PROJECT
NEWSLETTER

WELCOME TO THE THIRD TRACK & KNOW NEWSLETTER!

In this newsletter, you can find:

- reflections on the mid-term event of the project
- reflections on some key project liaison activities, stakeholder workshops/webinars and conference participations

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ABOUT THE NEWSLETTER

This newsletter informs you about the project mid-term event and other liaison activities of the EU H2020 research project Track & Know. The aim is to keep all relevant actors interested about the progress made in different research tasks in relation to managing big data, more specifically on the type of big data we focus on in the project and the tools/methods we develop to handle, analyse and visualize these datasets. Track & Know focuses on resolving key business cases for 3 test pilots, namely transport/mobility, insurance and health care. Business cases which will be explored in these pilots are as follows but not limited to: minimizing patients travel, carpooling and electric mobility potential, driver behaviour profiling etc.

Reflections on the Track & Know Mid Term Event

As part of the dissemination goals of the project, a mid-term event was held on **2nd May, 2019** as a **special technical session** within a reputed international conference on **Ambient Systems, Network and Technologies (ANT)** to gain attention of a wider and more related audience. This anual conference is a leading international conference for researchers and industry practitioners to share their new ideas, original research results and practical development experiences from Big Data analytics, cloud computing, emerging networking, tracking and sensing technologies, modelling simulation and transportation sciences, internet of things, etc.

The ANT conference is held from 29th April to 2nd May, 2019 in Leuven, Belgium and is attended by more than 150 individuals from all continents of the world with presentations on just over 100 research papers. Apart from the dissemination of project results, the conference provided an **excellent opportunity for enhancing the network and reach out to the researchers/practitioners in different but related domains** by advertising the project portfolio and distributing the project materials (i.e. newsletter/flyers).

The special session on Track & Know project consisted of **five key presentations** of which the first presentation was an overall introduction to theTrack & Know project, followed by four key technical presentations that described preliminary results and work in progress. This special session was well attended and generated some useful discussions on all presentations. The following paragraphs provide highlights of each technical presentation.

1. Dr. Ibad Kureshi from Inlecom System (replacing Athanasios Koumparos - Vodafone Innovus) presented a Fleet management pilot of the Track & Know project and highlighted the current progress made in relation to toolbox development to answer relevant business questions. For example: 1) enrichment of trajectory data with weather, holidays and geographical point-of-interest (such as fuel station) to give more context for accident prediction analysis; 2) identification of traffic hot spots and then indication of alternatives routes. Please click here for more details.

3. Mr. Kieran Lee from Royal Papworth Hospital- NHS presented details of the health pilot of the Track&Know project and highlighted current progress in relation to data characteristics analysis and relevant developments in the Track&Know toolboxes. The presentation also highlight on finding the optimal number of exchange facilities (mobile outreach clinics) to minimize travel distances of Obstructive Sleep Apnoea (OSA) patients. Please click here for more details.

2. Dr. Muhammad Adnan from UHasselt (replacing Feng Liu - UHasselt) presented details of the method for identifying traffic congestion hot spots using trajectory data and how alternative routes can be obtained using this technique. Some preliminary results on the approach are also presented by applying trajectory data of fleet from Vodafone Innovus. Please click here for more details.

4. Prof. Mirco Nanni from CNR presented details of the Insurance pilot of the Track & Know project and highlighted the current progress in relation to analytical toolbox development to answer relevant business questions. The presentation also discusses some results from the preliminary analysis such as machine learning model estimation for accident prediction using the data obtained from Sistematica, Use of individual mobility network approach with some contextual information to characterize driver behaviour and cities to enhance model predictions. Please click here for more details.

Some **key takeaways** from the discussions with participants that help exploit project research activities are as follows:
1) Collaborations with Track & Know partners in further exploration of a variety of big data analysis methods,
2) Sharing and availability of data (aggregate data) for testing and resolving other pertinent research questions,
3) Knowledge sharing in relation to understand how Track & Know has resolved data privacy, GDPR and other ethical issues.

Special Session: Track & Know

Technical Sessions	Thursday, May 2, 2019 08:30 – 10:00

Horizon 2020 Project: Big Mobility Tracking Knowledge Extraction in Urban Areas (Track & Know)
Ibad Kureshi

Utilising mobility data for health services optimisation
Kieran Lee, Lindsey Conrow, Loris Huber, Ibad Kureshi, Toni Staykova, Robert Weibel and Ian Smith

Business Innovation in the Development of Big Data Toolboxes for the Management of Professional Vehicle Fleets
Athanasios Koumparos, George Koutalieris, Christos Doulkeridis, Harris Georgiou, Akrivi Vlachou, Anagnostis Delkos, George Kaptsis

Dissecting traffic flows in congestion areas using GPS Data: A study with the VFI dataset
Feng Liu, Muhammad Adnan, Ansar Yasar and Davy Janssens

Car Telematics and Individual Mobility Networks for Insurance & Innovative Mobility Services (E.V. Migration, Car Sharing)
Leonardo Longhi, Mirco Nanni

