



SGI Studio Galli Ingegneria SpA

Overview of the AQUAKNIGHT Project

Giorgio Galli, COO, SGI Studio Galli Ingegneria SpA
giorgio.galli@sgi-spa.it



The logo consists of the letters 'S', 'G', and 'I' in a stylized, outlined font, each enclosed within its own square frame.

life, first

STUDIO GALLI
INGEGNERIA



ANNIVERSARY
1920 - 2010

Italian independent Consultancy

History

Established in 1920

Personnel

>150 staff

Turnover

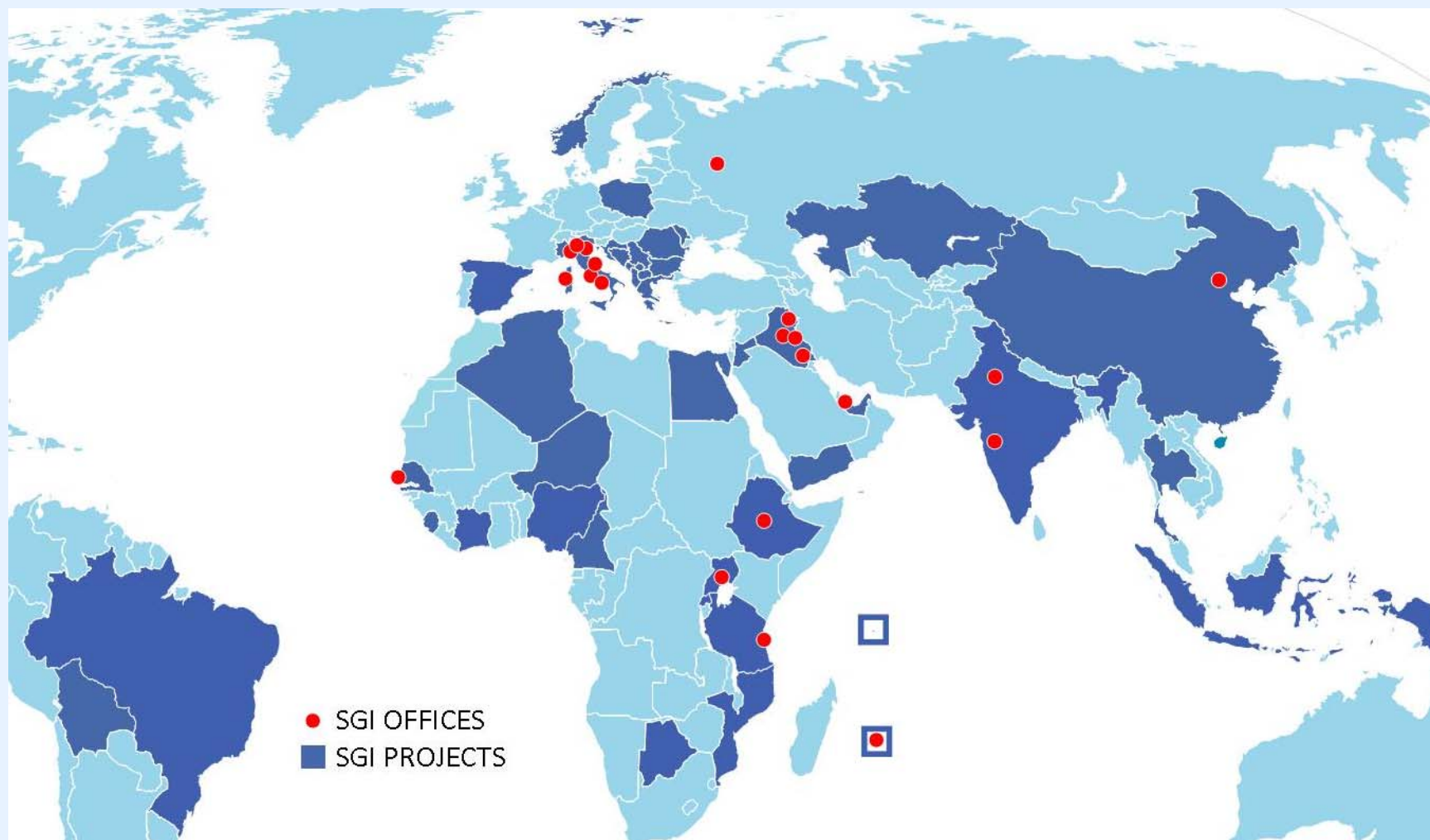
> 20 Million USD

Locations

Present in > 30 countries



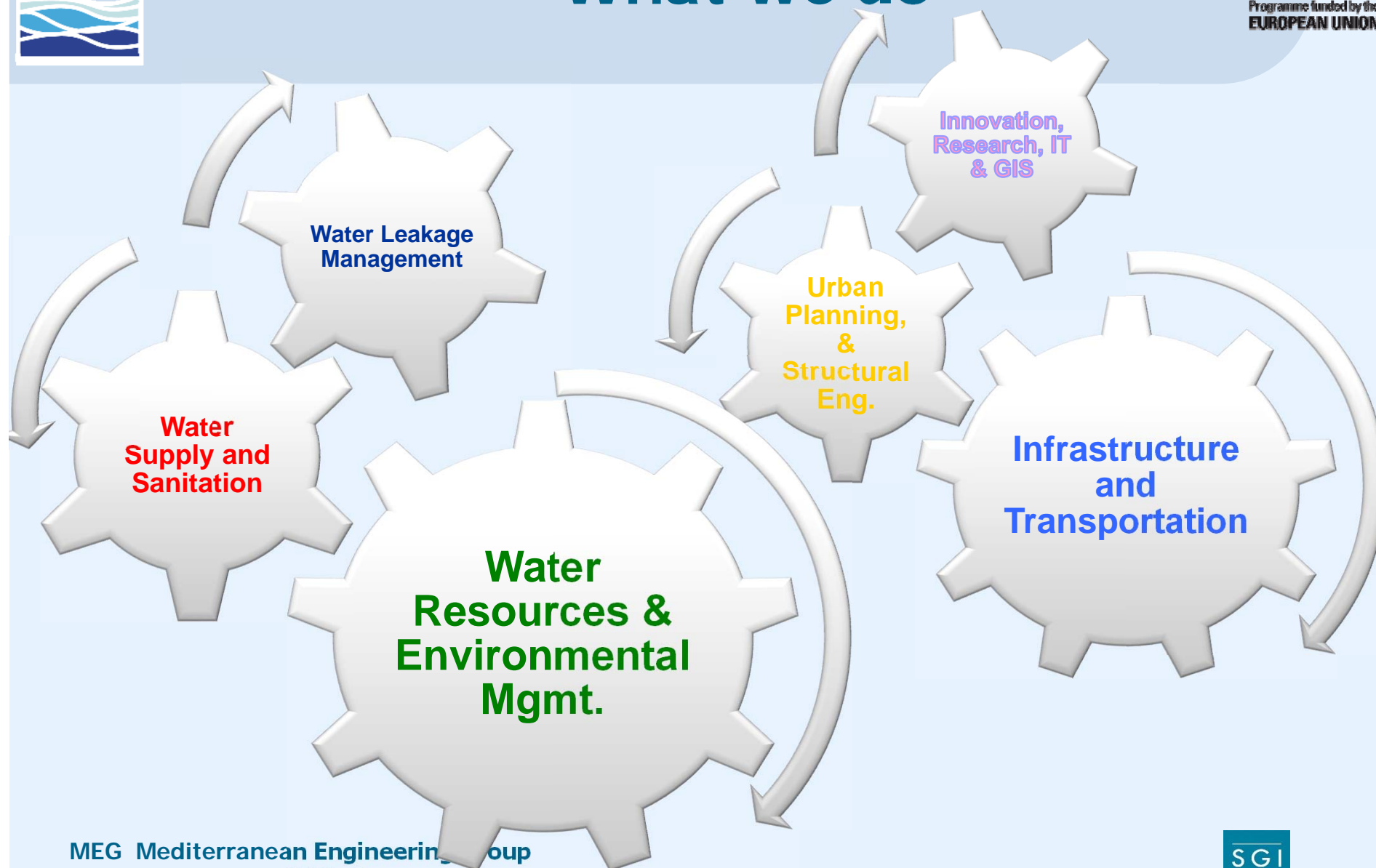
Where we are



MEG Mediterranean Engineering Group
27-28 November 2014, Rome



What we do





AQUAKNIGHT in a nutshell



- **Instrument:** *Cross-border Cooperation within the European and Partnership Instrument (ENPI)*
- **Duration:** *3 years*
(7 Dec 2011- 6 Dec 2014)
- **Partners:** *5 RTD, 5 End-users*



AQUAKNIGHT Consortium



| No. | Partner Name | Acronym | Category | Role |
|-----|---|-------------|--------------------------------------|----------|
| CO | Institute of communication and computer systems | ICCS | Research Institute | RTD |
| 1. | SGI Studio Galli Ingegneria S.p.A. | SGI | Professional/Industrial Organisation | RTD |
| 2. | Water Board of Lemesos | WBL | Local Authority | End-user |
| 3. | IREN Aqua Gas S.p.A. | IREN | Joint Stock Company | End-user |
| 4. | SONEDE International | SONEDE | Professional/Industrial Organisation | End-user |
| 5. | COMETE Engineering | COMETE | Professional/Industrial Organisation | RTD |
| 6. | Alexandria Water Company | AlexWaterCo | Public Administration | End-user |
| 7. | Aqaba Water Company W.L.L. | AWC | Implem. Agency, Commercial Org. | End-user |
| 8. | Signal Generix Ltd | SG | Commercial Org. | RTD |
| 9. | Department of Hydraulic Engineering and Environmental Application | UNIPA | University | RTD |



