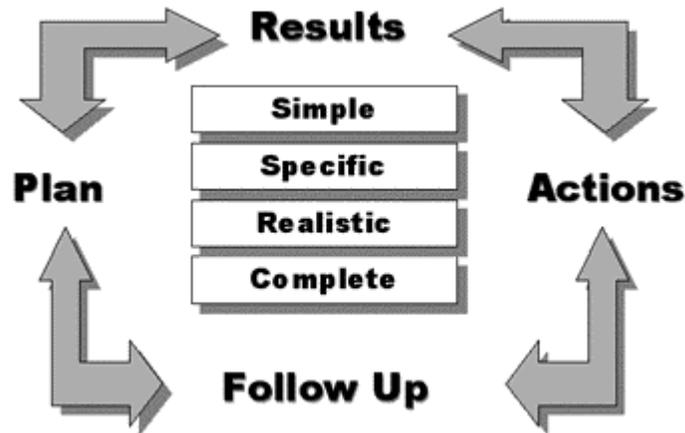
Keeping it Simple

Any strategic plan will be hard to implement unless it is simple, specific, realistic and complete. Table 18, Management Techniques for Risk Mitigation, indicates that even if a strategic plan is all these things, empowered leadership to monitor, revise, follow-up and act based upon results are all required for risk mitigation.

The *GEMSIS* plan depends on the human elements around it, particularly the human processes of leadership, commitment, involvement and teamwork. Organizational

discipline will be required to formally track progress and overcome any obstacles that may be encountered.

Table 18: Management Techniques for Risk Mitigation



Primary Risks

Initial risk identification and assessment is a key part of risk mitigation. A number of primary risks have been identified in the *GEMSIS* effort, which may result in plan retardation, implementation failure, expectation failure, or other sub-optimal consequences. These risks are as follows:

1. Inability to operate on a strategic level due to tactical commitments and related distractions. (The forest vs. the trees.)
2. Changes in strategic leadership, loss of key operational personnel and/or lack of availability or loss of other planned resources. (Loss of Organizational Continuity.)
3. Unpredicted or adverse reactions to change brought on by the enunciation or publication of quantitative data. (Facts vs. Long-standing Myths.)
4. Inability to secure appropriate purchase software. (In-house software development is slow and resource intensive and its success is uncertain.)
5. Basing improvements on a model of needed capabilities. (Models are Models.)

6. Basing infrastructure improvements only on current perceptions of organizational need. (Revolutionary Developments Obsolete Current Approaches)

While some of these risks are self-explanatory, others may require some explanation.

The Forest vs. The Trees

Although statewide EMS representatives know their problems in great detail, they sometimes disagree on which improvements are most important and may get caught-up in revisiting persistent, difficult (insolvable) problems. In discussions with the stakeholder committees during the formulation of *GEMSIS* goals, guidance was sought on how to obtain consensus positions. Stakeholder guidance indicated that the primary barriers to obtaining unanimous agreement were twofold: (1) an inability to separate current pressing, day-to-day, problems (tactical) from “big picture process” that can be deliberately manipulated over time and (2) genuine variances in local operating conditions. In layman’s terms problem number (1) is the commonly termed “not being able to see the forest for the trees” problem. Problem number (2) is a matter of education and sensitivity.

When the *GEMSIS* committees were first formed a natural progression occurred where the trees seemed to loom larger than the forest. Each of stakeholders committees was able to overcome this phenomenon to accomplish their planning mission. However, there is an ongoing danger that current circumstances will become so ominous that the strategic end-goals may become obscured. Senior management need to be aware of this phenomenon and periodically reposition expectations, as required.

Loss of Organizational Continuity

Historically, EMS leadership within the State of Georgia has been discontinuous relative to attention to information technology matters. While each administration has made substantive contributions to EMS infrastructure to be sure, the focus areas and approaches to implementing information technology have been different. Without a consistent, organized, multi-year strategy for technology improvement, it will be difficult

to identify and measure tangible system outcomes. Without organizational continuity, it will be difficult to permanently establish, institutionalize and sustain the *GEMSIS* activity areas. If players or priorities frequently shift regarding the order or importance of activities, it will be difficult to gauge program effectiveness.

