Dublin Region Non-Domestic Water Metering Project

INTRODUCTION

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Dublin Region Non-Domestic Water Metering Project

DUBLIN REGION
Comprises – 4 Local Authorities

Dublin City Council
South Dublin County Council
Dun Laoghaire Rathdown County Council
Fingal County Council

Region Population is 1.2 million approx.
Length of Watermains = 5,500 Km
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1. BACKGROUND AND DRIVERS

MAIN DRIVERS

- EU Policy “Polluter pays principle”
- 1998 - Government issued a water-pricing policy which required metering of all Non-Domestics
  Capital Investment €4 billion for water & waste services.
- Water Conservation / Network Management
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1. BACKGROUND AND DRIVERS cont’d.

Starting Position – Dublin Region

- 7,400 meters installed in the region for billing
- Majority read once per quarter
- 100 large users on Telemetry – monthly reads for billing
- 14,600 fixed charge accounts (unmetered)
- Estimated number of NDUs in region – 40,000
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1. BACKGROUND AND DRIVERS cont’d.

Starting Position – Issues

- Meters manually read once per quarter - reliability
- Billing Systems not designed to give consumption data
- Water Conservation teams couldn’t easily get data
- Automatic Meter Reading (AMR) Pilot - Fingal 2002
- AMR (Drive-By) to be an integral part of the Project
- Interfaces to 4 different billing systems
- Interfaces to Regional Telemetry and GIS
- Data Management a big issue
2. Pre-Contract

- Consultant appointed – Atkins
- Sample non-domestic surveys undertaken – to establish Size, Type & Nature of the works
- Lessons learned from other NDWMPs - Irish Projects
- Meter Reports
- Technology review AMR – Irish plus UK, Austria, France, Germany
- Contract Considerations – DB, DBO, Traditional
- Risk Analysis Workshops – Technology, Industrial Relations, Right Mix of Skills
2. Pre-Contract

Scope of Project

- Meter and AMR Installation
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2. Pre-Contract

Scope of Project

- Customer Identification / Initial Field Surveys
- Pre-Installation Surveys
- Metering Database
- Meter and AMR Installation
- Integration with 4 Different Billing Systems
- Integration with Regional GIS and Telemetry
- Data preparation for Billing Systems & Water Operations
- Customer Services Center
- Performance Testing – > 95%
- Training

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2. Pre-Contract cont’d.

Data Management Issues

The PSP shall note that the Virtual Private Network (VPN) provides an alternative to Leased Lines and should be considered in his proposals.
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2. Pre-Contract cont’d.

Data Management Issues
3. Project Structure

- Contractor Appointed - Gerry McCloskey Limited
- Key Service Providers
  - Ista – IstaNet, input to design of MDB
  - Hydrometer/CSL – Meters & AMR System
- Contract Activities – Surveys, Construction (Meters), Metering Database, Automatic Meter Reading (AMR)
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3. Project Structure – Project Teams

- Regional Project Team
  - Senior RE
  - Resident Engineer
  - Supervisor/Clerk of Works

- Local Authority Teams
  - DCC: RE, 3 Supervisors/Clerk of Works
  - DLR: RE, Supervisor/Clerk of Works
  - S DUB: RE, Supervisor/Clerk of Works
  - FCC: RE, Supervisor/Clerk of Works

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4. Design Phase

Pre-Construction

- Data Collection/Collation
  - Rates Database
  - Water Charges Database
  - Geodirectory
  - Yellow Pages
- Field Surveys
- Data Cleansing – Feed into MDB Design
- Pre-Installation Surveys
  ➢ Meter Design Proposals
4. Design Phase cont’d

Metering Database

- Cleansed Data - input
- Financial/Billing Systems – LA MDB’s
  - Agresso – Fingal
  - Hi-Affinity – Dublin City
  - Ingres – Dun Laoghaire
- SQL Database – South Dublin
- Regional Telemetry – Large Users to RMDB;
  - RMDB Grouped DMA consumption to Telemetry
- Regional GIS System – Positional Data/Survey Data from RMDB
- Open Source Platform – No Vendor Lock-in

- Metering Database Specification

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5. Construction Phase

Meter Installations

- Mechanical in Boundary Box
  - Inline
  - Concentric (90% approx.)
- Free Flow
  - Battery-Powered Magnetic
- Automatic Meter Reading – Drive-By & Fixed
  - Clip-on Transponders Pre-Configured (Concentric Meters)
  - Stand-Alone Transponders on all other types
- Post Installation Surveys – Location Checks, No-Flow & GPS
- Training for Local Authority Teams
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5. Construction Phase cont’d

Challenges

- Internal v’s External Installations
- Metering Policy – 4 Different approaches to Metering LA’s
- Fire Mains & Supplies to Hydrants
- Multiple Occupancy
- Shared Supplies
- Internal Plumbing Arrangements
- Variability in the Quality of As-Built Drawings
5. Construction Phase cont’d

Metering Database

- Development of Architecture (4 Local, 1 Regional MDB)
- LAMP – Linux, Apache HTTP Server, MySQL(Postgresql), Python/PHP
- Interfaces – Request/Response Files
  - Billing Systems
  - Telemetry/GIS – Water Conservation & Location Information
  - GeoDirectory – Property Information
  - HydroRadio – AMR Reads
- VPN Access to MDB’s – Communication Protocols
- Data Migration
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5. Construction Phase cont’d

Metering Database

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5. Construction Phase cont’d

Metering Database

- Testing
  - System Interface Tests
    - AMR → HydroRadio → MDB
    - MDB ← → Telemetry
    - MDB → Financial Systems
    - MDB → GIS
  - User Interface Testing

