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Information for Education Policy, Planning, Management, and Accountability in West Bank and Gaza:


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Abbreviations

AED Director General for Assessment, Evaluation and Examinations
AMIDEAST America-Mideast Educational and Training Services, Inc.
API application programming interface
DG Director General
EDSP Education Development Strategic Plan
E-HR human resources management information system
EMIS education management information system
FMIS financial management information system
GE general education school census statistics
GIS geographic information systems
HR human resources
HRMIS human resources management information system
ICT information and communication technology
ID identification
IQB AED’s item question bank
IT information technology
JSON JavaScript Object Notation
KPI key performance indicator
M&E monitoring and evaluation
MOEHE Palestinian Ministry of Education and Higher Education
MOF Palestinian Ministry of Finance
MS Microsoft
NIET National Institute for Education and Training
PHP PHP: hypertext preprocessor (a server-side scripting language)
ReST Representational State Transfer
RTI trade name for Research Triangle Institute
SLA service level agreement
SMIS School Management Information System
SQL Server Query Language
TIMMS Trends in International Mathematics and Science Study
TOR terms of reference
UAT user acceptance testing
UNICEF United Nations Children’s Fund
USAID United States Agency for International Development
Executive Summary

**Purpose.** The purpose of the data gap analysis is to help the Palestinian Ministry of Education and Higher Education to identify ways to improve the integration and utilization of its data systems for policy, planning, and management, as well as reporting and feedback to the public and stakeholders. With funding through the United States Agency for International Development (USAID), RTI International ([www.rti.org](http://www.rti.org)) fielded a three-person team to survey Ministry offices, assess existing data systems and applications, and debrief the Ministry and USAID on summary findings.

**Activities.** The field assessment took place from December 1 to December 20 2014. Preceding the field assessment, the team reviewed various background documents, including the 2014–2019 Education Development Sector Plan, the Education Statistical Bulletin, the World Bank Public Expenditure Review study, among others. The field assessment included a survey of key informants from across 12 Directorate Generals (DGs), one Field Directorate (Jericho), and one school (Al Bireh Primary). Other interviews and meetings were held with Ministry stakeholders and partners, including USAID, Education Development Strategic Plan (EDSP) technical advisor (from the ICON Institute), and ULTIMIT Advanced Turnkey Solutions.

**Methodology.** RTI applied a demand-supply-capacity framework during the assessment. Demand-side issues considered the degree in which data was routinely used or relied upon for day-to-day work and decision-making requirements. Data supply issues were concerned primarily with the availability and quality (timeliness, validity, reliability) of the data. Capacity considerations focused on the infrastructure, human resource capacity, the efficiency for data capture and management, and the technical capability for data analysis.

**Summary Findings.** As noted in the study terms of reference, the Ministry produces a wealth of data from across the various DGs. From a capacity standpoint, however, the data systems are developed in ad hoc ways, mostly relying on Microsoft (MS) Excel and MS Access. These systems require extensive clerical data entry work on behalf of schools and districts to maintain. The consequences of these multiple systems include significant inefficiencies due to duplication of data entry effort and report production, and decreased quality data in terms reliability due to multiple sources of records. This is particularly true in the case of teacher data, but also with respect to standardized test results. From a supply standpoint, the quality of the general education data is generally good, but the quality of the standardized test results is more questionable, particularly in terms of their reliability and validity.

**Recommendations.** The Ministry, with support from the United Nations Children’s Fund (UNICEF), has developed a comprehensive School Management Information System that is being piloted in 100 schools beginning this year. This system, which will rely on direct data entry by schools, captures a broad array of data on schools, teachers, and learners (including examination results). In our view, it offers the best opportunity to serve as the Ministry’s unified platform for integrating and linking its various data systems. Technical specifications for integrating the data systems are provided in Section 7 (terms of reference) of this report. Additional recommendations focus on ways to strengthen the capacity of the Ministry for
producing advanced data analytics and feedback tools for policy- and decision-making, strengthen the reliability and validity of the standardized test results, enhance the utility and sharing of the education sector implementation plans, support the rollout of the school management information system, and develop a Ministry-wide information and communication technology (ICT) policy that will provide the overarching framework to sustain their data management reforms.

**Conclusions.** The fundamental goal of the Ministry is to achieve “better decisions through better information.” The Ministry is not very far from realizing this goal. The recommendations are designed for local implementation, with local support. The Ministry overall has the technical capacity and institutional wherewithal to implement the recommendations that will further their goal.

1. **Introduction and Purpose of the Data Gap Analysis**

The Palestinian National Authority’s 2014–2019 Education Development Sector Plan (EDSP) demonstrates the Ministry of Education and Higher Education’s (MOEHE’s) commitment to a results-based management system. In fulfillment of EDSP, the MOEHE is striving to become an increasingly data-driven and data-informed organization. The MOEHE produces a wealth of information from multiple sources on education sector performance. However, it does not optimally integrate, analyze, and utilize the totality of the data at its disposal. To advance its goals, The MOEHE requested the data gap analysis to identify ways to improve the integration and utilization of its data systems for policy, planning, and management, as well as reporting and feedback to public and stakeholders.

As described in the 2014–2019 EDSP, the MOEHE’s key remaining management and administrative challenges include the lack of a unified management information system; the lack of genuine decentralization of planning, finance, and management functions; and the need for more open and transparent decision-making and reporting vis-à-vis the districts, schools, and wider public. Access to and use of information is the backbone of a well-working management system, particularly one that strives to decentralize decision-making and increase transparency and accountability. Our approach to the data gap analysis is not merely examining the needs of the current system, but assessing the needs of a future system that enables the desired level of decentralization and stakeholder feedback envisioned under the EDSP. **Attachment 1** contains the Scope of Work of this study.

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1 Data-informed being distinct from data-driven in asking the “why” behind the data, as opposed to making decisions based solely on the numbers themselves.
2. Analytic Approach

The analysis incorporated an assessment of data use and information needs, and an analysis of information technology (IT) and human resource (HR) capacities. The data use and information needs assessment examined three elements: (i) demand: how (and how well) data are used for relevant aspects of education sector planning, monitoring, and decision making; (ii) supply: the type and quality of information that are (or are not) available from the different data systems in the country; and (iii) capacity: the degree to which production and use of data are efficiently captured and optimally utilized across the directorates and field districts. This supply-demand-capacity analysis was applied at each level (national, directorate, school) and for key functions: planning and budgeting, resource allocation and management, monitoring and evaluation (M&E), and reporting.

The IT systems and HR capacity assessment examined the variety of software and hardware technology, applications, and connectivity in use by the Ministry, at each level. The systems and capacities assessed covered database applications, the availability and use of hardware, availability and quality of Internet, and the human resource IT skills available at each level and in each Director General (DG).\(^2\) The intent, therefore, is to develop recommendations that do not require technical skill sets and IT capacities beyond the existing capability of the Ministry or its IT service providers.

3. Activities and Methodology

The findings from this study are based on review of background documentation; field interviews with MOEHE, directorate, and school representatives; and analysis of existing data systems. These include the 2014–2019 EDSP, the Evaluation of the 2008–2012 EDSP, the Public Expenditure Review of Education in Palestine, the MOEHE Functional Audit (English version Executive Summary draft) conducted by America-Mideast Educational and Training Services, Inc. AMIDEAST, to name but a few. Attachment 2 lists the background documents and reports reviewed. Attachment 3 lists the persons contacted and meetings held.

Semi-structured interviews were conducted with the following DGs:

- DG for Information Communication Technology (ICT) (Computer Center)
- DG for Planning (including representatives from M&E, Studies, Geographic Information Systems [GIS], Statistics, and EDSP divisions)
- DG for Projects
- DG for Buildings
- DG for Supervision
- DG for Administrative Affairs (including representative from Personnel Administration)

\(^2\) MOEHE organizational directorates are referred to as Director Generals (DGs) or divisions, so as to distinguish between its geographic administrative directorates or districts.
• DG for Financial Affairs
• DG for Assessment, Evaluation and Examinations (AED)
• Former DG for Textbooks Printing
• DG for Field Follow-Up
• Former DG for General Education
• National Institute for Education and Training (NIET), IT Systems

For reference, the MOEHE organizational chart is provided under Attachment 4, translated to English from the MOEHE website.

Additional interviews were conducted with representatives from the following organizations:
• Jericho Field Directorate:
  − Education Director
  − Planning Division
  − Buildings Division
  − Health Division
  − Field Follow-Up Division
• Al Bireh Primary School, Al Bireh
• AMIDEAST, Leadership and Teacher Development Program
• ULTIMIT Advanced Turnkey Solutions, LLC

Following the meetings, the team conducted a debriefing with Ministry leadership, DG representatives, and USAID. Attachment 5 contains a copy of the PowerPoint presentation shared during this meeting.

4. Summary Findings of the Supply-Demand-Capacity Situation

4.1. Data Systems and Supply Issues

The team surveyed and assessed the availability of data that the DGs were producing, the process by which the data was being captured, and the systems by which the data was being managed. The summary of findings, ranging from general education school census statistics (GE) to the community and social networking portals (e-schools and e-learning) are described below, with a general discussion on the quality of the data where applicable.

1. **GE database.** The quality of the GE database (housing school census data on a Microsoft [MS] Access platform) is good in terms of its timeliness and accuracy. Most discrepancies result from lag times in updating the school census data, which takes place once per year; this lag time reduces the usefulness of data, particularly in regard to changes in teacher data and enrollment over the course of the year. The GE database is
validated through a three-level system: office auditing (review and signatures from school and district officers), database system checks, and district-level site visits and audits. The school census GE data are currently collected on paper forms completed by school heads once per year, aggregated by districts and entered into stand-alone Access databases, and consolidated at the central level. This will change once the School Management Information System (SMIS, described below) comes online.

2. **School Management Information System (SMIS).** The SMIS was developed with assistance from the United Nations Children’s Fund (UNICEF) to serve as one unified, centralized, and integrated web-based system to be used at all levels (schools, districts, and ministry) for all school-based GE data.\(^3\) The system calls for school-based data entry (online and offline versions) of school-, teacher-, and student-level data; a menu of standardized reports; and a query-builder capability for users to develop customized reports. The SMIS Components Hierarchy Diagram outlines the array of data schools will enter and is found under [Attachment 6](#). The system, which was developed by ULTIMIT Advanced Turnkey Solutions, a local Palestinian IT firm, is now in the final pilot phase of deployment. The plan calls for the Ministry to pilot the SMIS in 100 schools over the following school year (2015/2016), with the intent and expectation to reach full deployment to all schools by 2017. ULTIMIT has a service agreement to support, identify, and fix bugs over the 12 months during pilot deployment. Although this system offers the best opportunity to meet many of the Ministry’s data needs, there are several capacity challenges the Ministry is facing with respect to its deployment, notably the roles and responsibilities of schools and districts to implement. These issues and recommendations for continued support are discussed under Sections 4.3 and 5.4.

3. **Standardized test results.** AED oversees the administration of standardized tests. There are four types of standardized tests administered: (1) the Tawjihi, which is a high-stakes secondary school leaving examination that determines the academic track of the student; (2) the National Assessment Tests, which are curricular-based tests administered on a sample basis, once every two years, for Grade 4 and Grade 10 students in mathematics, Arabic, and science; (3) the Trends in International Mathematics and Science Study (TIMMS); and (4) the District Unified Tests, which are administered to all children in a specific set of grades and subjects. AED is in the process of developing an automated item question bank (IQB) for the Tawjihi, National Assessment and District Unified tests. The IQB will enable districts to develop the Unified Tests from a bank of items accessible online. Table 1 describes the data quality issues of the non-TIMMS tests based on feedback from key informants (not based on any direct evaluation of the tests themselves by the assessment team):

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\(^3\) SMIS Software Requirement Specifications, Version 3, November 2012.
Table 1. Data Quality Issues of Standardized Tests

<table>
<thead>
<tr>
<th>Standardized test</th>
<th>Data quality (validity and reliability) concerns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tawjih (secondary school leaving exam)</td>
<td>Content, predictive- and item-validity issues: questions as to the relevance to a twenty-first century curriculum and skill set; whether the test accurately predicts academic success in higher education; and whether the question items perform as expected and are measuring what is intended. Individual results are published in a newspaper rank ordering students by score.</td>
</tr>
<tr>
<td>National Assessment Tests</td>
<td>Item validity, reliability, and internal consistency issues: The test items measure three cognitive domains from easy to hard (knowing, applying, reasoning) for each subject. Test items are developed based on curriculum and textbooks, by subject specialists and teachers. Discrimination factors are analyzed in the pilot, but psychometric analyses are not applied, which provide a more rigorous method for determining item validity and reliability (i.e., are the items as difficult or easy as they intend to be, and do they perform consistently with the other items).</td>
</tr>
<tr>
<td>District Unified Tests</td>
<td>Item validity, reliability, internal consistency, inter-rater reliability, and data validation issues: In addition to issues similar to those mentioned with regard to National Assessment Tests above, other challenges include inconsistencies in how tests are scored (lack of inter-rater reliability testing) and lack of data quality controls on how tests are evaluated, recorded, and communicated.</td>
</tr>
</tbody>
</table>

4. Other quality- and outcome-oriented data (DGs of Planning/M&E and Studies divisions, Textbooks, and School Health). The M&E and Studies divisions under the Planning DG capture, analyze, and report on outcome-related information and EDSP key performance indicators, often through special research initiatives and sample surveys. Methods include surveying teaching practices through a sample of classroom observations, analyzing District Unified Tests, and surveying school heads on the number and characteristics of their schools’ dropouts. These studies are internally managed and administered by the Planning DG, with little to no utilization of existing external datasets except for the standardized test results.

The DG for Textbooks Printing maintains an excel sheet for every school. This sheet contains the number of learners per class alongside the number of textbooks available. The report is completed by the school and consolidated at the district level. Textbooks uses this report to determine the number of textbooks needed to be printed for the ensuing school year. The DG for School Health tracks learner health indicators for every school, using Excel. This information is consolidated at the district level and transmitted to the

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4 This past year, AED was not responsible for the administration of the District Unified Tests. Rather, the administration and data were managed under the auspices of the Deputy Minister’s office.

