Dear Sir/Madam,

We are delighted to report that the TOPAs project has achieved its 5th milestone – Complete System Validation & Replication Evaluation. This milestone marks the successful Implementation and Verification of the full TOPAs system, its integration into the demonstrator sites and the beginning of the final validation phase.

In the coming months the TOPAs solution will be used at all three project pilot sites addressing the varying needs and challenges relating to energy management. This provides the project the opportunity to demonstrate the replicability of the TOPAs solution and its ability to close the gap between predicted and actual energy usage under real world conditions.

Each stakeholder (Building Manager, Facility Manager or Service Provider) at the demonstration sites has access to their aggregated and analyzed building energy data and TOPAs services through a graphical user interface (GUI), below is an example of the site level view at Cork Institute Technology. This provides the user with a view on energy performance across blocks of buildings on a continuous basis.
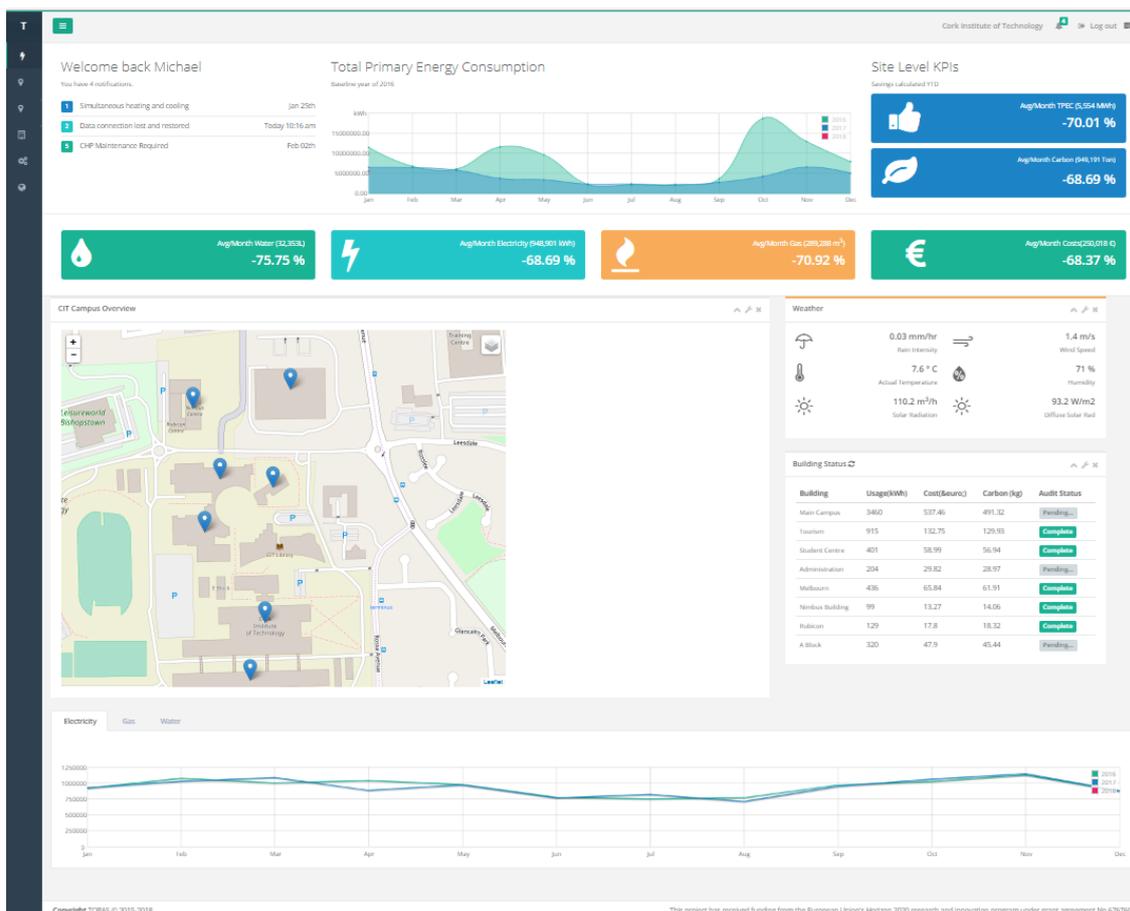
Energy performance data is extracted from multiple heterogeneous sources (buildings, meters, BMS, BIM, heating, ventilation, lighting and electrical systems). The TOPAs portal aggregates diverse data streams giving the end user a unified view of the energy

performance, energy consumption and energy savings, ensuring key performance metrics are visible, failures are monitored and prioritized, and the most relevant information is presented through a common frontend for multiple building sites and systems.