- Training
  - AMR
  - MDB
  - Billing Interface
  - Telemetry/GIS Interface
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6. Performance Testing Phase (One Year)

Meter Reading Process

- Meter Reads
- Meter/AMR Validation (Eyeball Checks)
- AMR Route Planning
- Query Investigations (Billing & Usage)
- Water Conservation – DMA reads, Consumption Alarms
- Business Process Review (LA Level)

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6. Performance Testing Phase cont’d

Metering Database

- Metering Database – Bug Fixing
- Data for Water Conservation Analysis
- Data Cleansing – Follow Up – Customer Classification
- Meter/AMR Testing
  - Bench Testing (400 No.), Age Profiling
  - Meter/AMR Slippage; Battery Life
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7. **Maintenance Phase (One Year)**

- Watching Brief
- LA Handover – Ownership Transfer
- LA Meter Reading
- MDB Maintenance & Support
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8. AMR System – Hydrometer/CSL

Benefits

- Rapid collection of metering data
- Complete data for billing purposes
- Accurate consumption data for billing / conservation
- Modern systems that are open, flexible & up-gradable
- Low maintenance solutions

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8. AMR System

Data Flow

Bluetooth communication between the HYDRO-POCKET and the Bluetooth receiver operates in the 2.4-GHz frequency band with a transmission rate of 115,200 bauds.

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8. AMR System

- Battery Life 15 years approx
- Stores
  - Reading Date and Time
  - Current Reading
  - Three Month-End Readings
- Leak Detection
- Tamper Alarm
- Waterproof (IP68)
- Sends data every 8 seconds

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8. AMR System - Meters

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8. AMR System – Quality Checks

- Existing water meter checked in stores against job card information
- Existing meter closing read matched to new meter opening read
- AMR signal strength checked
- AMR alarms checked and re-set if required
- GPS coordinates recorded at each meter location
- Final reinstatement photograph taken for road license closure.
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8. AMR System

- Radio Module Compact 868
- Radio Module External 868
- Bluetooth Receiver 868
- Standard Antenna
- Car Antenna
- Receiver Car Charger
- Hand Held Unit with Hydro Pocket Software
- Infra-red Optical Probe

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Hydrometer/CSL Hydro Radio – Drive-By

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## AMR Performance

<table>
<thead>
<tr>
<th>Fingal Co. Co.</th>
<th>2003</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meter Reads</td>
<td>2,400</td>
<td>5,500</td>
</tr>
<tr>
<td>Fixed Charge</td>
<td>2,600</td>
<td>100*</td>
</tr>
<tr>
<td>No. Meter Readers</td>
<td>6 (12)</td>
<td>2</td>
</tr>
<tr>
<td>Meter Read Period (days)</td>
<td>20</td>
<td>5 (8)</td>
</tr>
</tbody>
</table>

* Primary Schools not charged until 2010
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9. Fixed Network

Pilot System

- Technology Trial
- Fingal County Council HQ in Swords, Co. Dublin
- 4 No. Aerials Positioned on Roof
- 2 No. Target DMA’s = 318 Non-Domestics
- Read Recovery = 212 Non-Domestics
- Read Recovery (Adj. DMA’s) = 32 Non-Domestics
- Overage Range circa 600m radius
- Max. Distance approx. 4 km
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9. Fixed Network
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9. Fixed Network

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9. Fixed Network
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10. Conclusions

Key Facts

- Tender Value - €49.99m
- Project Start Date - Jan 2006
- Design/Construction Phase Completed - Sept 2008
  (Substantial Completion - 30,000 meters installed)
- Performance Testing Phase - Sept '08 to Sept '09
- Maintenance Phase - Sept '09 to Sept '10
- Current Spend €48.8m
  - Surveys & MDP’s 5.0m
  - AMR System(s) 2.0m
  - Meters 27.2m
  - General items 14.6m

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10. Conclusions cont’d.

Project Outputs - MDB

- Audit Trail
  - Meter Reads (Read Request/Response exchange)
  - System Changes
  - System Improvements
- External Data Transfer – CSV
- Pre-Canned reports
- Web-based – Low distribution cost – User Friendly
10. Conclusions cont’d.

**Project Outputs – Drive-By AMR**

- Range – 100m to 300m subject to Environment, Enclosure & Weather.

- Reliability
  - Read Rate >95% (currently 98% across Dublin Region)
  - Battery Life - 10 Years (Current tests indicate > 10 year life)
  - Meter Life – 10 Years (Current tests indicate meters within design parameters of +/- 2.0% after 10 years)
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10. Conclusions cont’d.

Learning Points

- Business Process Review
  - Critical – not all LA’s did one
  - Appointment of Key Staff – Skills Transfer
10. Conclusions cont’d.

**Learning Points**

- We would do it very differently in future
- **Contract Structure**
  - Surveys – Field & Pre-Installation  Contract 1
  - Meter/AMR Installs  Contract 2
  - MDB Development/Interfaces/M&S  Contract 3
  - LA Managed
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10. Conclusions cont’d.

Learning Points
Relationship Management

- Contractor, Consultant, Regional Telemetry & GIS, 4 Local Authorities

Each Local Authority:

- IT Dept
- Finance Dept
- Roads Dept
- Water Services
- 3rd Party Suppliers – Mentec, DST, Metasphere, Logica.
Thank you very much for your cooperation and interest during the Dublin Region Non-Domestic Water Metering Project.

Thanks to all the RE Teams.

- Very Complex Project.
- Thanks to various staff in each Department of the four Local Authorities for co-operation and interest.

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10. Conclusions cont’d.

**Special Thanks**

David Wade, Senior RE – Design Phase

John Keane, Senior RE – Construction Phase

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Questions ?

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