5 Note the Jericho District described a comprehensive validation protocol for double-checking test item scores, but this may be uncommon practice for other districts. Other informants reported observing variability between school and district results of the Unified Tests, which eroded their confidence in the tests’ reliability and validity.
central DG. The health indicators compiled by the DG for School Health are included in the School Health module in the SMIS.

5. **Teacher records and personnel evaluation data.** The DGs of Administrative Affairs, Supervision, Field Follow-Up, and NIET all collect and record information pertaining to teachers, staff, and school principals. HR data are managed by the **DG of Administrative Affairs** through an Oracle-based database software HR Management Information System (HRMIS or E-HR). HR data entered at the district level are consolidated in a central database in the Ministry. The database is updated on an ongoing basis as teacher and staff status changes throughout the year. There is no link between the teacher data captured through the GE (school census) database and the teacher data records on file in the HRMIS. **NIET** is the sole MOEHE institutional provider of in-service teacher training. They record teachers’ course attendance and grades received. The NIET and HR databases do not communicate, even though they reside on the same server. NIET and HR update their databases of teacher information by transmitting CD-ROMs and manually importing records from each other’s database.

The **DGs of Supervision and Field Follow-Up** collect comprehensive performance evaluation data on teachers and school heads respectively. District supervisors routinely collect teacher observation\(^6\) data through lesson observations. Field Follow-Up evaluates school principals using 360-degree satisfaction and evaluation surveys (including responses from parents, students, teachers, and other DG officers) to inform the summary school principal evaluation score. These systems are managed separately through MS Excel. Summary evaluation scores of teachers and school principals are tabulated by district-level Supervision and Field-Follow-Up officers respectively and provided to district HR personnel for manual data entry into the HR (Oracle) system. Moreover, the Supervision data provide specific location data on school clusters (with typically five schools per cluster) and education areas (five clusters within a district). These personnel evaluations and sub-district clusters could be valuable data points for analyzing education system performance (for M&E and Planning), but are not systematically analyzed/accessed/utilized beyond the Supervision and GIS databases where they are initially captured.

6. **Physical planning and infrastructure data systems (GIS Division and Buildings DG).** GIS, like M&E and Studies, is a division within the DG of Planning. Buildings DG is its own directorate. The **GIS database** is hosted and managed separately from the Ministry server. The GIS database contains GIS coordinates and shape files for schools and districts. The GIS Division is currently working on developing shape files for catchment areas, clusters, and education areas based on data supplied by DG Supervision. It is also developing a web-based interactive and dynamic analytic tool to allow web users to drill and mine spatial data. The **Buildings DG** maintains an Excel-based data system to calculate school needs and priorities based on a composite *school suffering index*. This

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\(^{6}\) Note the team did not assess the teacher observation protocol itself, either for its quality (relevance) or its reliability.
Excel tool is a sophisticated calculator that prioritizes a school’s needs against other schools in its catchment area, weighting for enrollment. The tool was developed centrally and is managed and updated at the district. On demand, districts transmit summary data to the Buildings DG by emailing the MS Excel file.

7. **Financial management information systems (FMIS).** The Ministry operates two separately developed data systems for the management of financial information: (1) a centrally managed system that was developed by Bisan IT firm for all government ministries (which is managed by the Ministry of Finance [MOF]) and (2) a locally implemented system (managed by MOEHE and used by districts and schools) that was also developed by Bisan as a pre-cursor to, but distinct from, the MOF-managed system. Selected data from the schools–district Bisan system, which is used to track expenditures of school fees and donations at the district and school levels, are manually uploaded into the MOF Bisan system. According to the MOEHE, the MOF Bisan system is too complicated for local implementation: their preference is for the schools and districts to continue using the old system. The DG of Finance did not express an urgent need to integrate the two systems. Part of the reason for this may be that the MOEHE has no control over the central system; the MOF manages and oversees any changes to the central Bisan system.

8. **The EDSP.** The EDSP is the Ministry’s roadmap for prioritizing programs and developing and implementing annual budgets, according to sector goals and key performance indicators. The Ministry developed a five-year plan (2013–2019)\(^7\) that details priority activities by DG and serves as the basis for the annual budgets and procurement plans. The EDSP implementation plan is Excel-based and is managed centrally. The central Bisan budget chart of accounts has been adjusted to link the EDSP input codes. The MOF is in the process of adapting the expenditure module to track expenses by EDSP items. This integration with EDSP will enable the MOEHE to align budget and expenditures to outputs and outcomes, as part of its goal to implement a program-based budgeting system. The MOF is tasked to implement any required changes to the Bisan architecture to link to the EDSP.

9. **E-Learning and E-Schools.** E-Learning and E-Schools are two web-based information sharing portals developed by the MOEHE to serve school stakeholders. E-Learning ([http://www.elearn.edu.ps](http://www.elearn.edu.ps)) is a curriculum and content sharing site designed primarily for school principals and teachers to access school management tools as well as teaching and learning materials for classroom use. Forums were developed for teachers to share experiences and engage in virtual peer-learning opportunities. E-Schools ([www.eschool.edu.ps](http://www.eschool.edu.ps)) was designed as a Facebook-type social networking service for parents, school leaders, and teachers, to share information on academic programs and engage parents and communities in school events and activities. The E-Schools portal also allows direct text messaging to parents of useful and timely notifications and

\(^7\) With technical support provided by the ICON Institute, with financial support from donor funds.
updates. Both of these systems were developed by ULTIMIT, which also developed the SMIS. Both E-Learning and E-Schools have been piloted but are not uniformly deployed. The team did not survey how many schools and communities are using these tools, but neither were designed to communicate formal Ministry data and information. The official record for education data remains the MOEHE website: [http://www.mohe.gov.ps](http://www.mohe.gov.ps).

### 4.2. Demand-Side Characteristics of the System

From a data demand standpoint, the findings are generally positive. The Ministry is producing and consuming data widely, and the use of data for decision-making appears to be institutionalized within the core work practices of the DGs. The demand-side challenges stem primarily from the limited sharing of data between DGs and the significant levels of effort expended to capture, manage, and analyze the data. Both of these challenges stem from the proliferation of non-integrated data systems. They are discussed in brief below, along with other demand-side issues identified.

1. **Data sharing limited across DGs.** The DGs naturally have their own data needs and requirements for fulfilling their mission and function. All of the DGs surveyed have developed their own mini information management systems and tools, either using Access-databases or Excel-based systems. In a few instances (under the DGs of Planning, GIS, Administrative Affairs, and Financial Affairs), more advanced systems have been (or will be) developed by external service providers. Although “demand for data” is strong within the owning DG, there appears to be less inclination or opportunity for cross-DG data sharing and use. This is due to several reasons: lack of knowledge about other DG data (i.e., they do not know it exists), lack of trust of the data other DGs capture (they do not think the data is any good), and lack of interest in using the data (they do not see a use for “external” data for their own purposes). The first two reasons reflect issues that could be addressed through integrating data systems (as discussed under Section 4.3). The latter issue could be addressed through strengthening capacity for data analysis (discussed under Section 5.2).

2. **Significant levels of effort expended on data collection and management.** Each of the DGs has their own data needs and requirements, which flow down to districts and schools to capture. Much effort in terms of manpower and person-hours is expended to capture and enter data into the various systems, particularly at the district and school levels. In schools, the administrators are burdened with multitudinous forms required by each DG. The level of effort expended indicates strong demand for data, but also underlines the capacity constraints of the system to efficiently capture and optimally use the data.

3. **Demand for data integration.** In terms of demand for integrated or more efficient systems, most of the DGs, with the exception of one or two, embraced the initiative. Nevertheless, institutional inertia has a way of impeding reform because individuals may

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8 Al Bireh Primary School reported that the school secretary spends nearly 100% of her time entering data. The Jericho Planning Office reported similar level of effort entering, validating, and cleaning data.
be slow to change or adopt their work practices to implement new systems. For an integrated system to benefit from widespread adoption and use, the Ministry leadership will need to employ change management strategies across DGs, districts, and schools, particularly as it deploys the SMIS. These strategies are discussed under Section 5.4.

4. Demand for data on education quality (teaching and learning). Palestinians place a great deal of emphasis (perhaps disproportionally) on the results of standardized tests. This is particularly true for the Tawjihi, the secondary school leaving examination. The EDSP has reinforced demand at the central level for other quality data on teaching and learning outcomes due to its performance monitoring requirements, as well as the Palestinian Authority’s mandate to implement Program-Based Planning and Budgeting, which requires the MOEHE to link outcomes to outputs and outlays. Less clear is the demand exhibited by schools and districts for other teaching and learning data. District Unified Tests are shared with school–community stakeholders and, at least as reported in Jericho, are incorporated into a broader self-assessment and reflection process with schools. But these schools and districts lack systematically generated progress reports on key performance indicators and are left to their own device to produce these. Schools maintain their own records but there is little to no feedback made available to them on their performance against the average of their peers in their cluster or district. This lack of systematic feedback reports is a key capacity issue addressed under Section 5.2.

4.3. Institutional and HR Capacity Issues

The core capacity issue facing the Ministry is the proliferation of multiple databases and multiple systems noted above, which reflects the central focus of this assessment. The assessment surveyed both the variety of data systems used across DGs, and the ICT and HR capability for analytic reporting and feedback to stakeholders. These are discussed below.

1. Data silos and multiple data systems. The proliferation of multiple, non-integrated data systems is the main reason for widespread inefficiencies within the system as a whole. This lack of integration is a product of the Ministry’s work practices, with two main consequences: significantly increased levels of effort required for capturing and managing multiple datasets at all levels and decreased accuracy and timeliness of data due to multiple systems of record, particularly of teachers. All DGs surveyed have developed their own database systems, most of which are Access- or Excel-based except for the HRMIS (Oracle), Bisan (MySQL), GIS (ArcGIS), and SMIS (SQL Server). Although some of these systems are hosted on the Ministry server, several are not, particularly the Excel- and Access-based databases (such as for GE, Supervision, Field Follow-Up, and Buildings). Attachment 7 details the inventory of the various database systems, the software platforms used, and their relationship to the DGs. Section 5.1 details our recommendations for integrating these systems.

2. Data flow and management. Figures 1 to 3 depict the ways data flow from schools to districts to the MOEHE. In some cases, DGs require schools to self-report (depicted under Figure 1 with grey-shaded arrows and boxes). In other cases, district officials are
responsible for collecting the data directly from schools (depicted under Figure 2 with dark blue-shaded arrows and boxes). Figure 3 illustrates the existing system of data silos that require distinct information pipelines from schools to districts to the Ministry. Each gray or blue arrow is a reporting requirement by the school or district. The width of the arrow denotes the relative efficiency of how that data is transmitted.

The blue arrows (         ) between the DG boxes in Figure 3 denote manual data sharing between the DGs, which takes place at either the district or central level. Note that Field Follow-Up has two arrows: it requires schools to self-report Israeli violations and also requires district officials to collect data directly on school principal performance evaluations.

3. **ICT infrastructure of the Ministry.** The DG for ICT (Computer Center) is the primary DG responsible for managing the server and databases of the Ministry’s information systems. It hosts the MOEHE Bisan (financial management information system), the HRMIS (personnel database), the SMIS, and the existing GE Access database. From a hardware standpoint, the Computer Center has enough capacity to handle additional data systems without the need for upgrading. The server equipment appears to be in excellent condition and is well-maintained in a climate-controlled environment.

The Ministry and districts appear to have no shortage of desktop computers. The Ministry is connected internally through a local network with available file sharing through the server. Although not formally surveyed, the Ministry indicated that all districts have access to Internet. However, only 30% of all schools are connected to the Internet, although most if not all schools have at least one computer dedicated for administrative use.

4. **HR IT administration capacities.** The DG for ICT has, as far as the assessment team could tell, one programmer and one network administrator on staff. Although the server capacity is adequate for large-scale systems support, current staffing levels are not sufficient to support large-scale systems administration such as the SMIS. The lack of IT support staff is due in large part to a government decision to cease or limit any new hiring. Most schools have computer-literate staff who possess basic data entry and clerical support skills. Schools tend to rely on either dedicated school secretaries or the technology teacher for managing their local data and computer systems.

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9 From interviews with MOEHE staff and corroborated in the “DRAFT Executive Summary of the MOEHE Functional Audit,” Leadership and Teacher Development Program, AMIDEAST, September 2014.
Figure 1. Data flow: schools self report to districts and to MOEHE

- Schools self-report
- Districts consolidate
- Ministry aggregates

Figure 2. Data flow: districts collect data directly from schools

- Districts collect data directly from schools
- Districts collate and submit reports to MOEHE

Figure 3. Current status: data silos and information sharing by DG

Legend

- Data is self-reported by school principals
- Data is collected at schools by district officials
- Denotes manual data sharing between DGs
- *To be replaced by SMIS modules.
5. **Staff capacity for data utilization, feedback, and advanced analytics.** Many staff in the Ministry and districts appear to have functional computer skills, and most staff appear to have functional skills in MS Excel. A few, particularly in the Planning DG and in AED, have experience with statistical software programs such as SPSS. However, it is not clear how advanced their statistical analytical capabilities are without explicit testing and evaluation of their skills. Advanced database administration and server query language (SQL) skills are absent in all but one or two individuals. Neither the existing GE data system, nor the future SMIS, has a sophisticated business intelligence capability, nor a plan for automating school and district reports or other feedback systems to schools and school stakeholders. As such, there is a glaring weakness in the system for mining and optimizing the rich vein of data that would be available should the data be linked, or for communicating and reporting back down to districts and schools their level of performance.

6. **Capacity for nationwide SMIS deployment.** Although the SMIS offers a tremendous solution for the MOEHE to implement a unified data management system and to improve the quality of its school-based data, there are several challenges relating to a large-scale, nationwide deployment of SMIS. The principal challenge is the training and behavior change strategies for school officers as well as district and Ministry users. Another major issue is the ongoing support needed from the IT provider, which developed the system with funding from UNICEF. Already, some issues have emerged that underscore this challenge: namely concerns about the level of quality assurance and technical completeness of the system. Further, as noted above, significant increases in IT administrative staff will be needed to support and maintain the system.