AQUAKNIGHT Overall Objectives



- A. Contribute to the sustainability of public services by achieving a **more efficient use of water resources** in the **URBAN** areas;
- B. Build a **cooperation framework between stakeholders of water services in EUMC and MPC** to foster initiatives for improving the efficiency of water networks;
- C. **Training & dissemination of the best practices in NRW management** among the Mediterranean utilities/consultants.



What is the problem?



- **Limited availability of Regional Water (a precious resource) due to increased demand, especially in the urban areas**
 - Rapid population growth in the urban areas
 - Water intensive economic activities
 - Unsustainable water use practices and Water losses.
- **Technologies and Methodologies are available, however there is:**
 - Missing integration of existing technologies;
 - Lack of analysis of water consumption and losses in the Mediterranean;
 - Insufficient training of water practitioners;
 - Lack of case studies in the Mediterranean Basin.



AQUAKNIGHT Achievements



- Application of international **best practices to evaluate and control water losses** (leakage and commercial loss) in the selected pilot areas;
- Development of a **Manual of Best Practice for reducing commercial water losses**;
- **Water utilities staff increased knowledge and capacity to reduce water losses**, with benefits in operational and financial terms;
- **Wide dissemination of best practice to control and manage water losses**;
- **Project methodology and tools reach wide group of stakeholders** in the participating countries and in other Mediterranean countries;
- **Consolidated partnership that can collaborate in future projects.**