Inability to Break with Past Practices

To achieve lasting results from process improvement efforts, it is necessary to: (a) break from or abandon the current information processing approaches that are underperforming to statewide needs and then (b) re-baseline revised strategic approaches. For EMS, this amounts to recognition that a great many things are needed, they are better purchased than trying to build in-house, ways must be found to fund initiatives during difficult budget times, and little additional support is available to assist implementation efforts. To do this, management must often be prepared to expend efforts to initially overcome obstacles stalling project initiation. In later project phases, management must be prepared to protect or insulate needed initiatives from any arbitrary guidelines or changes in over-structure priorities or rules. Because of these factors, information technology evolution generally requires senior management risk taking.

As the Gartner Group (2003) indicates technology components that are acquired based upon proven standards will have an enduring life. Organizations (like OEMS/T) that focus on acquiring technology components that are “industrial strength”, vendor maintained, well documented and easy to use are more successful than those lacking such strategic approaches. Organizations that understand how to add value to their operations one application at a time based upon web architecture will find that they can easily assemble very formidable information processing capabilities over relatively short periods of time.

Efforts to fix or patch things that are broken or have been broken for a while can become frustrating and a net drain for forward progress. Management must be prepared to defend and protect multi-year activities from resource supplantation based upon having to “fight fires”.

Models are Models

Basing improvement efforts on theoretical models is not without risks. Models are simplifications of the real world. In a sense, all models are wrong; some models are useful; and, models lack exhaustive descriptions of the people, processes, and technologies needed for success. The “up side” of models is that they provide a documented, disciplined and consistent way to break with the past and engage rapidly with the future.

Many benefits accrue from using a model such as *GEMSIS* as a framework for system-wide improvement. *GEMSIS* helps to forge a shared vision of what progress and process improvement should look like as a means for improvement. It makes tangible the thinking of many stakeholders representing years of EMS/EMSC experience. *GEMSIS* supports the measurement of the improvement process by providing a framework for performing reliable and consistent appraisals—which are always constructively based. Efforts are not characterized as deficient—they are characterized as laying along a continuum of capability that constitute desired future operations. Perhaps most importantly, *GEMSIS* is to be built on a set of processes and practices that have been developed in collaboration with a broad representation of EMS practitioners. Accordingly, *GEMSIS* is designed to build a foundation based upon industry standards with a predictable lifecycle.

The *GEMSIS* strategy can also be considered an “overlay” concept. An overlay provides a path for traveling to success in a rapid timeframe but also recognized that not every current problem and operating deficiency may be able to be corrected. It is not intended to provide quick fixes for projects that have been in trouble for a number of years. Overlay strategies have been used successfully to improve the strategic positioning of government operations and large businesses.¹⁴

¹⁴ While the techniques have various names, their success is well documented as a basis for continuous process improvement. (Deming 1986; Juran 1989; CMM, 1999, p. 11). Overlay strategies are not impregnable from revolutionary change but they can provide for flexible adaptation because they are operating somewhat in the future as opposed to having day-to-day tactical impact.

CONCLUSION

Plan Summary



*New ideas pass through three periods:
It can't be done. It probably can be done, but
it's not worth doing. I knew it was a good
idea all along!*

Arthur C. Clarke

Pictured left: Clay Mann, PhD, from the National EMS Data Analysis Resource Center addresses the *GEMSIS* Stakeholder's Group on the evolving NEMSIS data standard.

GEMSIS is the most comprehensive plan prepared to date for the development of Georgia statewide EMS information technology. The strategic premises outlined in this document should be embraced for 2004 -2006 implementation window and then be reexamined. *GEMSIS* is a simple plan. The vision behind *GEMSIS*, however, is complex and far-reaching.

GEMSIS provides an aggressive and thoughtful vision for how EMS information technology can be developed, used and applied. It is sensitive to the fact that, in Georgia, EMS is a multi-region operation with formidable and varying needs. It recognizes that EMS must have simple and easy to use applications; and, it recognizes that EMS has to build infrastructure that can be maintained with very little technical support. The need to collect accurate data, the need to publish meaningful information, the need for more effective partnerships with other elements of public health both at the State and Federal levels, and the need to rapidly gain tangible capability are all part of a realism that appreciates the need to balance central direction in the development of some areas of information technology with the distributed responsibility of individuals and groups in other areas.

