Surveying Department of Libya Geo-Tech Consulting

CAPACITY BUILDING
AT SURVEYING DEPARTMENT OF LIBYA

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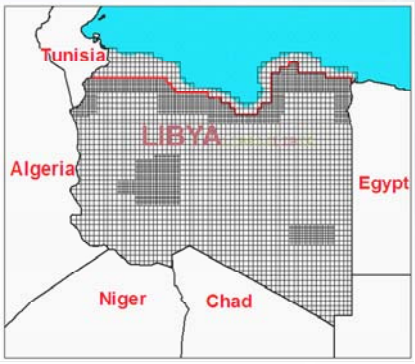
Libya, like all developing nations, requires accurate maps depicting its geography, natural resources, population centres, transportation network; and many other types of information that can be presented visually to support decision making and daily government business. For the optimal handling of the resources and any location related planning process geographic information are required. **Traditionally the geographic information was available in form of paper maps mainly based on analogue aerial photos.**



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NO	TASKS	DESCRIPTION
1	**Institutional Development and Capacity Building**	- Assessment of SDL & MSD - Study of International best praxis and success cases - Assessment of partnership with local institutions - Reviewing LSDI SDL assessment and upgrade SDL&MSD - Preparation of Strategic plans for SDL & MSD - Development of policies and procedures for data dissemination - Development of organizational chart - Development an institutional capacity building program - Preparation of implementation plan - Supervise implementation plan - Preparation of Technical training program
2	**Map Production, Geodatabase and Portal GIS**	- **Work Package-1**: CORS Establishment - **Work Package-2**: Geodetic Network and Geoid - **Work Package-3**: Ground Control Points - **Work Package-4**: Aerial photography and AT - **Work Package-5**: Orthophoto - **Work Package-6**: Digital, thematic and LBS mapping - 1/25,000 mapping - 1/50,000 mapping - 1/100,000 to 1/2,000,000 mapping - **Work Package-7**: Geodatabase and portal GIS - **Work Package-8**: HW/SE and Equipment - **Work Package-9**: Training

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TASKS	DESCRIPTION
Work Package-1: Establishment of CORS-LIBYA	Establish CORS along coast line of Libya (50 stations)
Work Package-2: Upgrading Geodetic Control Network and Geoid Determination	a) Establish additional stations (200) b) Survey existing stations (61 +) b) Determine national dm-level geoid
Work Package-3: Establishment of Ground Control Points	Establish ground control points for mapping
Work Package-4: Aerial Photography and Aerial Triangulation	a) Acquire aerial images in two seasons (1,660,000 km2) b) Carry out Aerial Triangulation (if required) or c) Carry out georeferencing

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TASKS	DESCRIPTION
Work Package-5: Orthophoto Mapping	a) Compile DEMs at 5 m grid spacing b) Compile orthophoto maps (1/10K) / 1,660,000 km2
Work Package-6: Production of 1/25K, 1/50K, and 1/100K-2000K Digital Topographic Mapping, Color Land Use Thematic Mapping and Navigational / LBS Mapping	a) Compile 1/25K map sheet (280,000 km2) b) QA/QC 1/25K existing maps (95,000 km2) c) Derive 1/50K map sheets from 1/25K sheet (375,000 km2) d) Compile 1/50K map sheets (1,285,000 km2) e) Derive 1/100K map sheet (1,660,000 km2) f) Derive 1/250K – 1/2000K map sheet (1,660,000 km2) g) Compile color land use mapping for all scales above h) Compile 1/25K navigational / LBS maps (10,000 km2) i) Compile 1/100K navigational / LBS maps (1,660,000 km2)
Work Package-7: Establishment of Geodatabase	Establish geodatabase and metadata consisting of: - Geodetic network points and CORS - Aerial photographs - DEMS and orthophotos - Topographic maps (1/25K -1/2000K) - Landuse thematic maps - Navigational / LBS maps - Other spatial data available in SDL

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TASKS	DESCRIPTION
Work Package-8: Provision of HW / SW and Equipment	a) Provide servers & workstations &PCs, tablet PCs b) Provide Softcopy Photogrammetric Systems c) Provide GNSS sets d) Provide 4WD Vehicles e) Provide Scanners, plotters, printers, archival drawers f) Provide Geodatabase, GIS and portal software f) Others …
Work Package-9: Training	a) Assist capacity building of SDL b) Conduct training of staff in-house c) Conduct training of staff for B.Sc. degree d) Conduct training of staff for M.Sc. degree

Good Practice Framework

SDL should follow the requirements of the Good Practice Framework. The prospect of implementing the Libyan digital base map system offers an opportunity to develop a strategic approach for developing and maintaining new, digital base maps and associated mapping and analysis functions.