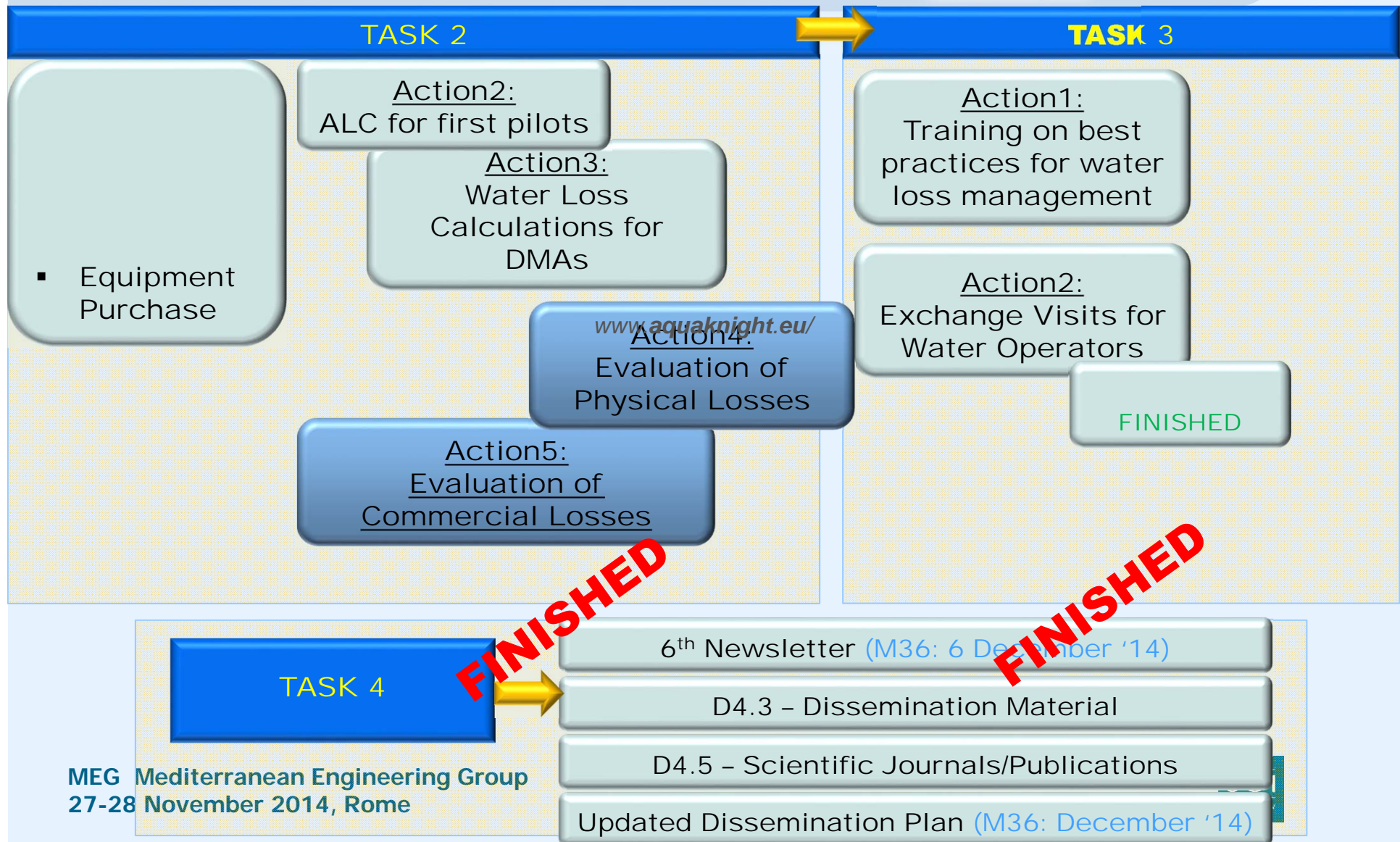
Project Structure



- Task 1 - Project launch and implementation of preparatory actions
- Task 2 – Pilot Projects (5 sites/Water Utilities)
- Task 3 – Capacity Building
- Task 4 – Dissemination
- Task 5 – Project Management



Project Flow and Tasks





Task 2 – Pilot sites



- Development of **5 parallel pilot projects**:
 - **Alexandria (Egypt)**
 - **Aqaba (Jordan)**
 - **Tunis (Tunisia)**
 - **Lemesos (Cyprus)**
 - **Genova (Italy)**





Project Structure – Task 2

Pilot Projects



- Purchasing and renting of needed equipment for Leakage and Automatic Meter Reading of DMAs
- Installation of Active Leakage Control systems
- Water Loss calculation for the pilot DMAs
- Provide training to water operators on the calculation/estimation of Non Revenue Water components
- Evaluation of physical losses and active leakage control
- Evaluation of commercial losses



TASK 2 – Pilot Projects



- **Physical Leakage**
 - Breaks in mains and service connections
 - Leakage from reservoirs
 - Background losses (valves, not detectable small leaks)
- **Apparent Losses**
 - Unauthorized use
 - Illegal Connections
 - Errors in meters and/or out of order meters





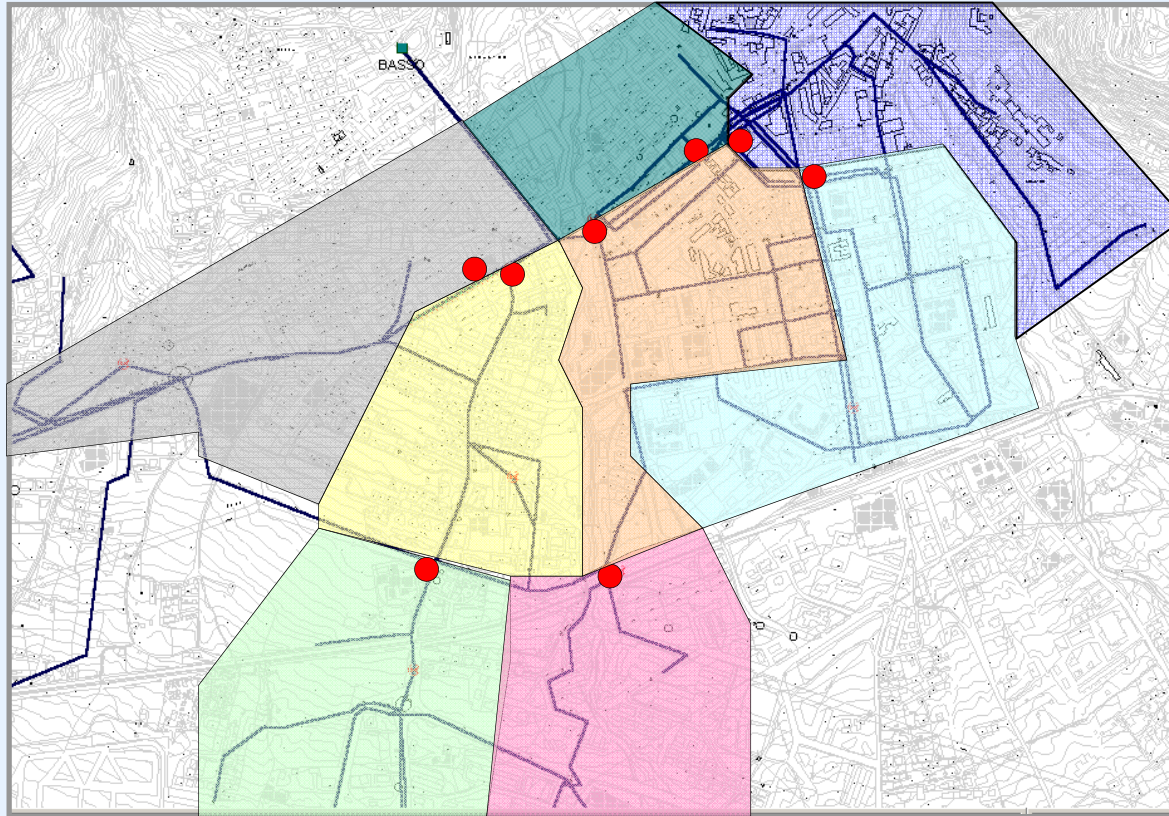
Water Audit (IWA Methodology)