Dramatic technological change will reshape society and its institutions in the next five to ten years. The pace of this change is increasing. The Internet and other information and communications technologies are changing the way EMS works, learns,

communicates, and the way EMS will do business. The Internet is shaping EMS in the same way that the steam engine and electricity defined the Industrial Age. Used creatively, the Internet and information technology can be a powerful tool for tackling some of our toughest challenges in improving statewide EMS. It can let us share information, make it easier to acquire new skills, and improve our ability to support our statewide regulatory mission.

The long-term, strategic importance of “anywhere” access to information through an improved statewide EMS infrastructure-- perhaps more than any other element-- underpins the 10 *GEMSIS* goals. A movement to web-based technologies will make the OEMS/T more effective in carrying out its mission. The ability to produce and disseminate unique information provides an essential service and promotes more efficiency in governmental services. Based upon the planning framework contained in this document, the OEMS/T should be able to clearly articulate a new vision for its IT activities. This new direction will establish new informational linkages with the environment, develop unique knowledge and take other actions that will create more dynamic internal operating capacity. There is an inherent complexity associated with this type of change. This complexity must be carefully managed.

The OEMS/T cannot move away from its role focused on regulating the processes associated with delivering prehospital care. It can, however, embed in its regulatory mission, mechanisms that will build infrastructure, enable systemic evolution, and support more efficient overall emergency preparedness. With appropriate support, the OEMS/T can better align people, process and technology with its regulatory responsibilities.

GEMSIS offers the best, near-term, chance for EMS to break with the patterns of the past, participate in, and shape the future of EMS in Georgia.

REFERENCES

- American College of Surgeons. (1999). *Resources for Optimal Care of the Injured Patient: 1999*. As retrieved September 22, 2003 from www.acs.com Chicago, IL, American College of Surgeons, 1999.
- Bartlett, C., & Ghoshal, S. (1990, July-August). Matrix management: Not a structure, a frame of mind. *Harvard Business Review* 138–145.
- Bertalanffy, L. V. (1972, December). The history and status of general systems theory. *Academy of Management Journal*. 14 (4), 407 – 426.
- Buehler JW, Berkelman RL, Hartley DM, Peters CJ. Syndromic surveillance and bioterrorism-related epidemics. *Emerg Infect Dis* [serial online] 2003 October:10. Retrieved from <http://www.cdc.gov/ncidod/EID/vol9no10/03-0231>.
- Child, J., & McGrath, R. G. (2001, December). Organizations unfettered: Organizational form in an information-intensive economy. *Academy of Management Journal*. 44 (6), 1135 – 1148.
- Davis, Charles R. (May, 1996). The administrative rational model and public organization theory. *Administration & Society*, 28 (1), 39 - 60.
- Duncan, W., Ginter, P., & Swayne, L. (1988). Competitive advantage and internal organizational assessment. *Academy of Management Executives*, 12 (3), 6–16.
- Feurer, R., Chaharbaghi, K., Weber, M., & Wargin, J. (2000, Winter). Aligning strategies, processes, and IT: A case study. *Information Systems Management*. 17 (1), 23-35.
- Gottlieb, J. Z. (2001), An Exploration of Organization Development Practitioners' Role Concept. *Consulting Psychology Journal: Practice and Research*, 53 (1), 35-51.
- Harris, D. L. (2000). Seven principles for sustainable social system: Lessons from teams, organizations, and communities. *Competitiveness Review*, 10, (2). 169 – 182.
- Hickson, D. J., Hining, C. R., Lee, R. E. Schneck, R. E., & Pennings, J. M. (1971). A Strategic Contingencies Theory of Intraorganizational Power. *Administrative Science Quarterly*. 216-229.
- Kaplan R. S., & Norton, D. P. (2001, March). Transforming the balanced scorecard from performance measurement to strategic management: Part 1. *American Accounting Association Accounting Horizons*, 15, (1). 87-104.

Kaplan R. S., & Norton, D. P. (2001, June). Transforming the balanced scorecard from performance measurement to strategic management: Part II. *American Accounting Association Accounting Horizons*, 15, (2). 147-160.

Kim, D. H. (1993). The Link between Individual and Organizational Learning. *Sloan Management Review*, Fall, 37-50.

Lusthaus, C. Adrien, M. (1998, October). Organizational Assessment: A Review of Experience, *Universalia Occasional Paper*. 31.

Malnight, T. (2001, December). Emerging structural patterns within multinational corporations: Toward process-based structures. *Academy of Management Journal*, 44, (6). 1187-1210.