7. **ICT vendor–Ministry relationships.** Palestine benefits from several highly qualified, technically capable ICT firms and professionals, many of which work directly for the government. There are five vendors that the MOEHE has engaged for various systems development and support: ULTIMIT (http://www.ultimit.ps), which developed the SMIS as well as E-Schools and E-Learning; JaffaNet (http://www.i-jaffa.net/), which developed the HRMIS Oracle-based system; Bisan Systems (http://www.bisan.com), which developed and manages the FMIS; Al-Israa (www.iscofsoft.com) which developed the NIET database system; and Alameen Technologies (http://www.alameentech.com/backup), which recently won a tender to develop GIS interactive web tools for MOEHE users. A recurrent issue that was raised in various meetings was the strained nature of the Ministry–vendor relationships, particularly in view of ongoing support and maintenance as well as system upgrading needs, which have unmet or unspecified contractual requirements. These issues will need to be addressed in order to integrate the systems as discussed under Section 5.1.

8. **Lack of MOEHE-wide IT policy.** The MOEHE does not have an official approved IT policy. This in part has led to the proliferation of multiple IT systems and lack of

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10 SPSS: Statistical Package for the Social Sciences.
uniformity and standards in IT system development. Recognizing the need for and value of a comprehensive ICT policy, the DG for ICT has drafted an ICT policy document. Our recommendations for a comprehensive policy document are found in Section 5.6.

5. Recommendations for Addressing Key Capacity and Supply Issues

Six areas of potential support emerge from the list of supply, demand and capacity issues identified. The technical recommendations for their implementation are discussed below. An illustrative Gantt chart of recommended tasks and activities is provided under Section 6.

1. Integrate data systems to improve efficiency and data quality.
2. Strengthen analytic and feedback capabilities.
3. Strengthen validity/reliability of standardized tests.
4. Support Ministry for SMIS deployment and widespread adoption.
5. Support development of file-sharing tools and reports for EDSP working documents.

5.1. Recommendation 1: Integrate Data Systems to Improve Efficiency and Data Quality

The core focus of this data gap analysis was to understand how existing data are being captured and used with a view toward how data could be optimally integrated. The challenges that non-integrated systems pose are numerous and significant. Multiple systems of record for schools and teachers degrade the timeliness and accuracy of data. Data on quality (teaching and learning) are not systematically linked to each other, which makes integrated reporting and advanced analytics all but impossible without significant effort. Desktop (MS Excel- and Access-based) systems lack capability for integration, distributed data, or concurrent information sharing. Data management officers at Ministry, district, and schools are overworked, collecting, entering, and cleaning data with little time for data quality assurance, validation, or school follow-up tasks.

Recommendations. The SMIS (though not yet deployed), combined with the HRMIS, offers the Ministry the best opportunity to integrate the majority of its non-financial data and information needs. Three integration strategies, each based on the existing status of the data systems to be integrated, are recommended:

i. Integrate teacher records through an HRMIS application programming interface (API) with SMIS and NIET.

ii. Integrate school records with other systems through an API with the SMIS.
iii. Develop new fields or modules directly in the SMIS for those Excel-based data systems that are not currently accounted for in the SMIS.

An API is simply a software program that allows database systems to talk to each other. APIs must be developed by the original software developer of the database application because they require intimate knowledge of the source code. Table 2 identifies the various data systems for API development or new SMIS field/module development. Section 7 details the technical specifications and guidelines for developing the data record integration APIs for software programmers to follow.

### Table 2. Data Integration Recommendations

<table>
<thead>
<tr>
<th>1. Teacher records integration (through API with HRMIS)</th>
<th>2. School records integration (through API with SMIS)</th>
<th>3. New fields/ modules in SMIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• SMIS</td>
<td>• GIS</td>
<td>• Cluster and Education Areas (school locality)</td>
</tr>
</tbody>
</table>
| • NIET                                                 | • HRMIS                                         | • District Unified Tests
| • Field Follow-Up                                      |                                                | • Health                                      |
| • Supervision                                          |                                                | • Buildings                                   |

#### 5.1.1. Proposed teacher records integration solution

Five data systems capture teacher records information: the HRMIS, the SMIS/GE database, the NIET, the Supervision DG (Excel), and the Field Follow-Up DG (Excel). Much of the data captured in the SMIS is already collected in the HRMIS. The HRMIS is updated routinely, whereas the GE database is updated only once per year. This leads to discrepancies between teacher records found in the GE database and those found in the HRMIS, particularly those related to teacher assignment and status changes that happen during the course of the school year. To ensure the HRMIS remains the true system of record for teacher data, we recommend an API that links and queries the HRMIS to the SMIS and the HRMIS to NIET. The HRMIS API will allow the SMIS to query teacher data utilizing the unique teacher identification (ID) number to link individuals between the databases. This would allow SMIS teacher data fields to be populated automatically without relying on school heads to submit this information directly into the SMIS, thereby decreasing the data entry burden of the school heads and secretaries. Because it would be updated routinely, changes in teacher status as captured by the HRMIS would automatically reflect changes in the SMIS, thereby improving the reliability and timeliness of the GE teacher data. Moreover, the additional validation of the HRMIS would assist to ensure the right teachers are at the right schools.\(^\text{12}\)

We propose a similar API for NIET and HRMIS. Currently NIET manually imports data that is sent by CD-ROM from HR to NIET to record course certifications completed by teachers. This

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\(^{11}\) Unified Tests and Health data systems are in grey because the SMIS already has fields and modules that account for their data needs.

\(^{12}\) These concerns were noted in the 2012 World Bank Public Expenditure Review as well as from other key informants during the interviews.
process not only takes time but is prone to error. An API would allow seamless communication between the NIET and HRMIS databases. This would enable NIET to update teacher records automatically without need for manual import, and conversely, enable the HRMIS to update the NIET certification records automatically.

To capture summary performance evaluation information of school principals (from Field Follow-up) and teachers (from Supervision), the simplest solution is to develop additional data fields in the SMIS for district officers to enter their summary scores directly. To be clear, the Excel and Access tools that Field Follow-up uses to calculate the scores are well designed for their purposes. We propose only that the Ministry and districts utilize the SMIS to capture and store the overall summary scores and generate summary reports as shown in Figure 4, which is a screen shot of a summary report provided by the district to the Field Follow-up DG for every school principal. Likewise with Supervision, the processes and tools for calculating teacher evaluation scores need not be replicated in the SMIS. However, we recommend that summary scores be entered into the SMIS rather than remaining in an Excel file that is currently not easily shared nor analyzed outside of the DG for Supervision.

Figure 4. Field Follow-Up summary evaluation score report of school principals

By incorporating the Supervision and Field Follow-up scores directly into the SMIS, and by linking the SMIS to the HRMIS using an API, the HRMIS will be able to pull the data directly without additional data entry required from HR administrative personnel at the district level. Figure 5 diagrams this relationship between the five data sets. Blue squares indicate where APIs are needed. Grey squares indicate new fields in the SMIS.
5.1.2. Proposed School Records Integration Solutions

For school records, several data systems would usefully be linked to the SMIS database. These include the Buildings data, Textbooks data, and the GIS data. Figure 6 diagrams which data sets could be linked through APIs and which data sets require development of new SMIS fields and modules. To appropriately incorporate Supervision and GIS data, new configuration fields for school locality for defining cluster and education area would need to be added to the SMIS global configuration module. Doing so will enable useful disaggregated analysis of education data below the sub-municipal and district levels. The Buildings DG relies on a “school suffering index” to prioritize school rehabilitation and improvement initiatives. It is possible that this index could be automated as a report generated from the SMIS rather than relying on Excel. Similarly, AED and other Ministry stakeholders could pull the results of the District Unified Tests directly from the SMIS as they are entered in the system.
5.1.3. Benefits of an integrated system—transform the SMIS into an Education Management Information System (EMIS)

An integrated system is one that has two primary systems of record: one system for teacher records derived from the HRMIS and one system for learner/school records derived from the SMIS. Figure 7 depicts how the data would flow from these two sources and how the flow relates to the various data needs of the DGs. This is a far more efficient scenario than the existing multiple pipelines of data generated from schools (as depicted in Figure 1).

In addition to increasing efficiency and consistency, an integrated system would enable the Ministry to mine the data and conduct analyses related to education performance as never before. For example, linking test results to teacher supervision and GE data could enable the Ministry to identify areas of strength and weakness in instruction, or shed additional light on whether specific resources or school characteristics lead to measurable improvements in student learning or other key performance indicators such as dropouts and enrollment rates. It would also make it possible to develop school-, district-, and national-level reports that present side-by-side progress and status of EDSP key performance indicators (KPIs) for feedback, M&E, and planning. These opportunities are discussed under Section 5.2, along with capacity building recommendations for Ministry to make optimal use of this data.
5.1.4. Critical issues and assumptions for data systems integration

The two critical issues pertain to the vendors to develop and execute the API and the changes to the work flow processes for data entry and use. The original software developers are needed to develop the APIs because they are most knowledgeable about the source code. This requires their technical collaboration, particularly for SMIS and HRMIS API development. Section 7 details the technical specifications and guidelines for developing the data record integration APIs for the vendor software programmers to follow. Section 6 outlines in a Gantt chart the expected timeframe for development and implementation. If incremental changes are desired, our recommendation would be to first develop the APIs for HRMIS and SMIS integration, and concurrently create the new SMIS fields and modules for Supervision and Field Follow-Up. These two tasks will cover the majority of the teacher records integration needs and greatly advance the data analytic opportunities discussed under Section 5.2.

The technical solution for developing the APIs and writing the program code is relatively straightforward. The conditions for their (the APIs) successful implementation are more challenging: namely, the Ministry’s relationship with the existing vendors, the Ministry’s ability to provide quality assurance and quality control over the API development process, and the data security and ICT policies that govern data access privileges between DGs. The vendor management issue should be addressed through contractual service agreements, either with the

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**Figure 7. Unified and integrated education management information system**

SMIS = System of School and Learner Records. Data entered by Schools

Schools and Districts

HRMIS = System of Teacher Records. Data entered by Districts
Ministry or through a third-party donor. Comprehensive user acceptance testing (UAT) protocols will identify and document the system performance requirements; guidelines for these UAT protocols are included in Section 7. A formalized ICT policy should address the data access and security issues (see Section 5.6). Lastly, training and behavior change strategies so that Ministry and district personnel learn to optimally utilize the SMIS must precede the change in work flow processes. These behavior change strategies relate primarily to supporting SMIS deployment and are discussed in detail under Section 5.4.

5.2. Recommendation 2: Strengthen Capacity for Data Reporting, Analysis, and Feedback

Currently, data reporting and analytic capabilities are limited to existing static reports generated from the Access GE database, along with special studies and evaluations undertaken by various DGs, namely Planning (M&E and Studies divisions) and AED. While these studies and evaluations reflect a strong analytic statistical capability, there are a number of areas where the DGs’ capacity could be strengthened. As noted under Section 5.1.3, it will be particularly important to take advantage of the increased quantity and diversity of data that may potentially be available through the SMIS and integrated data systems. These capabilities include use of business intelligence tools within the SMIS to mine data and produce visually appealing custom reports; advanced statistical analysis for policy- and decision-making by examining factors affecting school and learner effectiveness; expanded inventory of static reports to meet other DG-reporting needs; automated school, district, and national KPI progress reports for feedback to schools and districts; and query-building and GIS analytic skills of SMIS users (national and district users), particularly for Planning and Buildings officers. The following section details each of these recommendations in turn.

5.2.1. Integrate a business intelligence capability within the SMIS

In the era of big data, analytic and reporting engines are increasingly becoming available and accessible to users across all sectors, including education. Once the SMIS comes online and is integrated with other systems, the Ministry will have a vast array of data at their disposal. Business intelligence applications will turbocharge the analytic capability of the SMIS. Although the SMIS has an existing reporting module, it is limited to static reports and a somewhat complicated query-builder that produces customized reports. There are several commercial off-the-shelf products available, such as QlikView and Tableau, as well as more custom solutions such as EMIS Toolbox (RTI-developed) that can assist in this process. Our recommendation is to install an application that is integrated within the SMIS and does not require users to manually import, convert, or manipulate data through Excel or other data conversion files. The backend installation will require SMIS vendor support and assistance.

5.2.2. Build capacity for advanced statistical analysis of school and learner effectiveness

The Ministry has recently produced several studies that examine learner and school effectiveness as well as data on other EDSP KPIs. However, these reports do not examine more deeply the relationships between learner performance and other variables that may correlate, such as school GE indicators, and teacher observation or evaluation measures. For instance, in a few years after the SMIS has been deployed and learner data are available, cohort tracking and analysis will become a possibility, which will offer decision-makers a clearer picture of how, whether, and why students are performing at expectations at different levels. There are Planning and AED officers with foundational skills in SPSS; they would benefit from further training and assistance for developing advanced analytic reports, as would the policy-makers, who could use these analyses for more informed decision-making on resource allocations, teacher training, and school-based support initiatives. Such analyses would further buttress budget requests that tie proposed outlays to outcomes under the Program-Based Budgeting initiatives. This training in statistical analysis would increase the efficiency of the M&E and Studies divisions in capturing and analyzing newly integrated data sets, as well as enable additional analyses beyond what is currently available.

5.2.3. Expand inventory of SMIS standard, custom, and GIS reports to meet other DG-reporting needs

If the SMIS is to serve as the information repository for other DGs such as Textbooks, Buildings, Supervision, and Field Follow-Up, it must generate the standard reports these DGs need. Building additional standardized reports is a developer task, but it could also be done through the reports/query-builder feature by end-users. Our recommendations are therefore two-fold: provide additional resources to the SMIS developer to expand the inventory of standard reports, when the information and data becomes available (post-integration); and provide training to end-users to build custom reports using the report-builder function. The latter will require some basic knowledge of the database structure and relationships, requiring at least a full day of training. This could be incorporated into a broader training program on SMIS rollout discussed below under Section 5.4. In addition, the GIS team is developing a web-based spatial analysis tool that will incorporate key education indicators and variables. These could be powerful tools for Ministry policy- and decision-makers across DGs once this tool comes online.