| Simplified Water Balance using the IWA methodology (all figures in m3) | | | | |
|---|--|--|--|--|
| Period: 2/1/2013 to 2/5/2013 | | | | |
| 1 Distribution Input Volume < | | | | |



Active Leakage Control Methodology



Permanent sectors

Closed boundaries

Single supply pipe

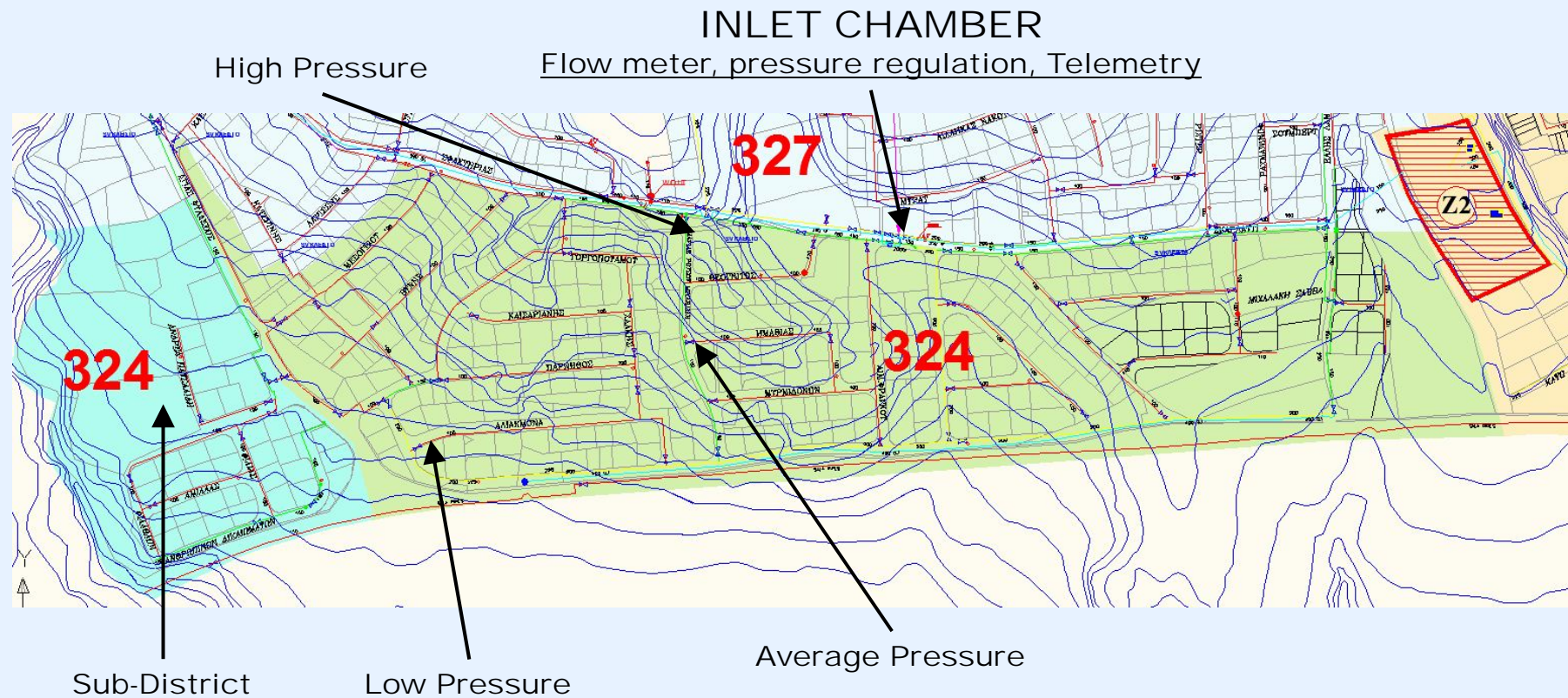
Flow meter on inlet

Quantify leakage in each DMA

Locate leaks



Pilot DMA setup (Lemesos)





