Accessing Synthetic Health Data for SMEs: A Greek Perspective

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Health Data Thematic Innovation Ecosystem | Accessing Synthetic Health Data for SMEs | 19.04.2023 11:00-13:00 CET
Hellenic Digital Health Cluster | Vision and Objectives

Vision
To strengthen the Greek digital health ecosystem and include Greece among the leading countries in the field worldwide

Objectives
1. Fostering cooperation, development of synergies and complementary partnerships
2. Networking among key stakeholders in the field of digital health
3. Supporting companies to attract funding
4. Promoting collaboration with national and international clusters and organizations active in the field of digital health
5. Supporting the development of a national digital health strategy
Greek Ecosystem | How it is evaluated

![Graph 1: Performance of EU Member States’ innovation systems](source: European Innovation Scoreboard 2022, European Commission)

![Graph 2: SME startups per 1 million population (2020 estimates) - EU-26 Member States, the EU-26 and selected non-EU countries in December 2021](source: Annual Report on European SMEs 2021/2022, European Commission)

![Graph 3: Source: Open Data Institute, Secondary use of health data in Europe. 2021.](source: Digital Economy and Society Index (DESI) 2022, European Commission)
Greek Ecosystem | Services available for health and welfare

National Initiatives

- **E-Services IDIKA** (COVID-19 registry and vaccination, e-prescribing, Atlas, e-booking, citizen EHR, etc.)
- **E-Services EOPYY** (admission/discharge notification, eDAPY, hemodialysis, radiotherapy, disease registries, etc.)
- **E-Services grnet** (Harmoni, user directory for hospitals, etc.)
- **Ministry of Health BI System** (Bi-Health)

- **Hospitals** (public and private)
- **Diagnostic Centres**
- **Telematics Applications**
- **Regional Health Authorities’ Initiatives**
- **Private Initiatives**
- **Research projects** (non-clinical applications, e.g. for clinical trials)
- **Cross-Border Services** (CEF, eHDSI, etc.)

Health and welfare

<table>
<thead>
<tr>
<th>Benefits</th>
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<tbody>
<tr>
<td>Child/housing allowance, social dividend, heating oil allowance, etc.</td>
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<thead>
<tr>
<th>Coronavirus COVID-19</th>
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<tbody>
<tr>
<td>Free checks, date for vaccination, certificate of vaccination.</td>
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<tr>
<th>Health professionals</th>
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<tr>
<td>Electronic prescribing, electronic pre-authorisation of medicines, EKPY benefits, etc.</td>
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<tr>
<th>Healthcare</th>
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<tr>
<td>Drug search, contracted providers with EOPYY, High Cost Medicines, Atlas health etc.</td>
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<tr>
<th>Hospital visits and hospitalisation</th>
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<tr>
<td>Availability of appointments with EOPYY doctors, Individual Electronic Health File (AHPY) for citizens</td>
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<tr>
<th>Medical file</th>
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<td>Immaterial prescribing, National Blood Donor Register, registration with a personal doctor, etc.</td>
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<tr>
<th>Persons with disabilities and chronic illnesses</th>
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<tr>
<td>KEPA request management, free fare ATHENA card, multimodal digital library AMELib etc.</td>
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Greek Ecosystem | Startups in MedTech, HealthTech, BioTech

Needs and Challenges

• More than 50% of the startups are related to **digital health** solutions mainly for disease management, telemedicine and wellness. (investments + expertise)
• More than 65% of companies are in the initial stages of development (**seed funding round**)
• 57% look for mentors and advisors.
• 40% of companies consider that **state intervention** is needed:
  • improving access to government funding programs
  • facilitation of clinical trials.

SOURCE: SEV, Hellenic Federation of Enterprises, 2022
Digital Health Solutions | International Trends

Evolution of situation / speed of development in the period 2018-2021

On average, how long is your company’s product development and launch cycle for digital healthcare solutions?

<table>
<thead>
<tr>
<th>Year</th>
<th>&lt; Less than 12 months</th>
<th>12-18 months</th>
<th>18-24 months</th>
<th>24-36 months</th>
<th>More than 48 months</th>
<th>Too soon to say</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>7%</td>
<td>22%</td>
<td>27%</td>
<td>20%</td>
<td>11%</td>
<td>5%</td>
</tr>
<tr>
<td>2020</td>
<td>15%</td>
<td>26%</td>
<td>25%</td>
<td>21%</td>
<td>6%</td>
<td>6%</td>
</tr>
<tr>
<td>2021</td>
<td>19%</td>
<td>31%</td>
<td>28%</td>
<td>9%</td>
<td>2%</td>
<td>11%</td>
</tr>
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</table>

What is the status of your company’s development of digital healthcare solutions?