5.2.4. Develop strategic communications framework, feedback tools, and work practices for school-, district-, and national-level reporting

The schools in Palestine are tasked with significant reporting obligations, requiring extensive clerical work. The clerical work, however, is not recognized as important, particularly because schools do not receive feedback from the data in useful ways (in the form of school progress reports for example), or on the quality of the clerical work itself.14 Although some information is fed back to schools—for example, the results of District Unified Tests—there is no strategic communication plan or reporting products that report on KPIs across each of the EDSP Program

14 “Executive Summary of the Functional Audit” and corroborated through interviews with key informants.
Areas and Strategic Goals for schools or districts. Rather, schools and districts must develop their own KPI products, if they are so inclined. Under these circumstances, it is all but impossible for schools and districts to compare their performance against district or national averages, or to develop reports in visually appealing, easy-to-understand graphical formats. The business intelligence tools described above may help develop automated reports for schools and districts, as could possibly the customized reporting tools already available in the SMIS. Our recommendation is to assist the Ministry to develop a strategic communications plan that not only enables the production of such reports, but establishes expected work practices to utilize and share the performance data with stakeholders as part of their broader school- and district-development planning process. The Ministry, districts, and schools could benefit in several ways by institutionalizing these type of reports and feedback loops—help set data-driven benchmarks and monitor progress for schools, clusters, and districts; help school–community stakeholders better understand their schools’ performance and prioritize their school development plans and programs; and help districts prioritize areas for supervisory and instructional support to their schools and teachers.

5.3. Recommendation 3: Strengthen Validity and Reliability of Standardized Tests

As detailed under Section 4.1, paragraph 3, the quality of standardized tests are a key concern, particularly in terms of their validity and reliability. Although AED senior personnel indicated that they do conduct a discrimination analysis of test items, which determines the item’s degree of difficulty on a scale that helps measure the learner’s abilities, they did not indicate that they conduct specific reliability and validity tests using psychometric, item-response theory techniques. AED is in the process of developing an online IQB web-portal to be shared with districts. This online item bank will allow districts to access a database of items to be used in creating District Unified Tests. The launch of this tool offers an excellent opportunity to provide the technical assistance and training to AED in utilizing psychometric analyses for validity and reliability testing. In addition, the District Unified Test protocols could be strengthened to ensure greater inter-rater reliability and validation of results. This should include utilizing the SMIS for recording learner results (the fields and modules for recording exams already exist in the SMIS), as well as standardizing validation protocols and training school and district officers tasked with managing the testing and scoring process.

5.4. Recommendation 4: Support Ministry for SMIS Deployment and Widespread Adoption

The above recommendations (particularly for data integration) hinge on a fully functional SMIS. This section discusses the current status of the system, identifies issues for its deployment, and provides a set of recommendations to support the Ministry in its implementation. As noted in Section 4.1, the SMIS is in an advanced stage of piloting. Over the ensuing year, three key issues will challenge the Ministry’s widespread use and adoption of the SMIS: (i) the phasing-in strategy over at least a two-year timeframe, (ii) the behavior changes required of system users (from Ministry down to district and school officials), and (iii) the technical support capacity of
the Ministry to manage and maintain the deployment. The following recommendations respond to these challenges.

**Recommendations.** The following recommendations could be implemented by the Ministry alone, with the DGs for Planning and ICT at the lead. However, the Ministry could benefit from continued external technical assistance to these DGs as they put their SMIS implementation plan in place.

- **Begin using the SMIS immediately.** Certain SMIS features and functions can be implemented immediately, even as the pilot rollout to all schools proceeds. We recommend migrating current and historical school statistic (GE) data as soon as possible. Migration of historical GE data will enable immediate use of the SMIS by the DG for Planning, and aid in developing trends analyses. Moreover, using the system immediately will help the Ministry identify bugs during this important first year while ULTIMIT remains under contract to support bug fixes. It is not only technically possible due to the SMIS’ data import feature, but well within the skill sets of the ICT DG to execute and ULTIMIT to support.

- **Ensure look-up configuration tables are pre-populated with owning DG’s input.** Every data module in the SMIS has a DG which owns the system of record. For example, Exam Types and Exam Name descriptions (in the Exams tables) should be pre-populated with AED’s input (and ideally linked to the future online IQB), health variables should be (and probably were) pre-populated or at least identified by the DG for School Health, etc. This process is particularly important to ensure new modules and data fields reflecting other DG information needs are appropriately developed, defined, and coded.

- **Ensure user roles and responsibilities are clearly communicated at each level.** The SMIS must be situated within the broader ICT Policy (discussed in Section 5.6). Clearly defined user roles and responsibilities are integral to this policy.

- **Assess school IT capabilities (rapid survey) and “SMIS readiness,” prioritize school support according to need, and design training program according to need.** Schools will encounter numerous challenges in utilizing the SMIS. Their varying capability in terms of IT equipment, technical capacity, and available human resources requires the Ministry to customize its approach to school training and support by determining how each school could be best supported and which schools need additional support. This information could be collated based on a rapid survey of ICT capabilities, assessing both infrastructure and human capacity and needs, as well as attitudes toward ICT on the part of the school principals and secretaries. For example, the 30 percent of schools with Internet capability should receive different training and support than those 70 percent that must rely on the offline SMIS desktop version.

- **Establish a community of practice social network for SMIS users.** Social networks have emerged as natural vehicles for peer learning and experience sharing. Facebook groups, for example, tend to develop organically, and a similar network would allow users across schools and districts to support and learn from one another, which is a crucial ingredient for fostering behavior change and technology adoption. The E-Learn
and E-Schools sites may offer similar opportunities for developing virtual communities of practice.

- **Establish help-desk and administrative support structures and protocols at central, district, and school-cluster levels.** Protocols for trouble-shooting and school support will need to be established. They should involve identifying the first responder for schools with challenges or questions, the role of the district in supporting the school, and the role of the Ministry and service provider. Ideally, clear communication channels and customer service-oriented systems would be established to allow for transparent tracking and resolution of problems.

### 5.5. Automating and Sharing EDSP Monitoring Tools

The 2014–2019 EDSP is a comprehensive roadmap that details the Ministry’s programs and initiatives by Program Areas (pre-school, basic, secondary, and tertiary) and by Strategic Goals (access, quality, efficiency, and governance indicators). As the basis for the Ministry’s Annual Budget, the EDSP ensures that outlays are linked to outputs and outcomes. These are in turn translated into Ministry-wide procurement plans that govern DG implementation plans. During a quick review of the existing EDSP documentation, the assessment team noted that all the documents are MS Excel-based and are situated on the server in a shared folder that all DGs should be able to access. To make the EDSP more actionable for all stakeholders, we recommend utilizing web tools that would enable the automated production of DG-specific implementation plans (based on the Ministry-wide procurement plan) that are more easily accessed and understood by DGs. Such a system would also allow for distributed data entry by all DGs for tracking implementation progress as well as budget monitoring and tracking. This could include the use of a SharePoint site, the Ministry’s existing site, or other custom tools.

### 5.6. ICT Policy Recommendations

As noted under **Section 4.3**, paragraph 8, the Ministry is already in the process of developing an ICT Policy for review and consideration. And while this is certainly within the capacity of the Ministry to develop, the Ministry may still benefit from an external consultant to provide additional review and guidance as to the content of the draft policy. **Attachment 8** contains an illustrative draft of an ICT Policy document. At a minimum, the draft policy should include the following:

- Outline of roles and responsibilities of designated information managers in each DG and at all levels; incorporate into job descriptions
- Role-based access privileges and user restrictions (who has access to what data—dynamic access controls)
- Data sharing guidelines with other education providers (e.g., United Nations Relief and Works Agency and private sector) based on consultations
- Uniform standards for future software and database system development
- Guidelines for procuring ICT equipment and software licenses
• Approval processes for system developments and procurements
• Guidelines for sourcing preferred service providers for external service support and developing service-level agreements

6. **Timeframe for Implementation**

The recommended tasks and activities could take place within a 12- to 18-month timeframe. **Figure 8** depicts an illustrative and simplified Gantt chart to illustrate how activities may be sequenced, how they relate to one another, and the estimated timeframe for their execution.

**Figure 8:** Illustrative Gantt chart of tasks and activities

<table>
<thead>
<tr>
<th>Recommended Tasks and Activities</th>
<th>2015 Q1</th>
<th>2015 Q2</th>
<th>2015 Q3</th>
<th>2015 Q4</th>
<th>2016 Q1</th>
</tr>
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<tbody>
<tr>
<td>SMIS data migration of school statistic data (current and historical)</td>
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<td>Map existing DG reports to SMIS fields; identify missing fields and reports for SMIS development</td>
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<td>Develop API specifications for SMIS, HRMIS, NIET, and GIS (requires access to source code)</td>
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<td>Draft ICT Policy</td>
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<td>Draft SMIS school needs assessment survey</td>
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<td>Draft SMIS pilot monitoring and evaluation</td>
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<tr>
<td>Train AED staff on psychometric item-response theory analysis</td>
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<tr>
<td>Build new SMIS modules or relational databases for existing Excel systems</td>
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<tr>
<td>Develop APIs for SMIS, HRMIS, GIS, and NIET systems</td>
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<tr>
<td>Incorporate business intelligence tool into SMIS</td>
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<tr>
<td>Develop customized reports for DGs and districts</td>
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<td></td>
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<tr>
<td>Develop training/capacity building plan for SMIS deployment</td>
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<tr>
<td>Plan to scale up SMIS deployment to deploy in all schools in a given district (or two)</td>
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<tr>
<td>Develop formats for EDSP reports for central, district, and school levels</td>
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</tr>
<tr>
<td>Develop EDSP automated budget and planning tool for distributed data entry and sharing</td>
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</tr>
</tbody>
</table>
7. Draft Terms of Reference (TORs) for Recommended Data Integration Tasks

The following TORs represent discreet technical tasks that support a deeper level of integration to address the data gaps identified throughout this report. Starting with the critical linkages among the HR database (HRMIS), the SMIS, and the other legacy systems, a set of application programming interfaces are recommended that will serve as the first step toward an open information technology architecture. Due to the technical nature of this document, a glossary of terms is provided under Attachment 9.

7.1. TORs to Integrate Teacher Records (HRMIS) with SMIS and NIET

Currently, teacher records are maintained in an online system called E-HR. This system was written in the Java programming language and was developed by Jaffa Net (www.i-jaffa.net), a local IT firm. Because these teacher records are used in information systems throughout the MOEHE, a mechanism for automatically retrieving these data is needed. To achieve this, and to allow for the greatest compatibility with future systems, the source code for HRMIS would need to be modified to allow for a ReST\textsuperscript{15} HRMIS API. The following integration points have been identified:

<table>
<thead>
<tr>
<th>Source System</th>
<th>Destination System</th>
<th>Linkage</th>
</tr>
</thead>
<tbody>
<tr>
<td>HRMIS</td>
<td>NIET</td>
<td>Teacher profile data (linked to teacher ID)</td>
</tr>
<tr>
<td>HRMIS</td>
<td>SMIS</td>
<td>Teacher profile data (linked to teacher ID)</td>
</tr>
</tbody>
</table>

NIET uses an online database for tracking trainings they administer. This system, which was developed using Microsoft ASP.net, will need to be modified to make calls to use the HRMIS API when looking up teacher records. The DG of Planning uses the SMIS, a PHP\textsuperscript{16} application. Similarly, this system will also need to be modified to use HRMIS API when looking up teacher records. For both ASP.net\textsuperscript{17} and PHP, there are several software libraries for interacting with a ReST API, which will significantly reduce the level of effort in making these code modifications.

7.1.1. Human resource requirements

As a technical task, this activity requires a software engineer proficient in the technology stack of the given platforms to perform this work. In the case of HRMIS, this means an experienced Java

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\textsuperscript{15} Representational State Transfer: An architecture style or design pattern used as a set of guidelines for creating web services that allow anything connected to a network (web servers, private intranets, smartphones, fitness bands, banking systems, traffic cameras, televisions, etc.) to communicate with one another via a shared common communications protocol known as Hypertext Transfer Protocol (HTTP). http://en.wikipedia.org/wiki/Representational_state_transfer

\textsuperscript{16} PHP: a server-side scripting language designed for web development but also used as a general-purpose programming language. (PHP: hypertext preprocessor)

\textsuperscript{17} ASP.net: an open-source server-side web application framework designed for web development to produce dynamic webpages.
software developer with experience in database access using SQL and API development. Jaffa Net should be contracted to perform the work as the updates can only be made by the vendor since the E-HR is not open-source.

7.1.2. Time table
To complete this work, adequate time must be allocated for a thorough inventory of the existing software architecture. Although the scope of this effort is minimal, it is estimated that 40 hours of work will be required to thoroughly plan, design, implement, and test the proposed change for the HRMIS application.

7.1.3. Exit criteria
In order for this to be considered complete, clear exit criteria must be established. Documentation for how to use this new integration should be incorporated into the existing software requirements specification. A test log that maintains the criteria and current status of each test (unit or integration) will be sufficient to demonstrate appropriate test coverage.

7.1.4. Key stakeholders
The DG of Planning, the DG of Administrative Affairs, NIET, and the software vendor Jaffa.net are all key stakeholders in facilitating this integration; as such, each organization should have representation in the planning and execution of this activity.

7.1.5. HRMIS API specification
The HRMIS API would be used by any system that requires teacher records data. Initially there would be three interfaces to these data: one for retrieving all current teacher profiles, the second for retrieving all teacher profiles filtering on a school ID, and finally one for retrieving a single teacher profile with a given teacher ID.