Pilot Preparatory Activities



- Selection of the Pilot District Metered Area (1,000-3,000 users)
- Set up of the pilot DMA
 - field surveys and network mapping
 - Boundary valve survey aimed at verifying their tightness
 - Installation of flow and pressure meters



Flow meter installation at TUNIS pilot

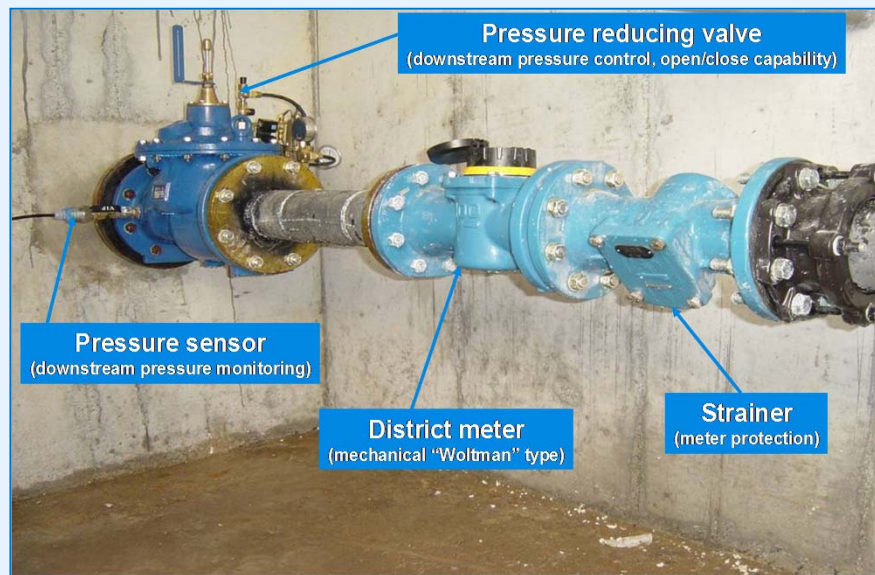




Pilot Preparatory Activities



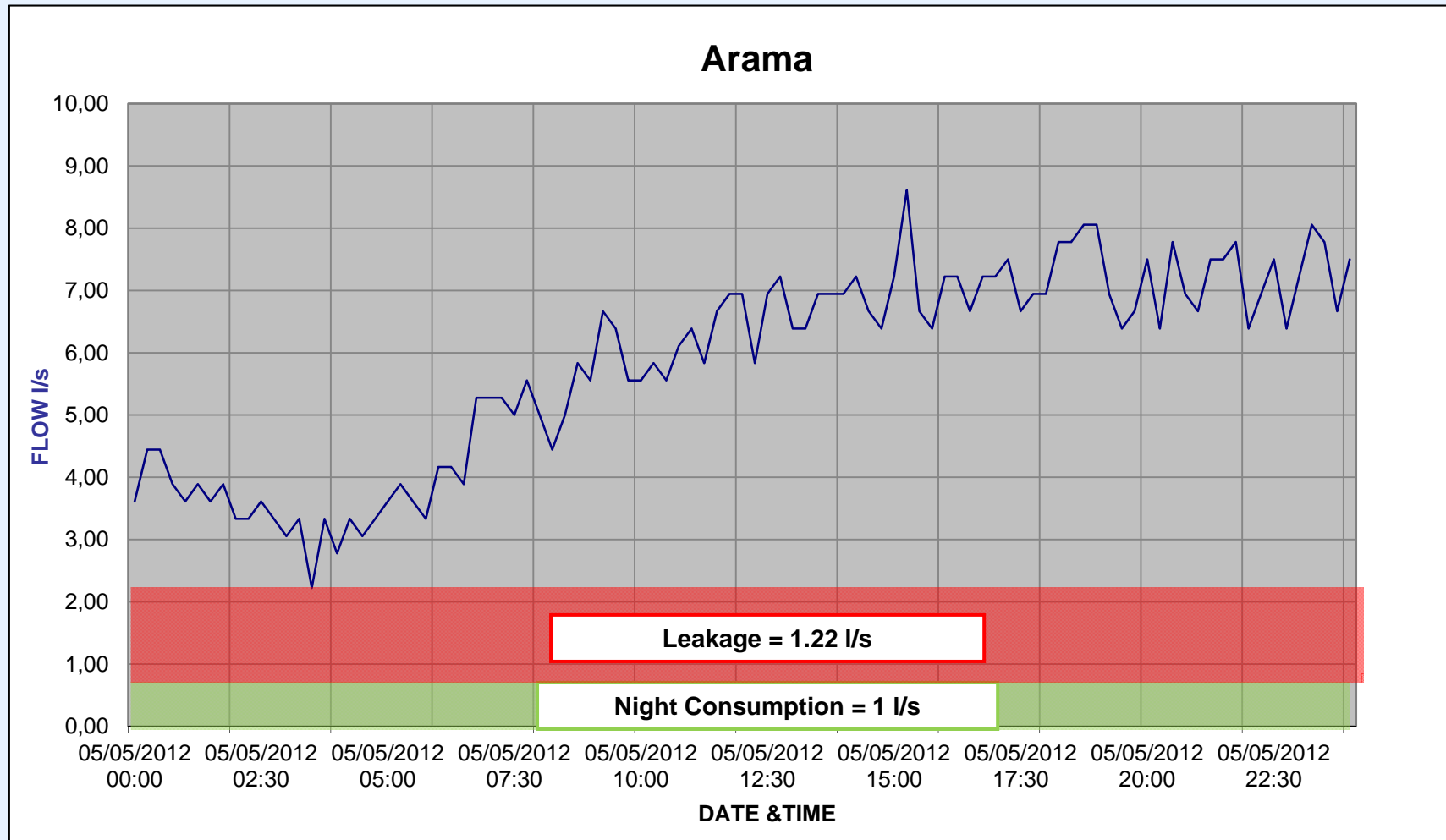
1. Procurement of equipment
 - Flow and pressure monitors, data loggers, AMR, Unaccounted Flow Reducers, leakage detection equipment, PRVs
2. Civil works for the construction of chambers to install Flow Meters, PRVs, etc.