To assist in developing such a strategy, the core functions that National Mapping/Survey organizations around the globe currently employ as a set of “good practices” are being documented.

Sector	Business Functions	Business Activities
The National Mapping / Survey Sector	Adopt and promote the use of standards	• Adapt and promote the use of technical standards • Adopt policies relevant to data sharing, distribution, information ownership and security
	Manage national geodesy	• Calculate and maintain a geodetic control network • Maintain monuments and monument records • Maintain geodetic standards • Manage survey support network
	Provide leadership for base mapping and conduct data collection	• Develop strategic and tactical leadership to manage data collection from multiple organizations
	Conduct data compilation and integration	• Develop data sharing partnerships • Integrate data from federal agencies and local organizations • Compile data at multiple scales and accuracies into a geodatabase • Map information from aerial and satellite sources • Develop ongoing and effective collaboration with other relevant agencies
	Manage information systems	• Administer the computing infrastructure • Design/build geodatabase • Database administration • Archival activities • Provide executive leadership • Institute IT investment and management policies • Maintain data quality • Manage distribution of data to other agencies and the public
	Conduct GIS analysis	• Generate derived products • Develop printing operations • Develop cataloguing mechanisms • Develop distribution strategy
	Partnership development	• Document metadata • Develop data sharing policies • Develop marketing strategy • Develop dissemination strategies
	Provide products and services	• Provide consulting on survey and mapping issues • Develop standard products • Provide special projects • Provide E-services • Respond to map requests from other agencies
	Procurement and contract administration	• Develop technical requirements/specifications • Develop quality assurance/quality control of deliverables • Develop contract policies • Implement contract management "best practices"

One important role of SDL will be to adapt and promote the use of relevant technical standards as the use of GIS, GPS and related technology expands throughout Libya. Many of the good business practice standards for geospatial information are developed and published by voluntary national or international standards organizations.

A second critical role for the Agency is to adopt policies that describe how the agency will address issues such as data sharing, distribution, information ownership, and information security.

The primary goal for SDL should be:

- Be the primary provider of base geographic maps and services
- Be recognized experts in surveying and digital mapping
- Serve decision makers and citizens current, accurate base geographic data that can be delivered via the Internet

Based on the modern approach of data acquisition, data handling, the seamless digital base map of Libya and the geodatabase as base and partially source for all location related information in Libya **some of the exits units become obsolete, others are changed by the amount of work and importance, new units have to be included** and some structures required for the institutional best praxis should be respected.

Institutional Development Report have been prepared and submitted to SDL.

This proposal consists of a national mapping organization which **produces maps and map information internationally and serves these data digitally over a portal**.

Capacity Building

The optimal and sustainable use and upgrade of a geoinformation system as the digital base map of Libya never cannot be successful without **tailor made education and training.** This is one of the key points for the successful build up and continuous use of a geodatabase.

The staff members have to be qualified for the new functions. In general the workforce has to be modernised to fulfil the new functions.

Capacity Building

SDL must shift emphasis from being an organization that is focused primarily on **traditional map production and transform to become geospatial knowledge managers**. This involves using a broader range of information (digital spatial data and attribute data, predictive models, analyses, scientific reports, etc.) and having the ability to incorporate data produced by other organisations.

Capacity Building

Map products derived from the digital database are different to former static paper maps, now **"living maps"** will be possible by linking spatial data and tabular attributes; and through the delivery of Internet mapping applications. These powerful applications allow users to interact with data to answer questions or solve problems directly from any Internet browser. This requires the knowledge of handling such systems in SDL and the **cooperating agencies requiring a school of Surveying and Geoinformation** associated with SDL.

Capacity Building

The **workforce and associated skills** needed in SDL are very different than the skills currently in place in the SDL. Operating in a digital environment will require significant organizational and personnel ***change.*** Change must occur in organizational philosophy, followed by **willingness, commitment and ability** to recruit, hire, and train new staff with expertise to perform the required functions. This means different skill sets and philosophy.

Workforce modernization, at the level necessary to support digital base mapping in Libya, can be achieved through **small core groups** of subject matter experts in each functional area **to provide leadership**, foreign contractor support, and provide quality assurance and integration, coordination, and outreach functions are needed. Achieving the goal of workforce modernization will require a timeframe of some years.

The deployment of a modern systems approach for managing spatial information will offer SDL and cooperating agencies the opportunity to plan a **new set of products and services.** The following tasks comprise actions that are necessary:

- oIdentify desired standard products
- oIdentify consulting and E-services opportunities
- oDesign a product/services dissemination strategy

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SDL should commit to become a key node on the **Libyan Spatial Data Infrastructure (LSDI)** and work together with other key federal agencies to insure its success. Not only will this allow input into the direction of the LSDI, but the experience gained through participation will serve as important opportunities for mentoring SDL staff.