<table>
<thead>
<tr>
<th>Description</th>
<th>Retrieve a teacher profile representation as an aggregation, expressed as JSON.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resource URI</td>
<td><a href="https://username:password@hrmis.moe.gov.ps">https://username:password@hrmis.moe.gov.ps</a> /teachers</td>
</tr>
</tbody>
</table>
| Sample Response | ```json
[ "teachers": [
  {
  "id": 12345,
  "firstname": "Ahmad",
  "lastname": "Abed",
  "telephone": "921-212-2121",
  "email": "ahmad@gmail.com"
  },
  {
  "id": 6789,
  "firstname": "Joseph",
  "lastname": "Abed",
  "telephone": "921-212-2121",
  "email": "joephy@yahoo.com"
  }
] ``` |
7.2. Integrate SMIS with Other Partner/Legacy Systems

There are other information systems used throughout the Ministry that consume data from the SMIS, including GIS and AED/IQB, AED/Tawjihi and AED/National Assessment (biennial), and AED/TIMMS. In the same way that the HRMIS could be modified to make its data more open and accessible, so too could the SMIS. The table below describes the source system of record and how and where it is integrated with the SMIS.
### Table 3. Source System of Record for Legacy Systems and SMIS Linkage

<table>
<thead>
<tr>
<th>Source System</th>
<th>Destination System</th>
<th>Linkage</th>
</tr>
</thead>
<tbody>
<tr>
<td>GIS</td>
<td>SMIS</td>
<td>GIS coordinates for each school, Census / population and projections data by locality and year</td>
</tr>
<tr>
<td>SMIS</td>
<td>AED/IQB</td>
<td>Subject ID and name/Grade ID and name</td>
</tr>
<tr>
<td>SMIS</td>
<td>AED/Standardized Test databases (Tawjihi and National Assessment)</td>
<td>School profile data/Student ID/Subject and grade IDs</td>
</tr>
<tr>
<td>AED/Standardized Tests</td>
<td>SMIS</td>
<td>Student test results, exam name and exam ID, exam type name and exam type ID</td>
</tr>
</tbody>
</table>

#### 7.2.1. Human resource requirements

As a technical task, this activity requires a software engineer proficient in the technology stack of the given platform to perform this work. There are three systems that will require the addition of an application programming interface: GIS, SMIS, and AED. For GIS, the application used by the DG of Planning is a commercial product called ArcGIS, which provides an array of integration options. As such, an ArcGIS specialist will be required for the GIS to SMIS integration. The API for SMIS and AED will require a PHP software engineer with experience in database access using SQL on MS SQL Server as well as API development.

#### 7.2.2. Time table

To complete this work adequate time must be allocated for a thorough inventory of the existing software architecture. Although the scope of this effort is minimal, it is estimated that 40 hours of work will be required for each API to thoroughly plan, design, implement, and test the proposed change to the application. Ultimately, the owner of the source system will be responsible for defining the API specification, although with input from key stakeholders.

#### 7.2.3. Exit Criteria

In order for this to be considered complete, clear exit criteria must be established. Documentation for how to use this new integration should be incorporated into the existing software requirements specification. A test log that maintains the criteria and current status of each test (unit or integration) will be sufficient to demonstrate appropriate test coverage.

#### 7.2.4. Key Stakeholders

The DG of Planning, the DG of Assessments and Evaluation, and the software vendor ULTIMIT Turnkey Solutions are all key stakeholders in facilitating this integration, as such each organization should have representation in the planning and execution of this activity.
7.2.5. SMIS API Specification

The SMIS API would be used by systems that require access GE and school planning data, including AED/IQB and AED/Standardized Test databases. Initially there would be two interfaces to these data: one for retrieving all schools with optional filters for district ID and grade and one for retrieving a school profile with a given school ID.

<table>
<thead>
<tr>
<th>Description</th>
<th>Retrieve school profile data (linked to school code), Variables for key performance indicators (enrolment, teachers, learner performance (aggregated), expressed as JSON.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resource URI</td>
<td><a href="https://username:password@smis.moe.gov.ps">https://username:password@smis.moe.gov.ps</a> /schools</td>
</tr>
<tr>
<td>Sample Response</td>
<td>{   &quot;schools&quot;: [     {       &quot;id&quot;: 12345,       &quot;name&quot;: &quot;Country School&quot;,       &quot;type&quot;: &quot;Primary&quot;,       &quot;address&quot;: &quot;1234 Country Street&quot;,       &quot;geo&quot;: {         &quot;lat&quot;: 34,         &quot;long&quot;: 39       }     },     {       &quot;id&quot;: 12345,       &quot;name&quot;: &quot;City School&quot;,       &quot;type&quot;: &quot;Secondary&quot;,       &quot;address&quot;: &quot;1234 City Street&quot;,       &quot;geo&quot;: {         &quot;lat&quot;: 32,         &quot;long&quot;: 33       }     }   ]   }</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Description</th>
<th>Retrieve a school profile representation as an aggregation for a given district, expressed as JSON.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resource URI</td>
<td><a href="https://username:password@smis.moe.gov.ps">https://username:password@smis.moe.gov.ps</a> /schools?districtid=9876</td>
</tr>
<tr>
<td>Sample Response</td>
<td>{   &quot;schools&quot;: [     {       &quot;id&quot;: 12345,       &quot;name&quot;: &quot;Country School&quot;,       &quot;type&quot;: &quot;Primary&quot;,       &quot;address&quot;: &quot;1234 Country Street&quot;,       &quot;geo&quot;: {         &quot;lat&quot;: 34,         &quot;long&quot;: 39       }     },     {       &quot;id&quot;: 12345,</td>
</tr>
</tbody>
</table>
Description | Retrieve a school profile representation of the addressed member, expressed as JSON.
--- | ---
Resource URI | https://username:password@smis.moe.gov.ps/school/12345
Sample Response | 
```
{
  "id": 12345,
  "name": "Country School",
  "type": "Primary",
  "address": "1234 Country Street",
  "geo": {
    "lat": 34,
    "long": 39
  }
}
```

Description | Retrieve a subject profile representation from a given grade id, expressed as JSON.
--- | ---
Resource URI | https://username:password@smis.moe.gov.ps/school/12345
Sample Response | 
```
{
  "subjects": [
    {
      "id": 12345,
      "name": "Arithmetic 101",
      "grade": "7"
    },
    {
      "id": 98742,
      "name": "Arabic 102",
      "grade": "7"
    }
  ]
}
```
7.2.6. AED API specification

The AED API would be used by systems that require assessment data managed by the DG for assessment, evaluation, and examinations. Initially, there would only be one exposed API for this dataset, which is to retrieve the subjects for a given grade.
7.2.7. GIS API Specification
The GIS server, ArcGIS, provides a rich ReST API for querying data.\textsuperscript{18} For applications, such as SMIS that would likely consume this data, documentation is provided by the GIS vendor and should be reviewed carefully.

7.3. Integrate Other Legacy Systems with an API or New Modules within SMIS
For directorates that maintain their data primarily in MS Excel spreadsheets, such as Field Follow-Up, Supervision, and Buildings, there is a tremendous opportunity to unlock their data with this new service-oriented architecture. This can be realized in one of two ways: through a custom SMIS module or through a third-party application. In either case, a thorough requirements-gathering effort will be necessary to capture what key data elements are included, any processing logic, and any security considerations. For example, the school principal summary evaluation scores would likely be included for Field Follow-Up, the school suffering index scores would likely be included for the DG of Buildings, and teacher evaluation scores and the attribute specification tables for cluster ID and education area IDs would likely be included for the DG of Supervision.

\textsuperscript{18} http://resources.arcgis.com/en/help/rest/apiref/
attachment 1. study scope of work

section c - background/goals & objectives/statement of work (sow), statement of objectives (soo) and performance work statements (pws)

C.1 Overview

The Contractor shall conduct a data gap analysis of the Palestinian Authority (PA) Ministry of Education and Higher Education (MoEHE) to assess its institutional capacities and human resource needs in terms of managing the Education Management Information Systems (EMIS) for the purpose of education data collection, analysis, and dissemination for policy making, systems development, program planning, monitoring and evaluation at all levels.

It is not a common practice for education systems around the world to make policy and planning decisions without sufficient accurate, relevant, or timely education data, particularly on quality or learning issues. Moreover, the data that does exist is often underused.

C.2 Background

The MoEHE’s EMIS has an abundance of data, databases and educational information systems. Some of this information is collected at the central Ministry; other information is collected and stored at the district or school level. More effective use of this wide range of information is essential in enabling the Ministry to move to a more evidence-based planning and decision-making system, and enable access to data for all relevant stakeholders; including for research purposes. The responsibility for the collection of data primarily resides with the Director General of Planning, especially the Division of Educational Statistics, which plays a centralizing and organizing role across the Ministry.

The main educational database consists of three components:

- General School Data (Number of students, teachers, etc.),
- Specialized School Data (sanitation units, libraries, etc.), and
- Qualitative school data (educational performance, annual national tests, etc.).

Aside from the three principal databases mentioned above, there are numerous smaller databases and information systems in place. Some of these databases are well advanced while others need improvement. These include:

- Budget and Accounting System (MoF, Bisan system)
- Human Resources (HR) Management System
- National Institute for Educational Training (NIET) Training Database
- Supervision Training Database
- Schools/students’ databases; such as results of schools and kindergartens surveys, students’ health, students with disabilities, educational facilities, etc.
- Database of Tests (national, standardized, and international)
- School Management Information System (currently under preparation)
- Inventory database; such as Furniture and Supplies
- Geographical Information System (GIS); such as school mapping
Area C database.
Planning and Projects Management (PPM) System.

Challenges remain with regards to the multiplicity of databases, and the EMIS needs to be more closely integrated with these other databases rather than continue on a stand-alone basis. Genuine decentralization in planning, finance, and management, and more open and transparent decision-making and reporting vis-a-vis the districts, schools, and wider public is a major goal for the new education strategy, which includes the years 2014 - 2018. Though there are some improvements, there are still several shortcomings, including information exchanges with the United Nations Relief and Works Agency (UNRWA) that need to be addressed.

The Ministry recently established a data center with the potential to integrate and harmonize all Ministry computer networks, servers and databases. The central Ministry has various wireless access points across its premises, and all staff is using modern desktops with Microsoft Office software. Although many schools have computer labs, more than 70% of schools are currently not connected to the Internet. Though planned, and despite the development of various IT systems such as e-school, a-exam etc., a comprehensive Information Communications Technology (ICT) policy was not achieved by the completion of the most recent strategic plan.

The Ministry has made technical and management improvements in developing an Annual Work Plan and Budget (AWPB). Related to the implementation of the AWPBs is the reporting system including the annual and semi-annual progress narrative, the monitoring and evaluation, the procurement, and the quarterly financial reports. While the quality of the reports has improved, they require further analysis to better inform and guide Ministry decision-making and development partners’ involvement. Aligning implementation reporting with financial expenditure reporting is partly dependent on harmonizing the Bisat system with the new program-based budgeting and planning logic whereby outputs are linked to policy objectives.

The division between the IT department and the use of computers and computer networks within the Ministry has led to fragmentation of policy direction and some confusion over provision and responsibilities. Thus, the development of a comprehensive IT policy covering both administration and schools remains a major challenge. It is necessary to identify means in which data, in an acceptable format, can be shared among numerous users throughout the Ministry and school systems.

C.3 OBJECTIVES

The Contractor shall implement the following tasks under the contract in collaboration with the MoEHE:

1. Inventory of databases, identification of user needs for information, and the system’s capacity to link education data with school/student information

In collaboration with the MoEHE, the Contractor will first conduct an inventory of all databases used at all levels that will include specific details of the information collected and the platform used. This exercise will simultaneously also identify users' needs for
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Ministry of Education and Higher Education
Task Order No. AID-294-BC-14-00001

information as well as the system's capacity to link education data with school/student information.

A. The Contractor will also examine data collection procedures. The data collection examination will check for redundant data collection. The Contractor will assess whether or not data are made available to other government entities for common use, or if they are collected repeatedly by different agencies.

The below-listed data systems should be analyzed as part of this data gap analysis:

- **EMIS systems**: The Contractor will examine the reliability of the EMIS data as well as the perception of reliability among potential users. In addition, the Contractor will analyze the main educational database, under the Division of Educational Statistics, that consists of general school data; specialized school data and qualitative school data; schools/students' databases; such as results of schools and kindergarten surveys, students' health, students with disabilities, and educational facilities; and the Planning and Projects Management (PPM) System.

- **Financial data systems**: The Contractor will conduct an analysis of the Budget and Accounting System (Ministry of Finance and the Bisan system).

- **Personnel data systems**: The Contractor will study the Human Resources (HR) Management System, the National Institute for Education Training (NIET) Training Database, and the Supervision Training Database.

- **Infrastructure and school mapping systems**: The Contractor will look for links to the other databases that can help analyze infrastructure and school mapping data.

- **Exams and outcomes databases**: The Contractor will study the Database on Tests (national, standardized, and international).

B. The contractor will compile an inventory of data services that outlines the type of data being provided, the supporting software with accompanying versions, its network configuration, and its access control. Each data service component identified will be reviewed to ensure that the correct permissions are in place to grant authorized users the appropriate level of access using a risk/gap analysis process.

C. The contractor will conduct a desk literature review of the existing systems' structures and current scopes of work: any available data dictionaries/system entities, with a list of all data elements necessary for the data gap analysis; systems' staffing structure; any previous EMIS/databases' analyses or assessments; the information technology (IT) policy; and any other policies or
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existing policy gaps that could identify required information priorities and/or information categories.

D. The Contractor through an informal interview process key members of the MoEHE will help identify gaps in service where either the datasets are not being shared effectively between offices, the datasets are not being aggregated and disaggregated appropriately in linking local and national EMISs, or the datasets are not structured consistently when shared. In addition, a thorough review of how and what datasets are made available to the public will be conducted.

2. Develop specific technical requirements

To prepare the Ministry for both implementing new database systems and retrofitting legacy systems, the Contractor will develop a set of high level technical recommendations. These recommendations will be developed to: (a) create single or multiple databases on platforms that permit sharing among users and conversion of existing standalone databases to be in conformance with single or multiple platforms proposed; (b) create interfaces that meet the needs of users from the school to the district to the Ministry; and (c) enable the transfer of information from all levels and between all users.

Where applicable, these documents will prescribe the data file format, data structure, and overall accessibility, including the interface definitions and access control. With these technical recommendations, the report will outline ways forward to integrate intra-ministerial data systems, as well as the potential integration with other ministerial systems (e.g., Ministry of Finance).