<table>
<thead>
<tr>
<th>Year</th>
<th>Idea</th>
<th>Development</th>
<th>Design</th>
<th>Testing/Validation</th>
<th>Certification</th>
<th>Production</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>13%</td>
<td>17%</td>
<td>32%</td>
<td>13%</td>
<td>3%</td>
<td>21%</td>
</tr>
<tr>
<td>2020</td>
<td>23%</td>
<td>11%</td>
<td>16%</td>
<td>4%</td>
<td>44%</td>
<td>1%</td>
</tr>
<tr>
<td>2021</td>
<td>9%</td>
<td>23%</td>
<td>14%</td>
<td>28%</td>
<td>10%</td>
<td>17%</td>
</tr>
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European Digital Innovation Hubs | Services Offered

One-stop shops for digital transformation

Digital Maturity

BUSINESSES USING ONE OR MORE

Cloud computing services
NOW: 34%
TARGET: 75%

Big data
NOW: 14%
TARGET: 75%

Artificial Intelligence
NOW: 8%
TARGET: 75%


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**Data Sources**

**Clinical**
- Demographics, EHR Data, Lab Test Results, Diagnoses, Procedures, Pathology/Imaging Data, Radiology Images, Microbiology Data, Provider Notes, Admission/Discharge and Progress Reports, Performance Status

**Medication**
- Medication Orders, Administration (Dose, Route, TTC/Adverse Reactions), Concomitant Therapies, Point of Sale Data, Prescription & OTC Prescription Refills, Allergies

**Claims**
- Medical Claims, Prescription Drug Claims, Other Drug and Treatment Use Data

**Molecular Profiling**
- Genomic and Genetic Testing Data (SNPs/Panel), Multi-Omics Data (Proteomics, Transcriptomics, Metabolomics, Lipidomics), Other Biomarker Status

**Family History**
- Historical Data on Health Conditions and Allergies Relating to Patient and Extended Family, Smoking Status, Alcohol Use

**Mobile Health**
- Fitness Trackers, Wearable Devices, Other Health Apps, Measuring Activity and Body Function

**Environmental**
- Climate Factors, Pollutants, Infections, Lifestyle Factors (diets, stress), Other Environmental and Occupational Sources

**Patient Reported**
- Patient Reported Outcomes, Surveys, Diaries (diets, habits), Personal Health Records, Adverse Event Reporting, Quality of Life Measures

**Social Media**
- Patient Communities, Twitter, Facebook, Blogs

**Literature**
- Disease Burden, Clinical Characteristics, Prevalence/Incidence, Rates of Treatment, Resource Use and Costs, Disease Control, Quality of Life Measures

**FORTH**
- Translational bioinformatics for precision medicine
- Drug discovery and/or safety assessment, clinical trials
- Biomedical Data related platforms, methods and tools
- Imaging Informatics, Hybrid molecular imaging facility and services
- HPC platforms, methods and services
- Computational Neuroscience
- Smart Hospitals, Intelligent DDS and Virtual Assistants
- Administrative Automation & Digitization
- Health Information Infrastructure and eHealth Interoperability
- Integrated Primary Healthcare
- Personalized Care Delivery – Care Coordination
- Citizen-centric eHealth, mHealth, Personal Health Systems and Pervasive Health Monitoring
- Biosensors for Health or Wellness related Applications
- Social Care and Welfare Management
- Civil protection and emergency management
- Cybersecurity and Trust related tools, platforms and services
- Assisting Digital Transformation in Healthcare
- mPTE/ MRI facility for advanced preclinical molecular imaging services
- User experience design and evaluation of ICT products and web-accessibility evaluation
- EUIM
  - ICT supported Integrated Care

**CERTH**
- Computational methods for drug safety
- Building Artificial Intelligence (AI) in Healthcare
- Medical Information Security
- User-centred design for eHealth Applications
- Real-world evidence analysis
- EHR management for clinical trials
- Interoperability on health data exchange
- Medical Big Data visual analytics
- Core bioinformatics and biostatistics services
- Training for digital skills
- Biosensors for Healthcare Applications
- Personal Health Systems and Pervasive Health Monitoring
- MCR
  - Distributed infrastructures for precision medicine
  - Privacy-preserving statistical aggregation
  - Human activity tracking
  - Robotix’s workflow
  - Database querying using soft constraints
  - Spatiotemporal data integration and processing
- Knowledge discovery from biomedicai data
- Drug-Drug interaction (DDI) prediction
- Biomedical question answering

**ATHENA**
- Data services for precision medicine pipelines
- Data services for clinical analysis, annotation and interpretation
- Knowledge Bases for NGS Diagnostics
- Data-intensive biomedical informatics
- Elastic cloud data services for biomedical informatics
- Biomedical information extraction from scientific articles
- Blockchain solutions for biomedical applications
- Computational drug design
- Containerization strategies, consulting, and solutions for biomedical informatics
- Privacy by-design strategies, consulting, and solutions for biomedical informatics
- Voice assistants for smart hospital applications
- Computer vision for clinical diagnosis support systems
- Speech analytics for disease detection
- Virtual and augmented reality for smart health applications
- Effective patient communication in a smart hospital environment

**NKUA**
- Hi-throughput analytical instrumentation, chromatograms and spectrometry management
- Chemical data interpretation through chemoinformatics
- Modelling and simulation of chemical and biological procedures

**TUC**
- Electrophysiological Data Analysis
- Spatiotemporal, multidimensional and multimodal algorithmic analysis

Synthetic Data Uses

In health care, synthetic data could be an electronic health record (EHR) dataset with patient identifiable information and other sensitive information replaced with fake data to avoid reidentification.

Data Sharing and Data Access
• Hackathons and data competitions
• Software testing
• Machine learning
• Statistical model development
• Education & training

Data Amplification and Data Augmentation
• Scaling up small datasets
• Correct bias

The introduction of applications and tools to support integrated health and care services is expected to have a significant impact on the quality of life, innovation-based competitiveness and the sustainability of care for individuals, businesses and the society.

Advantages of synthetic data:
- overcome regulatory restrictions
- easier to access
- streamline simulation
- avoid statistical problems
- facilitate AI/ML training

... still not a complete replacement for RWD
Thank you for your Attention!!!