- oContribute data to the geospatial portal
- oServe on relevant policy committees and technical working groups
- oParticipate in pilot projects
- oCoordinate with other Libyan Spatial Data Infrastructure agencies

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One of the most important strategic actions SDL can undertake is to inculcate the organization with a philosophy of **working cooperatively** with outside organizations.

SDL staff has to be open for cooperation within SDL and with other cooperating organisations it must be present what it means to be a “good partner”. Such non-technical quality is essential for the progress.

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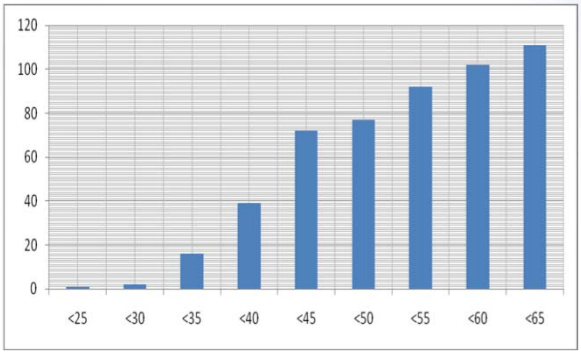
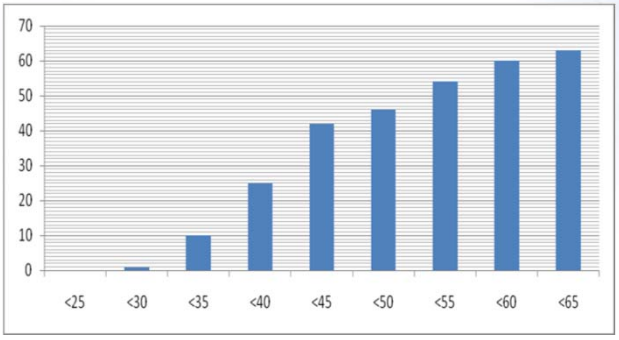
PRESENT STAFF OF SDL (total)

Up to 25 years old: 1
Up to 30 years old: 2
Up to 35 years old: 16
Up to 40 years old: 39
Up to 45 years old: 72
Up to 50 years old: 77



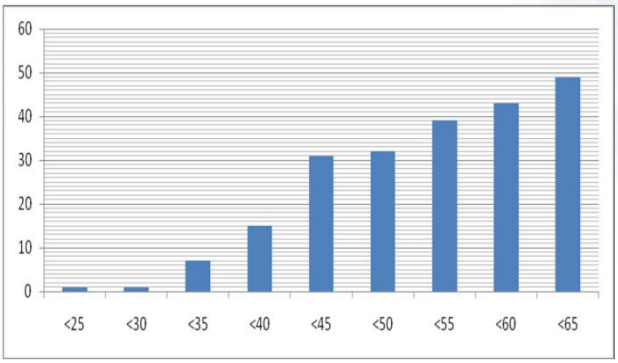
PRESENT STAFF OF SDL (technical)

Up to 25 years old: 0
Up to 30 years old: 1
Up to 35 years old: 10
Up to 40 years old: 25
Up to 45 years old: 42
Up to 50 years old: 46



PRESENT STAFF OF SDL (administrative)

Up to 25 years old: 1
Up to 30 years old: 1
Up to 35 years old: 7
Up to 40 years old: 15
Up to 45 years old: 31
Up to 50 years old: 32



The average age of SDL staff is **over 40.**

63 out of 111 staff members belongs to the group being able to get technical training and education. Only 25 of them are under 40 years and, they also have **no experience in digital map production** techniques.

It is obvious; that the available staff members of SDL are not fitting into the requirement criteria's of proposed new authority without having tailor made education and training.

NO	SUBJECT	QTY
M. Sc. In Geodesy		
1	Satellite Geodesy, GNSS, CORS	2 Student / 2 years
2	Physical Geodesy, Geoid	2 Student / 2 years
M. Sc. In Photogrammetry and Remote Sensing		
3	Aerial Photography, LIDAR, sensors and Orthophoto Mapping	2 Student / 2 years
4	Digital Photogrammetric Mapping, City models	2 Students / 2 years each
M. Sc. In GIS		
5	Information Systems, Database Design, Geodatabase Establishment	2 Student / 2 years
6	Web-Based GIS, Portal GIS, Data Dissemination	2 Students / 2 years each
M. Sc. In Cartography		
7	Map Publishing, Map Generalization and Presentations	2 Student / 2 years
M. Sc. In Surveying and Mapping		
8	Surveying and Mapping	2 Student / 2 years
M. Sc. In Software Engineering and Systems		
9	Software Engineering	2 Students / 2 years each
10	System Administrators / Analysts	2 students / 2 years each