3. Data Linkage Evaluation

To effectively link education data with school and student information, common and consistent naming conventions and ultimately openness within the various management information systems (MIS) are required. The Contractor will evaluate the overall capacity for allowing such integration in two steps:

A. The Contractor will clearly identify the various systems of record and their outputs.

B. The Contractor will identify how these various data linkages are used and by whom and to ensure the appropriate access controls are in place.
4. Staffing structure and training needs
   A. The Contractor will conduct an analysis of the personnel data systems to allow
      the Contractor to begin identifying the staffing structure and training needs in
      relevant IT software and in the use of databases and analysis.

5. Final report
   The Contractor will include all findings in a draft final report of the data gap analysis that
   will first be shared with the Mission for review, comments, and clearance, after which it shall be
   shared with the MoEHE for their review, comments, and clearance. The report will include a
   description of the current EMIS, recommendations(s) for EMIS structures or upgrades, and draft
   scopes of work for the recommended structure/upgrade systems for procuring from local entities/firms. Comments and recommended changes will be
   incorporated into the final version of the report.

It is the intention of USAID/West Bank and Gaza (USAID/WBG) to use the technical
specifications and designs provided in the deliverables for possible local procurement. Therefore, RTI is precluded from bidding or partnering on any future procurement related to the SOWs to be developed under the Task Order.

C.4 DOCUMENTATIONS FOR REVIEW
   Literature to be reviewed by the contractor ahead of this data gap analysis will be
   provided by the MoEHE as below:

   - Existing systems’ structures and current scopes of work; such as: a list of the
     systems containing information on system name, office responsible for data, list
     of sub-systems, basic description, and technical owners and users.
   - Any available data dictionaries/system entities with a list of all data elements
     necessary for the data gap analysis such as names, definitions, data types,
     option values, data or systems’ mappings, and data models.
   - Systems’ staffing structure.
   - Any previous EMIS/databases’ analyses or assessments done.
   - The Information Technology (IT) policy
   - Any other policies or existing policy gaps that could identify required information
     priorities and/or information categories.

[END OF SECTION C]
Attachment 2. Documents Consulted

AMIDEAST, “Executive Summary of the Functional Audit of the MOEHE”, September 2014, Leadership and Teacher Development Program
Edwards, S., and LaTowsky, R., Early Grade Reading Assessment Baseline, West Bank, RTI International, EdData II, USAID, September 2014
Experts Turnkey Solutions, “MOEHE Business Analysis of National Item Banking System,” 2013
MOEHE 2014 Bulletin of Education Statistics
MOEHE 2015-2017 Budget and Annual Work Plans
MOEHE Buildings site selection report, school suffering index (MS Excel)
MOEHE Draft ICT Policy, DG for ICT
MOEHE EDSP procurement plan (MS Excel)
MOEHE Field Follow-up school principal evaluation report (MS Excel)
MOEHE Geographic Information Systems Report, 2014
MOEHE Results from 2012 National Assessment Tests, 2014, Assessment, Evaluation and Examinations
MOEHE School Health Annual Report (MS Excel)
MOEHE teacher supervision report (MS Excel)
MOEHE Toward a Unified ICT Strategy Plan, 2010
MOHE School Census Survey, 2014
Pettigrew, M., External Evaluation of the Education Development Strategic Plan (2008 to 2012), June 2013, ICON Institute
Romahi, E., “Assessing the Educational System in Palestine: An NGO Perspective,” Teacher Creativity Centre, November 2010
Thaung, N. “Better Data for Better Teacher,” presentation to the MOEHE, August 2012, UNESCO
ULTIMIT Advanced Turnkey Solutions, “Software Requirements Specification (SRS) for Developing, Integrating and Implementing School Management Information System (SMIS), Parts 1 and 2, Version 5” UNESCO, November 2012
World Bank, West Bank and Gaza Education Sector Analysis, September 2006
### Attachment 3. Persons Contacted

<table>
<thead>
<tr>
<th>Date</th>
<th>Ministry Office/Organization</th>
<th>Representatives</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>10/23/2014</td>
<td>MOEHE Computer Center</td>
<td>Mr. Mohammad Alkhatib</td>
<td>Head of Data and Programming</td>
</tr>
<tr>
<td>10/28/2014</td>
<td>USAID</td>
<td>Mr. Robert Davidson</td>
<td>Director, Office of Education and Youth</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mr. Alex Khayo</td>
<td>Systems Manager</td>
</tr>
<tr>
<td></td>
<td>AMIDEAST</td>
<td>Dr. Said Assaf</td>
<td>Leadership and Teacher Development (LTD), Chief of Party</td>
</tr>
<tr>
<td>10/30/2014</td>
<td>MOEHE Office of Assistant Deputy for Planning</td>
<td>Dr. Basri Saleh</td>
<td>Assistant Deputy for Planning</td>
</tr>
<tr>
<td>11/17/2014</td>
<td>MOEHE Computer Center</td>
<td>Mr. Taleb Al-Haj</td>
<td>Director, Computer Center</td>
</tr>
<tr>
<td>11/24/2014</td>
<td>MOEHE Computer Center</td>
<td>Mr. Taleb Al-Haj</td>
<td>Director, Computer Center</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mr. Mohammad Alkhatib</td>
<td>Head of Data and Programming</td>
</tr>
<tr>
<td>11/27/2014</td>
<td>MOEHE Computer Center</td>
<td>Mr. Mohammad Alkhatib</td>
<td>Head of Data and Programming</td>
</tr>
<tr>
<td>12/3/2014</td>
<td>MOEHE Computer Center</td>
<td>Mr. Mohammad Alkhatib</td>
<td>Head of Data and Programming</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mr. Rida</td>
<td>Leadership and Systems Administrator</td>
</tr>
<tr>
<td>12/4/2014</td>
<td>AMIDEAST</td>
<td>Dr. Said Assaf</td>
<td>Leadership and Teacher Development (LTD), Chief of Party</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mr. Steven Keller</td>
<td>AMIDEAST Country Director</td>
</tr>
<tr>
<td>12/7/2014</td>
<td>MOEHE Office of Assistant Deputy for Planning</td>
<td>Dr. Basri Saleh</td>
<td>Assistant Deputy for Planning</td>
</tr>
<tr>
<td></td>
<td>MOEHE Directorate General of Projects</td>
<td>Eng. Samir Rajab</td>
<td>Director General of Projects</td>
</tr>
<tr>
<td></td>
<td>MOEHE Assessment &amp; Evaluation Department</td>
<td>Dr. Mohammed Matar</td>
<td>Director, Assessment &amp; Evaluation Dept.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mr. Khaled Bisharat</td>
<td>Head of Research &amp; Statistical Analysis</td>
</tr>
<tr>
<td>12/8/2014</td>
<td>ULTIMIT</td>
<td>Mr. Saeed Zidan</td>
<td>CEO</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mrs. Amenah</td>
<td>SMIS Team Leader</td>
</tr>
<tr>
<td>12/9/2014</td>
<td>MOEHE DG of Planning &amp; Statistics</td>
<td>Dr. Ma'moon Jaber</td>
<td>Studies &amp; Information Manager</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mr. Munjed Suleiman</td>
<td>Head of Statistics Section</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mrs. Rabeeca Alian</td>
<td>Head of Monitoring &amp; Evaluation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mrs. Omniat Buirat</td>
<td>SMIS Officer</td>
</tr>
<tr>
<td></td>
<td>MOEHE School Map Section</td>
<td>Mr. Mahdi Hamdan</td>
<td>Head of School Map Section</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mr. Abduallah</td>
<td>GIS Officer</td>
</tr>
<tr>
<td>Date</td>
<td>Ministry Office/Organization</td>
<td>Representatives</td>
<td>Position</td>
</tr>
<tr>
<td>----------</td>
<td>--------------------------------------</td>
<td>-------------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>12/10/2014</td>
<td>MOEHE Computer Center</td>
<td>Mr. Taleb Al-Haj</td>
<td>Director, Computer Center</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mr. Mohammad Alkhatib</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MOEHE DG of Finance</td>
<td>Mr. Musheer</td>
<td>Director General of Finance</td>
</tr>
<tr>
<td></td>
<td>MOEHE DG of Administrative Affairs</td>
<td>Mr. Mustafa Alodeh</td>
<td>Director General of Administrative Affairs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mr. Mohanad Abu Shama</td>
<td>Director of Personnel Affairs</td>
</tr>
<tr>
<td></td>
<td>MOEHE DG of Buildings</td>
<td>Mr. Fawaz Mujahed</td>
<td>Director General of Buildings</td>
</tr>
<tr>
<td>12/11/2014</td>
<td>MOEHE DG of Supervision &amp; Educational Qualifying</td>
<td>Mr. Tharwat Keilani</td>
<td>Director General of Supervision &amp; Educational Qualifying</td>
</tr>
<tr>
<td></td>
<td>MOEHE Directorate of Education - Jericho</td>
<td>Mr. Mohammed Hawash</td>
<td>Director of Education - Jericho</td>
</tr>
<tr>
<td>12/15/2014</td>
<td>MOEHE DG of Field Follow up</td>
<td>Mr. Mohammad Al-Qubbaj</td>
<td>Director General of field follow up</td>
</tr>
<tr>
<td></td>
<td>MOEHE DG of Text Books and Printing</td>
<td>Mr. Ali Abu Zaid</td>
<td>General Director of Text Books and Printing</td>
</tr>
<tr>
<td></td>
<td>MOEHE - AL-Bireh Elementry Mixed School</td>
<td>Mrs. Rula Abu Bakir</td>
<td>Principal</td>
</tr>
</tbody>
</table>
Attachment 4. MOEHE Organizational Chart
Attachment 5. De-Brief Presentation Shared with MOEHE and USAID

State of Palestine Ministry of Education and Higher Education
Data Gap Analysis

December 16, 2014
Prepared by Chris Colantoni, Amman, Jordan
Center for Research Excellence (CORE), Jordan, USA

Purpose of the Data Gap Analysis

- Support MOEHE goal to achieve “better decision-making through better information”
- Identify system capacities and needed upgrades or improvements in terms of sharing data within the MoEHE as well as the public at the national level.
- Recommend solutions and develop technical requirements for MOEHE or third-party implementation.
Activities and Methodology

- Survey of DGs through semi-structured interviews
  1. Planning (M&E, Studies and Statistics/SMIS, EDSP)
  2. ICT
  3. Projects
  4. Buildings
  5. Supervision
  6. HR
  7. Finance
  8. AED
  9. Textbooks
  10. Field Follow-Up
  11. General Education
- Background research and policy reviews
- District divisions (Planning, Buildings, Health, Field Follow-Up) — Jericho
- School visit (Al Bireh)
- Analyze data schematics and source records (where applicable)
- Stakeholder interview (ULTIH, AMID/EA)
- IT/ICT capacity analysis

Analytic Approach

Quality information is available and used, but neither optimally nor efficiently.

Supply

Demand

Capacity

Quality information available, but underutilized or sitting idle.

Data Gap Analysis for Education Policy, Planning and Management in West Bank and Gaza
Findings

- The Ministry is producing and consuming data widely; institutionalized within core work practices
- Many good systems are in place, which offer significant opportunity for data integration
- Multiple studies conducted by multiple departments
- Significant levels of effort are expended to produce and utilize data
- Rich, valid data on the quality of teaching and learning
- Strong IT infrastructure and network
- School Management Information System (SMIS) offers an opportunity for a unified platform for data integration
- Bisan budgeting module and EDSP are linked.

Key Capacity Issues

1. Data silos reflect organizational work practices
2. Data reporting and analytic capabilities
3. New SMIS will require significant Ministry support for its widespread adoption
4. EDSP monitoring tools are Excel-based; limits sharing and use.
5. Lack of uniform standards & HR for IT systems implementation
Data Silos and Information Sharing – Current Status

Width of arrows reflects relative efficiency of data transmission.

Data Integration Capacity Issues

- Multiple sources of records of schools and teachers
- Qualitative (teaching and learning) data not systematically integrated with school statistics
- Desktop (MS Excel and Access) systems lack capability for integration, distributed data entry and information sharing
- Significant inefficiencies due to duplication of data collection, management efforts across DGs and district divisions
- Data validity and quality degraded due to the lack of controls and duplication.
Proposed Data Integration Tasks

1. New Fields/ Modules in SMIS
   - Unified Tests
   - Field Follow-Up
   - Buildings
   - Supervision
   - Textbooks
   - Census data

2. API to SMIS
   - AED standardized tests
   - GIS
   - HRMIS

3. API to HRMIS
   - SMIS
   - NIET

API = Application Programming Interface. Software program that allows database systems to talk to each other.

Requires software service provider support for development

SMIS

Source: SMIS software requirement specifications, v.5.0, UJITMRT
Teacher Records Integration – Recommended Solution

API = Application Programming Interface.
Allows relational database systems to talk to each other.