MEG Mediterranean Engineering Group
27-28 November 2014, Rome



Minimum Night Flow Analysis

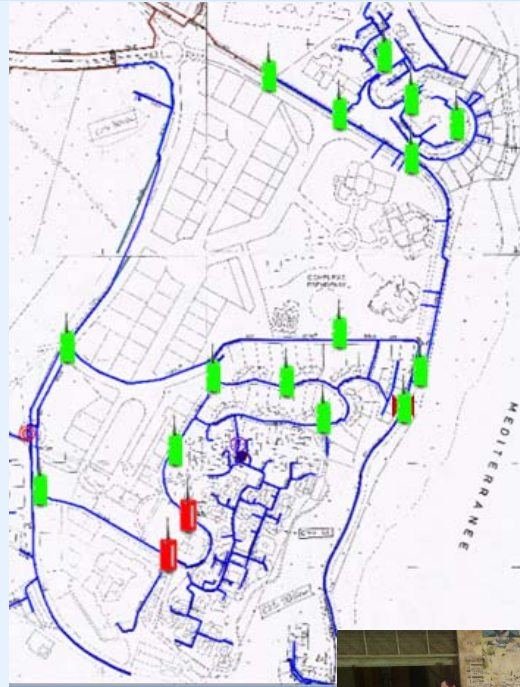




Evaluation of Real Losses



- Leakage pre-location using sounding, noise logging or step testing
- Leakage pinpointing using acoustic equipment (correlator, ground microphone)
- Continuous monitoring of DMA inlet during leaks repair to check reduction in MNF





Evaluation of Commercial Losses



- Creation of a small sub-district with less than 100 users
- **Leaks repair** inside sub-district
- Installation of an accurate inlet flow meter and **comparison with accumulated customer meters readings**
- Replacement of customers old meters with new meters
- Evaluation of **Commercial Losses recovery**





Performance Indicators



| | AWC Aqaba Pilot | AWCO ARAMA Pilot | SONEDE Gammarth 90 | IREN Genova Leamara | WBL –Lemessos Sub Area 324 |
|---|--------------------|---------------------|-----------------------|------------------------|-------------------------------|
| <i>N° Consumers/Km</i> | 91 | 233 | 65 | 79 | 46 |
| <i>Input Volume (l/s)</i> | 22.9 | 6.54 | 26 | 24.72 | 2.75 |
| <i>Leakage from MNF (l/s)</i> | 6.59 | 0.71 | 5.0 | 3.0 | 0.70 |
| <i>Leakage from WB (l/s)</i> | 6.53 | 0.81 | 4.2 | 3.1 | 0.88 |
| <i>Real Losses per connections from MNF (l/conn./day)*</i> | 838 | 51 | 266 | 399 | 168 |
| <i>Real Losses per length of mains from MNF (l/sec/Km)*</i> | 0.27 | 0.16 | 0.20 | 0.38 | 0.11 |
| <i>N° leaks repaired</i> | 23 | - | - | 6 | 2 |
| <i>Recovered water from leaks repair(l/s)</i> | 5.56 | - | - | - | 0.56 |
| <i>Recovered water from PRV (l/s)</i> | - | - | 0.2 | - | - |
| <i>Total Recovered water (l/s)</i> | 5.56 | - | - | 0.37 | 0.56 |
| <i>Water Consumption (l/s)</i> | 13.00 | 5.02 | 9.76 | 20.86 | 1.87 |
| <i>Meters Error (% of Consumption)**</i> | 19% | 16.0% | 4.7% | 3.5% | 5% |
| <i>Unauthorised Consumption (l/s)</i> | 1.48 | - | 0 | 0.0625 | 0,01 |



