Delivering on the **smart city** vision, through impacting applications

Panagiotis Demestichas
WINGS ICT Solutions,
University of Piraeus

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WINGS Mission

TECHNOLOGY EXPERTISE → APPLICATIONS (ENTERPRISE / VERTICAL, CONSUMER)
DIGITAL TRANSFORMATIONS

High-Tech Areas.
IoT (Internet of Things), Robotics.
AI (Artificial Intelligence).
Hyper connectivity (up to 5G/6G).
XR (Extended Reality).

Application sectors, Digital transformation.
(1) Environment.
(2) Utilities & Civil Infrastructure.
(3) Production & Manufacturing.
(4) Service sectors (Health, etc.).

ESG aspects.
Sustainability.
Equity, Inclusion, Diversity.
Governance, Trustworthiness.
Demand for Applications

1. Environment Protection

2. Manufacturing & Logistics

3. Smart Cities
   Infrastructure, Buildings, Health / Wellness, …

4. Agriculture / Aquaculture
Areas, Products, Other Information

A. Environment
- 1. AIRWINGS: Air Quality, Wildfires, Civil Protection.
- 2. ARTEMIS: Water, Energy, Gas
- 3. WINGSPARK: Parking, Transportation, Infrastructures

B. Utilities (Networks) & Infrastructures
- 1. AIRWINGS: Air Quality, Wildfires, Civil Protection.
- 2. ARTEMIS: Water, Energy, Gas
- 3. WINGSPARK: Parking, Transportation, Infrastructures

C. Production Systems
- 4. AQUAWINGS: Aquaculture
- 5. AGNES: Agriculture, Food Industry, From farm to fork
- 6. WINGS-Charriot: Smart Warehouses, “Corridors”, Industry 4.0

D. Service Sectors
- 7. STARLIT: Digital Health & Wellness

~150 Employees:
1. Solution Engineers (SW & HW): 55%
2. Data Analysis (ML, …): 17%
3. Solution Architects (Product / Project Management, …): 18%
4. Business (Sales, …): 10%
Smart Cities: Challenges

**Trend:** Larger Cities – Larger Population in Cities

**Stress:** Environmental, Resources, Technology

**Critical points:** Inequalities, Sustainability, Trust
Smart Cities: An approach

**Question**: are we making impacting investments???

**Smart City** (Liveable)

- **Stability (B)**: Contribute to the Safety and Security of Citizens and Operations
- **Environment (A)**: Air-quality, Resources, Weather
- **Infrastructure (B)**: Transportation, Buildings: Water, Energy, Health
- **Education & Culture (C)**: Health and Wellness of Citizens
- **Healthcare (D)**: STARLIT (digital solutions for health & wellness)

**Notes**: (i) influence by EIU models, and more; (ii) numbers indicate the priorities allocated by our team
A. Environment – Air Quality

CAPABILITIES

- **Air Quality**: monitoring indoor / outdoor, smart city / building / industrial / production (livestock / farming).
- **Parameter value predictions**; Correlation of values.
- **Computation of Air Quality Index (AQI)**.
- **Situation / risk prediction**
- **Notifications and alerts**;
  - Health / Wellness indicators.
  - Prevention, early detection / warnings: hazards, fires, risk levels.
  - Action triggering
- **Complement**: insights on air, weather, solar radiation, EMF aspects.

Outdoors
(O₂, CO, CO₂, SO₂, NO, NO₂, PM1, PM2.5, PM10, Noise, Temperature, Pressure, Humidity)

Indoors
(CO₂, CO, VOC, O₃, NO₂, PM1, PM2.5, PM10)

5G (B5G), 4G, NB-IoT, GPRS, Cat-M, LoRa

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Extensions

Weather Stations
Solar radiation
EMF (Electromagnetic field) radiation, Mobility information

Cameras, drones (Environment protection, wildfires, etc.)

WILDFIRES
**B.1. Infrastructure – Water**

**Status.** Towards **Integrated Water Management**: potable, rain, waste-water; from metering to optimizations and **Digital Twins**. Many stakeholders.