Teacher Data Integration Outcomes

- Increase timeliness and accuracy of teacher data for planning
- Timely data on teacher qualification and upgrading needs
- Decrease level of effort in managing teacher data across the Ministry
- Link teacher practices to school effectiveness
School-Quality Data Integration Outcomes

- Link inputs to outputs and outcomes
- Generate consolidated EDSP performance reports by programs and outcomes, at Central, District and School levels
- Utilize GIS spatial analysis
- Incorporate data on teaching/learning materials into the EDSP reports
- Establish Unique Student Identification

But..... reporting and analytic capabilities need to be strengthened

- SMIS reports limited to current modules only
- Unable to report down to sub-district levels (education area and school cluster)
- Time consuming to develop EDSP performance reports for Central and district levels
- Currently no systematic production of school report cards; strategic communications and feedback to school-community stakeholders is limited, not holistic
- Limited opportunity for advanced policy analysis due to lack of integration
- Standardized test items not rigorously evaluated for validity and reliability
Recommended Solutions for Strengthening Data Analysis Capability

- **Technical/software tools:**
  - Build customized reports for new SMIS DG users based on consultations and existing reports
  - Incorporate business intelligence tools into SMIS for advanced analytics and data mining capability (off the shelf applications - licensed and open source options)

- **Human resource capacity building:**
  - Training on use of psychometric IRT analytic tools (requires special software)
  - Training to conduct advanced statistical analysis from merged data to conduct policy-oriented research

Outcomes of enhancing data analysis capability

- Ensure validity and reliability standardized test data
- Policy analysis on school/teacher effectiveness
- Disaggregate indicators by district, education area, cluster and schools
- Customized and real-time reports for DGs and districts
- School- and district reports with consolidated EDSP indicators, visualized and automated
All this first requires a fully functional SMIS

- **Current Status of SMIS:**
  - Deployed on MOE servers, piloting to begin in 100 schools in the West Bank
  - Fully developed system to provide learner, teacher and school data,
  - Provides tools to school heads for school administrative tasks
  - Designed for school-level data entry

Key issues for SMIS deployment

- Will take a minimum of two years for near universal use by schools
- Will require significant training and behavior change strategies for school, district and DG users
- Will require additional IT human resources to help manage the database and software
Recommendations for supporting SMIS deployment

- Don't wait 2 years to use the SMIS. Migrate current and historical school statistic data as soon as possible.
- Prioritize data elements for data entry; minimize burden of school-level users.
- Ensure user roles and responsibilities are clearly communicated (at each level).
- Assess school IT capabilities (rapid survey) and prioritize school support according to need.
- Design national training program to specific user roles and responsibilities, as well as school needs.
- Develop a community of practice social network for SMIS users.
- Develop helpdesk and admin support at Central and district levels.
- Situate the SMIS into a broader MOE ICT Policy.

ICT Policy Recommendations

- Include outline of roles and responsibilities at all levels; incorporate into job descriptions.
- Role-based access privileges and user restrictions (who has access to what data – dynamic access controls).
- Incorporate data sharing guidelines with other education providers (e.g., UNRWA and private sector) based on consultations.
- Include uniform standards for future software and database system development.
- Provide guidelines for procuring ICT equipment and software licenses.
- Clarify approval processes for system developments and procurements.
- Develop guidelines and preferred service providers for external service support and service level agreements.
Recommended Near-Term Steps (3 to 6 months)

- SMIS data migration of school statistic data (current and historical)
- Map existing DG reports to SMIS fields; identify missing fields and reports for SMIS development
- Develop API specifications for SMIS, HRMIS, NIET and GIS (requires access to source code)
- Draft ICT Policy
- Draft SMIS school needs assessment survey
- Draft SMIS pilot monitoring and evaluation
- Train AED staff on psychometric IRT analysis

Recommended Medium-Term Steps (6 months to one year)

- Build new SMIS modules or relational databases for existing Excel systems;
- Develop APIs for SMIS, HRMIS, GIS and NIET systems
- Incorporate business intelligence tool into SMIS
- Develop customized reports for DGs and districts
- Develop training/capacity building plan for SMIS deployment
- Plan to scale up SMIS deployment to deploy in all schools in a given district (or two)
- Develop formats for EDSP reports for central, district and school levels
- Develop EDSP automated budget and planning tool for distributed data entry and sharing
Summary of Recommendations

1. Integrate teacher records (HRMIS) with SMIS through API development (or replace existing HRMIS with SMIS)
2. Integrate other legacy systems with API or new modules within SMIS
3. Enhance business intelligence and reporting capabilities within SMIS
4. Strengthen reliability, validity of standardized tests
5. Develop deployment and change management plan for SMIS
6. Establish ICT policy

Thank you and Questions?
Attachment 6. SMIS Hierarchy of Modules and Data Components
Attachment 7. MOEHE Software Inventory
<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Description (data use/purpose)</th>
<th>Back-end</th>
<th>Front-end</th>
<th>Website</th>
<th>Owning DG</th>
<th># Users</th>
<th>Owner</th>
<th>Developer/Sponsor</th>
<th>Date Introduced</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>School EMIS/educational data</td>
<td>Collects school &amp; kindergarten data, teachers records, students, student &amp; teacher distribution, and teachers load...etc. (It collects most of K12 related info and produces main-Ministry statistical books)</td>
<td>Access</td>
<td>Access</td>
<td>DG of Planning &amp; District DGs</td>
<td>40</td>
<td>Statistics Section (DG of Planning)</td>
<td>ITC</td>
<td>1998</td>
<td></td>
</tr>
<tr>
<td>2.1</td>
<td>Bisan Enterprise Edition</td>
<td>Financial enterprise application featuring: receivables, payables, inventory, budget and many more</td>
<td>MySQL</td>
<td>Java</td>
<td>DG of Finance &amp; District DGs</td>
<td>180</td>
<td>DG of Finance</td>
<td>BISAN</td>
<td>2007</td>
<td></td>
</tr>
<tr>
<td>2.2</td>
<td>Gov Financial System</td>
<td>Used to record financial transactions based on the MOF requirements</td>
<td>MySQL</td>
<td>Java</td>
<td>DG of Finance &amp; District DGs</td>
<td>5</td>
<td>DG of Finance</td>
<td>BISAN</td>
<td>2011</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>HR Management System (E-HR)</td>
<td>It is a full featured HR information system which includes functions such as employee main file, vacations and leaves, evaluation/performance, teachers salaries, and every transaction related to the employee file</td>
<td>Oracle</td>
<td>Ors. Forms</td>
<td>DG of Administrative Issues &amp; District DGs</td>
<td>180</td>
<td>DG of Administrative Issues</td>
<td>Jaffa.Net</td>
<td>2006/2007</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Survey of schools and kindergartens</td>
<td>It is a simplified (customized) copy of the EMIS to speed up the collection process for the early decisions regarding teachers distributions</td>
<td>Access</td>
<td>Access</td>
<td>DG of Planning &amp; District DGs</td>
<td>40</td>
<td>Statistics Section (DG of Planning)</td>
<td>ITC</td>
<td>1998</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>GIS (School Map) Software</td>
<td>GIS set of tools to combine schools and educational info to geo maps</td>
<td>SQL-Server</td>
<td>ASP.Net</td>
<td>DG of Planning</td>
<td>School Map Section</td>
<td>Off-the-Shelf</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>6</td>
<td>NET Training database</td>
<td>A software solution used to track and administer training courses offered by the NIET, it relies on the employees files from the e-HR and tracks trainees qualifications</td>
<td>SQL-Server</td>
<td>ASP.Net</td>
<td>NIET</td>
<td>Based on Sessions</td>
<td>ITC</td>
<td>1998</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Supervision training database</td>
<td>A set of access and excel tools used for teachers evaluation</td>
<td>Access/Excel</td>
<td>Access/Excel</td>
<td>DG of Supervision &amp; District DGs</td>
<td>40</td>
<td>DG of Supervision</td>
<td>ITC</td>
<td>1997</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>School health database</td>
<td>Tracks students health within the school including (vaccination, epidemics, eyes and dental disease)</td>
<td>Access</td>
<td>Access</td>
<td>DG of School Health &amp; District DGs</td>
<td>40</td>
<td>DG of School Health</td>
<td>ITC</td>
<td>1998</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Database on furniture and supplies</td>
<td>A tool to track Ministry assets @ HQ/OGs/Schools</td>
<td>Access</td>
<td>Access</td>
<td>DG of Supplies &amp; District DGs</td>
<td>40</td>
<td>DG of Supplies</td>
<td>ITC</td>
<td>1998</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Projects Database</td>
<td>A group of simple tools which replace the Jaffa.Net PKS to track project info and challenges</td>
<td>Access</td>
<td>Access</td>
<td>DG of Projects</td>
<td>3</td>
<td>DG of Projects</td>
<td>ITC</td>
<td>2013</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Database on tests (national, standardized, and international)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.1</td>
<td>International Tests</td>
<td>An online system available for two months which used to administer the TIMSS</td>
<td>Access/Excel</td>
<td>Access/Excel</td>
<td>DG of Assessment, Evaluation, and Examinations</td>
<td>D.G. of Assessment, Evaluation, and Examinations</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>11.2</td>
<td>Test Item Bank</td>
<td>This system targets one component of testing session work (stage evaluation) which helps in generating test forms and archive the questions and goals of a specified course</td>
<td>Sharepoint</td>
<td>ASP.Net</td>
<td>DG of Assessment, Evaluation, and Examinations</td>
<td>D.G. of Assessment, Evaluation, and Examinations</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.3</td>
<td>Tawjeehi (Secondary School Standard Exam)</td>
<td>A database to track and manage Tawjeehi which includes students files, exams and reports</td>
<td>Oracle</td>
<td>Forms</td>
<td>DG of Assessment, Evaluation, and Examinations</td>
<td>D.G. of Assessment, Evaluation, and Examinations</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Field Follow-Up</td>
<td>A set of tools to track surveys and teachers evaluations and addresses the settler/military violations in Area C</td>
<td>Access/Excel</td>
<td>Access/Excel</td>
<td>DG of Field follow up</td>
<td>ITC</td>
<td>ITC</td>
<td>1998</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>School Management Information System (in preparation)</td>
<td>An enhanced system to administer the education process (to replace the EMIS) which additionally features students full file, grades, absence, school info, teachers, and many more.</td>
<td>MS SQL Server 2012</td>
<td>PHP</td>
<td>YES</td>
<td>Winstry, District DGs, Schools, &amp; Teachers</td>
<td>DG of Planning</td>
<td>ULTIMATE</td>
<td>2014-2015</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Planning and Projects Management System (PPM)</td>
<td>It was combined with the HR system (in the same bid), but it is not successfully implemented</td>
<td>Oracle</td>
<td>Ors. Forms</td>
<td>DG of Planning</td>
<td>DG of Planning</td>
<td>Jaffa.Net</td>
<td>2006/2007</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>e-School</td>
<td>A web based system used a platform to connect schools, students, parents, and the ministry (forums &amp; news)</td>
<td>SQL-Server</td>
<td>PHP/Dupal</td>
<td>Public</td>
<td>-</td>
<td>ITC</td>
<td>ULTIMATE</td>
<td>2012</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Dajel</td>
<td>An online network of schools to share materials, exams, homeworks, training courses, and discussion boards</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ITC</td>
<td>2015</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>E learning</td>
<td>The palestinian eLearning platform, it is part of a project to revitalize the use of electronic learning through palestinian schools</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2014</td>
<td></td>
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</tbody>
</table>

**Data Gap Analysis for Education Policy, Planning and Management in West Bank and Gaza**
INFORMATION TECHNOLOGY POLICY AND PROCEDURE MANUAL

INTRODUCTION
The MOEHE IT Policy and Procedure Manual provides the policies and procedures for selection and use of IT within the business which must be followed by all staff. It also provides guidelines MOEHE will use to administer these policies, with the correct procedure to follow.

MOEHE will keep all IT policies current and relevant. Therefore, from time to time it will be necessary to modify and amend some sections of the policies and procedures, or to add new procedures.

It is very important to apply these policies and procedures to all employees. The main benefits to having this policy and procedure manual:
- ensures all staff are aware of obligations in relation to selection, use and safety when utilising information technology within the business
- is a proven way to help your managers and supervisors make consistent and reliable decisions
- helps give each employee a clear understanding as to what you expect and allow.

It is crucial to make this policy manual a living document by:
- Asking IT staff for their thoughts on how to improve it.
- Review it every six months.
- Make explaining your policies and procedures an important part of your induction process.
- Incorporating any suggestions, recommendations or feedback on the policies and procedures.

EXPECTED SECTIONS
The expected topics that this manual should cover include but not limited to:
1. Unit Operations:
A clear description of the organization (DG for Educational Technologies and Information and Communication Technology - ETICT) duties, services, and operations.

2. Organization Structure:
A well-defined description of the organization’s departments and units along with a clear documentation of their duties and tasks (segregation of duties).

3. List of ETICT services & their agreement level
   a. Technical support
   b. Accounts and users management
   c. Enterprise applications services
   d. Data management (exports & uploads)
   e. Training
   f. Labs administration & maintenance
   g. Video conferencing
   h. Educational technologies tools
   i. Electronic libraries and resources

4. MOHE Policies related to ETICT
   a. Policy location and publication of this manual
   b. Hardware purchasing
   c. Software acquisition
   d. Records management/retention
   e. Handling students/employees and schools records
   f. Domain Name System (DNS)
   g. Communication technology (Cell Phones)
   h. Multimedia systems
   i. Computer labs
   j. Equipment reassignment or disposal
   k. IT security
   l. Electronic publications
   m. Telecommunications
   n. Wireless

5. ETICT Policies
   a. Backup
   b. Data warehouse
   c. Desktop computer standards
   d. End user desktop authorities
   e. Mass email
   f. Software licenses
   g. Data security
6. ETICT Procedures & Best Practices
   a. Email System
   b. File Sharing & Copyrights
   c. Mobile Security Guidelines
   d. Network printers, copiers, & multifunction devices
   e. Password guidelines
   f. System administration
   g. Video conferencing

7. Continuous Development
   a. Policy Writing Instructions
   b. Procedures Writing Instructions
   c. Development and Review Process
SAMPLE POLICY FORM
Technology Hardware Purchasing Policy
Policy Number: 
Policy Date:

Computer hardware refers to the physical parts of a computer and related devices. Internal hardware devices include motherboards, hard drives, and RAM. External hardware devices include monitors, keyboards, mice, printers, and scanners

Purpose of the Policy
This policy provides guidelines for the purchase of hardware for the MOEHE to ensure that all hardware technology for the Ministry is appropriate, value for money and where applicable integrates with other technology for the Ministry. The objective of this policy is to ensure that there is minimum diversity of hardware within the Ministry.

Procedures

Purchase of Hardware
The purchase of all desktops, servers, portable computers, computer peripherals and mobile devices must adhere to this policy.