TASK 2 Pilot Projects - Deliverables



- **Report describing the field activities for setting up the District Metering Area (DMA)** in each pilot project (1,000-3,000 users)
- **Spreadsheet to calculate water losses and instructions on its use** (water balance, components of Non Revenue Water) produced in English and translated into the languages of the end-users (Italian, Greek and Arabic)
- **Report describing the activities of leakage control carried out in each pilot districts** (Water savings, economic intervention with active leakage control and pressure management, Flow/pressure analysis)
- **Manual of Best Practice for reducing commercial losses** (Conclusions drawn from the experimentation of automatic Meter Readers in the five pilot projects, the errors of existing meters, impact of customers' tanks on consumption patterns, measures to reduce customers' meters under-registration, the benefits of AMR, and devices to reduce unmeasured flows, Measures to prevent unauthorized consumption).



Task 3 – Capacity Building



Outcomes

| Planned Project Outcomes | No. of training courses achieved | Location |
|-------------------------------------|----------------------------------|--|
| 6 Training courses for MPC partners | 6 | <ul style="list-style-type: none">•2 in Alexandria•2 in Tunis•2 in Aqaba |
| 3 Training courses for EU partners | 4 | <ul style="list-style-type: none">•1 in Lemesos•2 in Genoa (1 extra)•1 in Athens |
| 2 Exchange visits | 2 | <ul style="list-style-type: none">•1 in Reggio Emilia•1 in Lemesos |



Task 3 – Capacity Building



Training Courses for MPC partners

| No | Topic | Location | Reporting period |
|----|---|------------------|------------------|
| 1 | Water Balance | AWCO, Alexandria | M5 - Apr 2012 |
| 2 | Leakage Control Technologies | SONEDE, Tunis | M7 - June 2012 |
| 3 | Tests for evaluation of commercial losses & AMR | AWC, Aqaba | M13 - Dec 2012 |
| 4 | International Best Practices | AWCO, Alexandria | M18 - May 2013 |
| 5 | Advanced Leakage Control Technologies | SONEDE, Tunis | M25 - Dec 2013 |
| 6 | Project results in the MPC | AWC, Aqaba | M30 - May 2014 |



Task 3 – Capacity Building



Training Courses for EU Mediterranean partners

| No | Topic | Location | Month |
|----|---|----------------|----------------|
| 1 | International Best Practices | IREN, Genova | M10 - Sep 2012 |
| 2 | Advanced Leakage Control Technologies and case studies | WBL, Lemesos | M20 - Jul 2013 |
| 3 | Advanced Leakage Control Technologies and case studies | IREN, Genova | M24 - Nov 2013 |
| 4 | Final Project results and tools for Water Loss Management | UNIPA, Palermo | M36 - Nov 2014 |



Task 3 – Capacity Building



Exchange visits

| No | Topic | Location | Reporting period |
|----|--|--------------------|------------------|
| 1 | 1 st Exchange visit | IREN Reggio Emilia | M6 - May 2012 |
| 2 | 2 nd Exchange visit (coupled with 2 nd training course for EU utilities) | WBL, Lemesos | M20 - July 2013 |



Task 3 – Capacity Building



2nd Exchange Visit in Lemesos, 18 July 2013



MEG Mediterranean Engineering Group
27-28 November 2014, Rome



TASK 4 – Dissemination Activities



- Definition of the **Dissemination Plan**
- Development of the **project website**
www.aquaknight.eu
 - continuously updated until month 36
- Establishment of the **network of stakeholders in the Mediterranean region** (continuous growth until the end of the project)
- Production of **dissemination materials**
 - Brochure, leaflet, poster, notice boards, project presentations, project logo
 - Project **Newsletters** published every six months and describing the main project achievements



TASK 4 – Dissemination Activities



- **Dissemination events** – 2 international conferences held
 - Participants ~90 in each event
 - Huge local interest
 - Ministries, holding companies, environmental agencies present
- **Presentation/participation in other events**
 - Fairs, conferences, workshops, etc
- **Publications on scientific journals related to project results and achievements and publications of articles about the project**
- **Clustering activities** aimed at creating proper links with other EU projects having similar aims





The end!



Thank you for your attention!

Giorgio Galli (SGI)
giorgio.galli@sgi-spa.it