**City** measures / roles.
- **Buildings**: quality, leakage
- **Parks**: irrigation

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**WATER sources** (precipitation, snow melting, other)

**COLLECTION**

**DAM**

**TREATMENT**

**STORAGE**

**USE**
- Residential, City,
- Industry,
- Agriculture

**WASTE-WATER**

**TREATMENT**

**WATER disposal to environment, reuse, etc.**
B.1. Infrastructure – Water

CAPABILITIES
✓ End-systems (residence, industry, agriculture), network components: pumping stations, pipes, ...
✓ Metering (accounting): Real-time monitoring, prediction of demand and of supply capabilities, wastewater aspects.
✓ Faults: faulty meters, network components, leakages, floods.
✓ Performance: assessment w.r.t. IWA indexes, revenue water maximization, irrigation optimization, quality of water.
✓ Security: physical installation, cybersecurity aspects.
✓ Configuration: actuations, irrigation, etc.
✓ Digital twins (diTTo) for water infrastructure
**B.2. Infrastructure – Energy**

**Status.** Maximize share of Renewable Energy Sources, and leverage on storage. Many stakeholders.

**City** measures / roles.
- Focus on **buildings**, public, schools, other
- Learn needs, optimize deployments
B.2. Infrastructure – Energy

CAPABILITIES
✓ Metering (accounting): prediction of demand / supply.
✓ Faults: faulty meters, outage.
✓ Performance:
  ✓ Planning of RES/storage deployment in cities.
  ✓ Optimization of energy use in buildings.
  ✓ Processes optimization in factories.
  ✓ Minimization of energy thefts.
  ✓ Development of a marketplace.
✓ Security: physical installation, cybersecurity aspects
✓ Configuration: actuation actions.
✓ Management of energy production sites (in roadmap)
B.3. Infrastructure – Transport

Cities / respective authorities play a key role in maintaining the Structural health of infrastructure.

Traffic carried on infrastructure, Vehicle station management: parking, charging stations

Passenger station management (public venues)

Other services associated with public transport

Public safety through same infrastructure.
B.4. Infrastructure – Buildings

Building management.
Areas
- Residential and Business settings
- Building managers / residents / employees

Combination of WINGS solutions:
- **Air quality / Security** through AIRWINGS
  - Navigation in business
- **Energy / Gas, Water, Lighting** through ARTEMIS
- **Transport** (parking) through WINGSPARK (business settings)
- **Health / wellness** through STARLIT
- Other areas: structural health aspects

Open to extend to further areas

Notes: Figure modelling a business setting
C. Education / Culture - Schools

WINGSchool: Solution aggregation

- Air Quality Indoor & Outdoor.
- Energy Management.
- Smart Recycling Bins.
- Computation and projection of impact of measures taken.
- Gamification engagement of students.
- Education programs leveraging on personalization based on AR / VR (Augmented / Virtual Reality)
D. Health and Wellness

**STARLIT**: Solutions for digital health and wellness based on artificial intelligence and IoT

- **Patients**: Real-time vital signs monitoring (ECG, Blood pressure, SpO2, GPS, etc.)
- **Wearable devices**: Real-time monitoring
- **IoT and AR devices**: Real-time monitoring & predictions
- **Paramedic**: Live video streaming with remote doctor and ultrasound images for quicker and more confident clinical decisions
- **Dashboard (Patient View)**
  - Real-time vital signs monitoring & predictions
  - Video Conference with doctors
  - Notifications/Alerts
  - Data download
- **Dashboard (Doctor View)**
  - Real-time vital signs monitoring & predictions
  - Video Conference with doctors
  - Notifications/Alerts
  - Data download
- **Healthcare Professional**: Better management of cardiovascular, neurological, chronic and other diseases

Data Analysis
Prediction
Data Ingestion
Data Management
Decision Making

Patients on a single page & on the map
Real-time vital signs monitoring & predictions
Video Conference with patients
Notification/Alerts management
Live-Streaming/Remote Support
Ultrasound Images (DICOM)
Data download

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- Data download

**Healthcare Professional**: Better management of cardiovascular, neurological, chronic and other diseases
D. Health and Wellness

- Patients who need regular medical monitoring
- Vulnerable groups
- People with limited access to primary health care services
- Public and Private Hospitals
- Municipal Dispensaries and Health Centers
- Municipalities and Regions
- Emergency services
D. Health and Wellness

Description
- **Location**: Attika region. Municipality of Nea Filadelfeia / Chalkidona (~40 K inhabitants).
- **Beneficiaries**: Municipality social / health care services, 300 citizens.
- **System**: WINGS Starlit product instance, providing “care at home” and “assisted living” functionality to elderly and people in need.
- **Functionality**:
  - Monitoring vital signs, detecting critical situations, e.g., falls
  - Warning, prioritized to carers and to close-ones
- **Features**: Dashboards / apps, AI, data management, devices (smartwatches)
- **Compliance with legal and ethical frameworks**
- **Dissemination**: [Link]
Aggregation of solutions: WINGSCity:
Way forward

**Steps:** Coordinated investments essential for impact and sustainability. Synergies.
Contact Information

WINGS ICT Solutions SA

Address - 189, Syggrou Avenue, 17121, Athens, Greece
Phone - +30 21 55 0 11 555
Web - http://wings-ict-solutions.eu
E-mail - info@wings-ict-solutions.eu