1. Purchasing desktop computer systems
2. Purchasing portable computer systems
3. Purchasing server systems
4. Purchasing computer peripherals
5. Purchasing mobile telephones
6. Smart phones & Tablets
7. Smart boards
### Attachment 9. Glossary of Terms

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>API</td>
<td>Application programming interface. Software program that allows to database applications to communicate with one another.</td>
</tr>
<tr>
<td>SMIS</td>
<td>School Management Information System. For the purpose of this project, SMIS is a fully web-based system, designed and developed for the use at school level to store, manage and secure data and information of schools (i.e. students, educational resources, school infrastructure and other related data). Also, SMIS is a system that extracts indicators through out-of-the-box statistical reports to be used by planners and decision makers at school, districts and ministry levels. In this document, we used SMIS term interchangeably with the term EMIS (Education Management Information System).</td>
</tr>
<tr>
<td>EMIS</td>
<td>Education Management Information System. An alternative name of SMIS.</td>
</tr>
<tr>
<td>HRMIS</td>
<td>Human Resources Management Information System. A database of personnel (especially teachers, principals, secretaries) that can be integrated with the SMIS to generate the Schools Formations.</td>
</tr>
<tr>
<td>Java</td>
<td>A general-purpose computer programming language that is concurrent, class-based, object-oriented.</td>
</tr>
<tr>
<td>JSON</td>
<td>JavaScript Object Notation, is an open standard format that uses human-readable text to transmit data objects consisting of attribute-value pairs. It is used primarily to transmit data between a server and web application, as an alternative to XML.</td>
</tr>
</tbody>
</table>
Attachment 10. Task Analysis for Data Integration

The following section attempt to provide a roadmap to aid the Ministry to plan for and implement the core data integration recommendations. This includes:

- the important issues/actions around which consensus would be needed
- the players/representatives of different units/offices who would have to be involved
- the information/considerations that would need to be on the table to facilitate reaching an informed consensus

Recognizing that these recommendations require coordinated efforts across directorates and amongst private firms, we identify the core stakeholder offices to be engaged and the documentation to be shared that will aid in building consensus and developing a coordinated action plan.

**Table 4** describes the related teacher records integration tasks. These include: developing APIs from HRMIS to SMIS; API between HRMIS and NIET; and developing additional fields in SMIS to incorporate Field-Follow-Up and Supervision evaluation scores of school heads and teachers respectively into the SMIS.

**Table 5** describes the related school records integration tasks. These include: new modules and/or fields in the SMIS for DG Buildings (school suffering index data), district unified test results, school cluster and education area location variables, and textbook inventory, as well as API between GIS databases and SMIS.

These integration tasks will require coordinated efforts between the DG for ICT, the DG for Planning/SMIS and other relevant DGs. They also require the direct involvement of the private vendors responsible for database systems development. ULTIMIT Advanced Turnkey Solutions (SMIS developer) along with the other vendors where applicable, must be tasked to develop the terms of reference and user acceptability test requirements. In addition, for systems that migrate from Excel to the SMIS (such as Textbook Printing Inventory Reports or Field Follow-Up Evaluation Reports), the vendors should develop new standardized reports based on end-user reporting needs.

**Governance and management considerations for task implementation.** Given the cross-DG collaboration and consultation required, the close management of the vendors, and the corresponding change in work practices that accompany each integration task, we recommend a **Data Integration Task Force** that draws from the relevant DG offices, chaired by a senior executive (Assistant Deputy Minister or Deputy Minister) in the Ministry. For each task, a subcommittee of technical experts and data end users should be tasked to guide the specific action plans, oversee vendors and conduct user acceptability testing.

In addition, each of these integration tasks reflects new work to be performed by vendors, new work practices to be adopted by school, district, and central end users, and new reporting
requirements within the SMIS. The vendors must be contracted for their services, the end users must be trained, and the policies that govern access privileges for data entry and reporting must be developed or updated. Each of the subcommittees of the Data Integration Task Force should be empowered and capable to develop the documentation and management tools to successfully oversee the implementation of these tasks and activities.
Table 4. Task Analysis for Teacher Records Integration

<table>
<thead>
<tr>
<th>Discrete Tasks</th>
<th>Key issues for consensus</th>
<th>Benefits and considerations</th>
<th>Stakeholders and reference docs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher records integration</td>
<td><strong>Develop APIs for HRMIS and SMIS databases</strong></td>
<td><strong>Discrete Tasks</strong></td>
<td><strong>Key issues for consensus</strong></td>
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<tr>
<td></td>
<td>Agreement on system of record or teacher data: HRMIS or SMIS</td>
<td><strong>Benefit.</strong> Single system source of record for teacher data; reduce discrepancies across multiple databases; reduce clerical workload on part of schools and districts.</td>
<td>Stakeholders</td>
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<td></td>
<td>Determine the HRMIS teacher data/records that the SMIS requires (for Planning, districts and schools) – review Staff Module in SMIS system requirements specifications (SRS) document (Ver3.0, Part II).</td>
<td><strong>Considerations.</strong> Does the HRMIS provide all the needed information of SMIS? If not, what is missing? Conversely, does the SMIS provide all the needed school-level data for the HRMIS (eg, enrolment data)? If not, what is missing (eg, teacher appraisal scores)? Are teacher ID and school codes harmonized in HRMIS and SMIS?</td>
<td>Reference docs</td>
</tr>
<tr>
<td></td>
<td>Determine the SMIS school data/records that the HRMIS requires (for DG Administration)</td>
<td><strong>Benefit.</strong> Reduce manual transmission and upload of data between HRMIS and NIET systems.</td>
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<td>Determine access privileges for HRMIS and SMIS users</td>
<td><strong>Considerations.</strong> Does NIET have reliable internet and reliable access to Ministry/ICT server? Are there other DGs that need access to NIET data?</td>
<td>Stakeholders</td>
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<tr>
<td></td>
<td><strong>Teacher records integration</strong></td>
<td><strong>Develop APIs for HRMIS and NIET databases</strong></td>
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<td></td>
<td>Determine the NIET records that the HRMIS (DG Administration) requires</td>
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<td></td>
<td>Determine the HRMIS records that NIET system requires</td>
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<tr>
<td>Discrete Tasks</td>
<td>Key issues for consensus</td>
<td>Benefits and considerations</td>
<td>Stakeholders and reference docs</td>
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<tr>
<td>Teacher records integration</td>
<td>Develop additional fields in SMIS:</td>
<td>Benefit. Enables analysis of teacher and head teacher appraisal / performance data with other data on school/learner performance. With API between HRMIS and SMIS, eliminates manual transmission of data between HR and Supervision and Field Follow-Up.</td>
<td>Stakeholders</td>
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<tr>
<td></td>
<td>• Field Follow-Up evaluations</td>
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<tr>
<td></td>
<td>• Supervision evaluations</td>
<td>Considerations. Do district Supervision and Field Follow-Up officers have read/write access to SMIS modules? API between HRMIS and SMIS should allow HRMIS to access this data directly.</td>
<td>DG Planning,</td>
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<tr>
<td></td>
<td>Determine which data produced by Supervision and Field Follow-Up should be incorporated into the SMIS Staff Module (for example, summary evaluation scores only or other data?).</td>
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<td>DG of Administrative Affairs</td>
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<td></td>
<td>Determine modifications to SMIS Staff Module SRS and SMIS Staff use case modifications</td>
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<td>DG of ICT</td>
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<td></td>
<td>Determine access privileges for HRMIS and SMIS users</td>
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<td>DG of Supervision</td>
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<td></td>
<td>Determine SMIS-generated standardized reports for Supervision and Field Follow-Up</td>
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<td>DG of Field Follow-Up</td>
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<td>JaffaNet</td>
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<td></td>
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<td>ULTIMIT Turnkey Solutions</td>
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</tbody>
</table>

**Next steps for all tasks.** Form Data Integration Task Force. Develop subcommittees dedicated to each task with participation of technical officers from relevant stakeholders. Develop action plan for managing vendors, including TORs and user acceptability tests. Develop plan to train staff and conform work practices to new system. Update reports modules in SMIS SRS and standardized reports according to DG specifications and needs.
### Table 5. Task Analysis for School Records Integration

<table>
<thead>
<tr>
<th>Discrete Tasks</th>
<th>Key issues for consensus</th>
<th>Benefits and considerations</th>
<th>Stakeholders and reference docs</th>
<th>Reference docs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>School records integration</strong></td>
<td><strong>Develop fields/module in SMIS for DG Buildings school suffering index</strong></td>
<td><strong>Benefit.</strong> Single repository for school-data</td>
<td>DG Planning, DG Buildings, DG of ICT, ULTIMIT, Turnkey Solutions</td>
<td>Buildings “school suffering index” reports, SMIS SRS</td>
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<tr>
<td></td>
<td>Determine data requirements and needs for DG Buildings that are not currently accounted for in the SMIS</td>
<td><strong>Considerations.</strong> Does the SMIS provide all the needed information for DG Buildings? If not, what is missing? What type of reports will be needed from the SMIS? What are the protocols for districts or schools to enter or access the data? How easily or difficult to add additional modules into the SMIS to calculate “school suffering index”.</td>
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<td></td>
<td>Determine SMIS School Module SRS and SMIS use case modifications to account for new data needs</td>
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<td></td>
<td>Determine access privileges for District DG Buildings officers and SMIS report formats</td>
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<tr>
<td><strong>School records integration</strong></td>
<td><strong>Develop fields in SMIS for unified test results for learners</strong></td>
<td><strong>Benefit.</strong> SMIS provides standardized database with offline capability for capturing unified test results. By integrating standardized test results with other EMIS data enables integrated reporting and advanced statistical analysis (see recommendation 2).</td>
<td>DG Planning, AED, DG ICT, Office of the Deputy Minister, ULTIMIT, Turnkey Solutions</td>
<td>List of unified tests and scoring procedures, SMIS SRS</td>
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<td></td>
<td>Determine whether unified test options are included in the SMIS Exam Type and Exams Configuration modules</td>
<td><strong>Considerations.</strong> Should unified test summative scores for individual students should be entered only? Or should the system accommodate item-by-item results captured? The latter may be a future development and could be linked to the Item Question Bank currently under development.</td>
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<td></td>
<td>Review protocols and user access privileges for entering unified test data into SMIS at cluster-based test centers.</td>
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<td></td>
<td>Determine policy and training needs for end users to address the reliability concerns of the test results.</td>
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<tr>
<td><strong>School records integration</strong></td>
<td><strong>Develop fields to incorporate cluster and education area names and codes as location variables into SMIS</strong></td>
<td><strong>Benefit.</strong> Allows for sub-district analysis of education indicators by education administrative locations: cluster and education area; enables comparative analysis of schools in a cluster, clusters in an education area, or education areas in a district. This is beneficial for using data for targeted sub-district school/cluster support and prioritization within a given cluster.</td>
<td>DG Planning, DG Supervision, DG Planning/GIS, DG ICT, ULTIMIT, Turnkey Solutions</td>
<td>List of clusters and education areas provided by Supervision, with names (and codes if applicable), List of clusters and education areas provided by GIS with names and codes</td>
</tr>
<tr>
<td>Discrete Tasks</td>
<td>Key issues for consensus</td>
<td>Benefits and considerations</td>
<td>Stakeholders and reference docs</td>
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<tr>
<td><strong>School records integration</strong></td>
<td>Determine fields for new public configuration module for textbook data per class and subject</td>
<td><strong>Benefit.</strong> Streamlined data entry and reporting of textbook needs by schools. Allows for automated reports by DG for Textbooks Printing. Could enable advanced analytics relating textbook type and quality to school and learner performance. Could provide real-time data on textbook inventory needs and requisitions.</td>
<td>DG Planning&lt;br&gt;DG Textbooks Printing&lt;br&gt;DG ICT&lt;br&gt;ULTIMIT Turnkey Solutions&lt;br&gt;SMIS SRS, Part I of II.</td>
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<tr>
<td>Develop fields/modules in SMIS to incorporate data on textbook availability and report on textbook needs in schools</td>
<td>Determine use case requirements for data entry</td>
<td><strong>Considerations.</strong> In addition to the existing data currently captured by DG for Textbooks, what other data could be valuable for administrative actions, statistical analysis and real-time inventory management?</td>
<td>DG Planning&lt;br&gt;DG Textbooks Printing&lt;br&gt;DG ICT&lt;br&gt;ULTIMIT Turnkey Solutions&lt;br&gt;SMIS SRS</td>
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<tr>
<td><strong>School records integration</strong></td>
<td>Determine reporting requirements for DG for Textbooks Printing</td>
<td><strong>Benefit.</strong> For GIS Department, enables their database to capture updated real time data on school characteristics and variables for production of spatial analyses, atlases and dynamic reports. For DG Planning/SMIS, GIS data enables opportunity to incorporate spatial analysis for future business intelligence tools developed for SMIS. May allow for greater use of spatial analysis by end users at central and district levels.</td>
<td>DG Planning&lt;br&gt;DG Planning/GIS&lt;br&gt;DG ICT&lt;br&gt;ULTIMIT Turnkey Solutions&lt;br&gt;Alameen Technologies</td>
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<tr>
<td>Develop API between SMIS and GIS database systems</td>
<td>Determine whether boundary data/shape files are to be incorporated into SMIS public configuration modules for Areas, Directorates, Governorates, Localities (and Clusters and Education Areas)</td>
<td><strong>Considerations.</strong> What are the technical implications if any to migrate/host the ArcGIS database on the MOEHE/ICT server? How might the web-based dynamic analytic tool under development by GIS serve as a broader business intelligence/reporting engine? How might other DGs make use of spatial analyses of school, teacher and learner performance data?</td>
<td>DG Planning&lt;br&gt;DG Planning/GIS&lt;br&gt;DG ICT&lt;br&gt;ULTIMIT Turnkey Solutions&lt;br&gt;Alameen Technologies&lt;br&gt;SMIS SRS</td>
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<td>Determine whether GIS coordinate data is available for in public configuration modules and school variable fields</td>
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<td></td>
<td>Determine school records and data that ArcGIS database requires, as well as the dynamic reporting tool currently under development.</td>
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<td></td>
<td>Determine means to migrate to GIS database onto MOEHE/ICT server</td>
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</tbody>
</table>

**Next steps for all tasks.** Form Data Integration Task Force. Develop subcommittees dedicated to each task with participation of technical officers from relevant stakeholders. Develop action plan for managing vendors, including TORs and user acceptability tests. Develop plan to train staff and conform work practices to new system. Update reports modules in SMIS SRS and standardized reports according to DG specifications and needs.