On March 21st, 2018 a "Business Angels" workshop was hosted by IBM at the IoT Watson Center in Munich, Germany. In this meeting the Business Plan was presented and valuable insight was gained with regards to the TOPAs exploitation and commercialization potential, opportunities and barriers.

In addition to the substantial progress made in the Implementation and Deployment of the TOPAs system, the TOPAs team has also published several scientific papers:

- **Design Framework for Reliable and Environment Aware Management of Smart Environment Devices, Journal of Internet Services and Applications, December 2017**
  A smart environment is equipped with numerous devices that are possibly distributed over different locations. These devices are automatically controlled to achieve different objectives related, for instance, to comfort, security and energy savings. This paper proposes a design framework for the reliable and environment aware management of smart environment devices. A case study with concrete devices, in the field of building automation, is presented to illustrate the framework.
  The paper, written and presented by CEA, is available here.

- **TOPAs, an IoT Driven Framework for Energy Efficiency in Buildings, MDPI, November 2017**
  The energy consumption of buildings lies often far above the performance objectives of the design phase. This is due to several factors, among other serious deficits in the energy operation of building services. TOPAs adopts the principle of continuous performance auditing by not only considering energy use but also knowledge and understanding of the buildings use and their climatic state. Thus it provides a holistic performance auditing process through supporting tools and methodologies that try to minimise the gap between predicted and actual energy use. TOPAs offers an open BMS IoT driven framework. This framework is composed of core services to connect to any BMS and aggregate all the information in an open platform. Add-on services are also available to improve the understanding of buildings and reduce further the gap.
  The paper, jointly written and presented by CEA, CIT, IBM & FHISE is available here.

- **Design Framework for Reliable Multiple Autonomic Loops in Smart Environments, IEEE, October 2017**
  Today's control systems such as smart environments have the ability to adapt to their environment in order to achieve a set of objectives (e.g., comfort, security and energy savings). This is done by changing their behaviour upon the occurrence of specific events. Building such a system requires to design and implement autonomic loops that collect events and measurements, make decisions and execute the corresponding actions. The design and the implementation of such loops are made difficult by several factors: the complexity of systems with multiple objectives, the risk of conflicting decisions between multiple loops, the inconsistencies that can result from communication errors and hardware failures and the heterogeneity of the

devices. In this paper, we propose a design framework for reliable and self-adaptive systems, where multiple autonomic loops can be composed into complex managers, and we consider its application to smart environments. A case study in the field of building automation is presented to illustrate the proposed framework.

The paper, written and presented by CEA is available here.

Publically available deliverables have also been published recently, and are available on the 'Public Deliverables' page on the project website, these include:

- **Development Kit (Cookbook) for Extending TOPAs**
  This document explains how to integrate TOPAs Core and Tools into a new building. It is written as an "instruction manual" or a "tutorial" for a potential future user of the TOPAs solution, describing the integration of the TOPAs Core and Add-On tools into a new building. It is intended for new users who want to capture, understand or improve energy performance through use of the TOPAs Core and Add-ons services.

- **Recommendations for Continuous Performance Auditing**
  Continuous performance auditing for commercial buildings provides real time data and analysis to eliminate the costs of periodic auditing while benefits are generated from increased efficiency and reliability. The importance of continuous improvement is recognized and emphasized in energy management standards and is central to the ISO 50001 energy management standard. A comprehensive energy management plan should consist of an extensive energy audit that includes continuously examining energy usage and patterns, as well as collecting, analyzing and reporting on data from major energy consumers within a facility. TOPAs provides novel ICT-solutions to enable continuous measurement, monitoring and analysis of the Energy Performance Indicators (EnPIs), thus achieving a 'Continuous Auditing' process.

Looking forward, the TOPAs Consortium will host 2 workshops at the upcoming "Sustainable Places 2018" Event in Aix-les-Bains, France on June 27th and 28th, 2018.

One workshop will be TOPAs-specific and will present the "TOPAs Success Story", a platform providing a suite of tools and services for upscaling energy management from buildings to blocks of buildings.

The second is a collaborative workshop covering 3 EU sister projects – TOPAs, MOEEBIUS & HIT2GAP, addressing Data Management, Citizen (occupant) engagement, Replicability & Business Modelling, Upscaling Energy Management from Buildings to Blocks of Buildings, Building Performance Optimisation & Gap Reduction.

We invite you to join us at this Event. Additional details available here

As always, the project website is a good place to catch up on our latest News & Events, scientific papers and public deliverables. We invite you to follow us, and will welcome any contribution or communication with the professional community.

Sincerely yours,
TOPAs Consortium.
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