M.Sc Courses

2 years abroad

Geodesy
Photogrammetry and Remote Sensing
GIS
Cartography
Surveying & Mapping
Software Engineering and Systems

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BSc + short courses (2 month)

B. Sc. In Geomatics Engineering		
11	Geomatics Engineering	20 students / 4 years each
Short Courses Abroad		
12	Geodesy, Photogrammetry, GIS, Mapping	25 students / 2 months

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NO	SUBJECT	QTY
General Training		
1	Surveying and Mapping Principles, Coordinate Systems, Datum and Map Projections	2 Weeks / 12 trainees
2	Geodesy, CORS, GNSS Measurement Techniques, Network Design, GPS Field Surveys, Computations, Terrestrial Surveys	2 Weeks / 12 trainees
3	Aerial Photography, Aerial Triangulation, DEMs, Orthophoto, Photogrammetry	4 Weeks / 12 trainees
4	Satellite Mapping, Remote Sensing, Rectification	2 Weeks / 12 trainees
5	GIS, Portal GIS, Geodatabase (Design and Establishment)	4 Weeks / 12 trainees
6	Project Planning, Management and QA / QC	2 Weeks / 12 trainees
Software Training		
7	Basic courses on the softwares that will be used in the project, the trainees in General Training will be grouped according to the software need at each stage.	8 weeks / 6 trainees
Project Specific Training		
8	In-house Courses about the Project Activities and Products, Operation and Maintenance	8 Weeks / 4 trainees
On-the-job Training		
9	On-the-job Training related to all activities of the Project	30 Trainees / afterward company employee

training in Libya, on-the-job

General training 2 – 4 weeks

Software training 8 weeks

Project specific training 8 weeks

On-the-job training – for all technical staff members

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NO	ITEM	QTY
ESRI Licences		
1	ArcView Concurrent	10
2	ArcEditor Concurrent	2
3	ArcScan Concurrent	2
5	ArcGIS Server ENT Basic Upto 4 cores	2
6	ArcGIS Server Advanced Up to 4 Cores	2
7	ArcGIS Server Advanced Network Extension Up to 4 Cores	2
8	ArcGIS Server Advanced Spatial Extension Up to 4 Cores	2
9	Annual Subscription for ESRI Developer Network (EDN)	2
10	ArcGIS Image Server Up to 4 Cores	2
11	ArcGIS Data Interoperability Concurent Use License	2
12	ArcGIS Survey Analyst Concurrent License	2
13	ArcGIS Portal Toolkit	2
14	ArcPAD together with Rugged Tablet PCs	10
ORACLE Licences		
1	Oracle Database Enterprise Edition (Processor Based)	2
2	Partioning (Processor Based)	2
3	Tunning Pack	2
4	Configuration Management Pack	2
Microsoft Licences		
1	Windows Server Enterprise 2003 R2a Win32 English 1pk DSP OEI CD	20
2	Visual Studio Professional	6
3	Windows Office 2007 Enterprise (100 Users)	2
4	Antivirus (100 Users)	2

CORS Training will cover the following topics:
CORS receivers, other hardware / equipment, CORS and CC installation, integration and maintenance
CORS and CC Operation (communication with CORS, network solution, computations of corrections, post-processing, etc.), and services to users

the software licenses for which training is required are listed

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School for surveying and geoinformation at SDL

• The successful use of the Libyan digital base map system, not only by SDL, **requires educated staff**. Training and education will be given during the national mapping and geodatabase project, but the requirement for training never ends.

•There is a lack of education in surveying and geoinformation, as required by SDL and others, within Libya. Also on the university level education in surveying engineering in combination with geoinformation, today often named also **as geomatics, does not exist.**

• **A School of Surveying and Geoinformation** for applied education on the level of technician and for giving training courses to other governmental units as well for continuous training of SDL staff members **should be founded.**

•This school should start with education on the level of technician and should give training courses for other governmental units.

•A major topic of this education is **the applied training**. More necessary as theoretical knowledge is the practical handling of the equipment and the software. It may be possible to add later on in cooperation with a university the education on the level of BSc, while the education on MSc-level at least for a while has to be made abroad.

Conclusion

Up to date the following works have been done, in scope of Institutional Development / Capacity Building works;

- oOrganization have been reviewed and a new Organizational Chart have been proposed
- oCapacity Building program
- oTechnical Training program
- oStrategic Plan
- oData Policy
- oProject Management approach and proposal

Conclusion

- o Map projection and datum
- o1/1K,1/5K,1/10K base maps technical specifications
- oQA/QC for field surveying
- oGeographical names
- oMapping Index
- oBuilding Construction Technical Specification


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