Mistovich, J. J., Hafen, B. Q. & Karren, K. S. (2002). *Prehospital Emergency Care*. 7th Ed.. NY, NY. Prentice Hall. ISBN: 0130492884.

Mitroff, I., Mason, R. O., & Pearson, C. M. (1994). Radical surgery: what will tomorrow's organizations look like? *Academy of Management Executive*, 8, (2). 11 – 21.

National Association of Emergency Medical Services Physicians (1989). Emergency medical dispatching [position paper]. *Prehospital Disaster Medicine*. 163-6

National EMSC Data Analysis Resource Center (July, 2003). *Research in Emergency Medical Services (EMS)*. As retrieved September 22, 2003 from www.nedarc.org

National EMS Clearinghouse (1988). *The EMS Office, Its Structure and Functions*.

The Council of State Governments, Iron Works Pike, Lexington, KY. 53-61.

National EMS Research Agenda (2001) Grant: DTN 22-99-H-05100 As Retrieved from <http://www.nhtsa.dot.gov/people/injury/ems/ems-agenda/toc.htm>

National Highway Traffic Safety Administration: EMS Agenda for the Future (1996, August). Washington, D. C.: U. S. Department of Transportation (DOT HS808441).
National Heart, Lung, and Blood Institute (1993).

National Institutes of Health (September, 1993). *Staffing and Equipping Emergency Medical Services Systems: Rapid Identification and Treatment of Acute Myocardial Infarction*. U. S. Department of Health and Human Services, National Institutes of Health, HIH Publication No. 93-3304.

Palus, C. J., Horth, D. M., Selvin, A. M. & Pulley, M. L. (2003). Exploration For Development: Developing Leadership by Making Shared Sense of Complex Challenges. *Consulting Psychology Journal: Practice and Research*, 55 (1), 26-40.

Rajagopalan, N., & Spreitzer, G. (1997, January). Toward a theory of strategic change: A multi-lens perspective and integrative framework. *Academy of Management Review*, 22, (1). 48-79.

Randolph, W. A., & Dess, G. G. (1984). The congruence perspective of organization design: A conceptual model and multivariate research approach. *Academy of Management Review*, 9, (1). 114-127.

Rindova, V. P., & Kotha, S. (2001, December). Continuous "morphing": Competing through dynamic capabilities, form, and function. *Academy of Management Journal*, 44, (6). 1263-1280.

Robbins, S. P. *Organizational behavior* (10th ed.). Upper Saddle River, NJ: Prentice Hall. ISBN 0-13-100069-1.

Rodgers, R. & Hunter, J. E. (1991). *Impact of Management by Objectives on Organizational Productivity*. *Journal of Applied Psychology*, Vol. 76, No. 2, 322-336.

Selznick, P. (1947). Foundations of the Theory of Organization. *American Sociological Review*. 25-35.

Scott, R. (2003). *Organizations: Rational, natural, and open systems*. Upper Saddle River, NJ: Prentice Hall. ISBN 0-13-016559-X.

Smart, P. K., Brookes, N. J., Lettice, F. E., Backhouse, C. J., & Burns, N. D. (2002). A boundary-based view of product development-a feasibility study. Proceedings of the Institution of Mechanical Engineers -- Part B. *Engineering Manufacture*, 216, (1). 1-12.

Simpson, R. L. (1958). Vertical and Horizontal Communication in Formal Organizations. *American Sociological Society*. 188-196.

Spaite, D., Benoit R., Brown D. (1995). Uniform prehospital data elements and definitions: A full report from the uniform prehospital emergency medical services data conference. *Annals of Emergency Medicine*. (25), p. 525-534.

Townley, B. (2002, February). The role of competing rationalities in institutional change. *Academy of Management Journal*, 45, (1). 163 – 179. United States General Accounting Office Report (GAO) to Congressional Requesters (October, 2001). *Emergency Medical Services: Reported Needs are Wide-Ranging, With a Growing Focus on Lack of Data* (GAO-02-28). U. S. General Accounting Office, Washington, D. C.

APPENDICIES

Appendix A: Operational Overview of Georgia Office of EMS/Trauma

Appendix B: GEMSIS EMS Portal Project (Essential Concepts for Success

Appendix C: Georgia Patient Care Reports (PCRs) Data Status



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