Location: Room 5
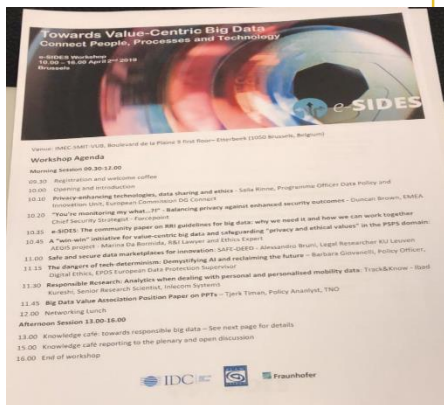
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https://www.trackandknow.eu

Key Liaison Activities, Workshops and Conferences

Big Data Value Forum Workshop on 'Policy issues, opportunities and barriers in big data-driven transport'

Track & Know has planned for **clustering and knowledge transfer activities with the ICT-15 lighthouse projects Transforming Transport (TT), DataBio, e-SIDES others.** In relation to this Track & Know took part in the Big Data Value Association (BDVA) workshops at the 2018 Big Data Value Forum (BDVF) in Vienna, Austria on Wednesday 14th November 2018. At a workshop, focused on challenges in Policy arranged by the Transforming Transport (TT) project, Track & Know provided a different voice using our unique case studies of Insurance, Driver Behaviour and Medical Services. The presentation and subsequent discussion included steps to identify barriers and opportunities in regulation to facilitate growth in car-pooling and EV vehicle adoption, as well as the use of mobility in a broader context to affect policy and organisational change. Please click here for more information.

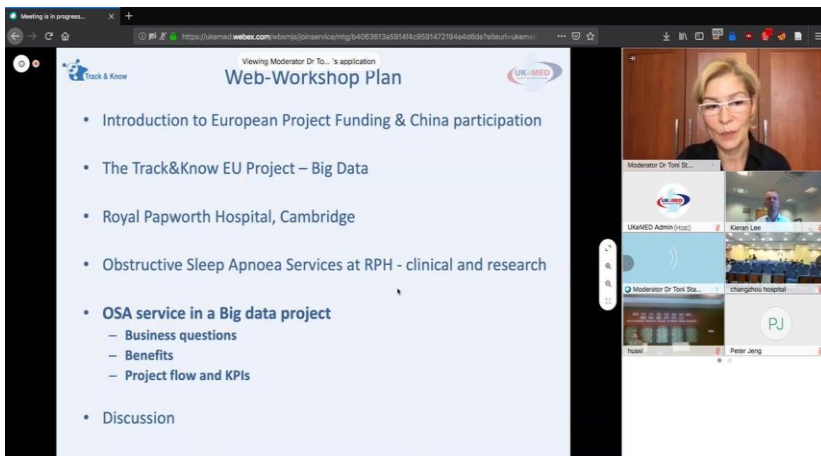## E-sides Workshop on 'Towards Value-Centric Big data: Connect People, Proceses and Technologies'

The workshop was held on April 2nd, 2019 in Brussels, at the IMEC/BDVA venue (at the Vrije Universiteit) with an aim to gather all actors whose work and active engagement can promote responsible research and innovation in data the field of Big Data paving the way to design and deploy the next generation of Big Data solutions. Track & Know advocated the case of responsible research in relation to analytics when dealing with personal and personalised mobility by showcasing the development of a software framework that aims at increasing the efficiency of Big Data applications in the transport, mobility, motor insurance and health sectors. The discussion emphasized on **the identification of biases created by historical series of person movements and test them through ethical and informed processes**. In addition ensuring personal data protection and informed consent (e.g. in the health use cases) through appropriate staff training techniques. Please click here for more information. In relation to that workshop, E-side has also published a full report. Please click here to get the full report.

Stakeholder Workshops/Webinars on Medical Service Optimization

A series of two workshop (face-to-face) and webinar was held on 4th December, 2018 and 12th December, 2018 in relation to health pilot of Track & Know project. The aim of the workshop is to engage with the health relevant stakeholders, get them aware of the project plans, health pilot business case and questions address via bigdata toolboxes and type of data used to understand the problem.

Stakeholders involved/invited in the workshops are Respiratory Physicians from First People's Hospital Changzhou China, West China Medical School, Hospital of Sichuan University China, Sino-Health International Business Company, Sleep Apnoea trust association, Home sleep motor manufacturer, British Thoracic Society, Stowood Scientific, OSA partnership group, Cambridge and Peterborough Clinical Commissioning Group and Linguamatics: Data mining software company.

Stakeholders feedback were positive as they see the project in the UK as very beneficial. In China there is great interest in OSA service development and participation in joint research. No further data requirements were suggested, however it was proposed to examine relationship with other medical conditions, such as diabetes in OSA sufferers and look at service optimisation to join the outreach attendances of the two conditions. A plan has been proposed for the project to provide education to other stakeholders in the UK, as well as to use the project results for revision of the other OSA centre service flows. Workshop material can be accessed here.
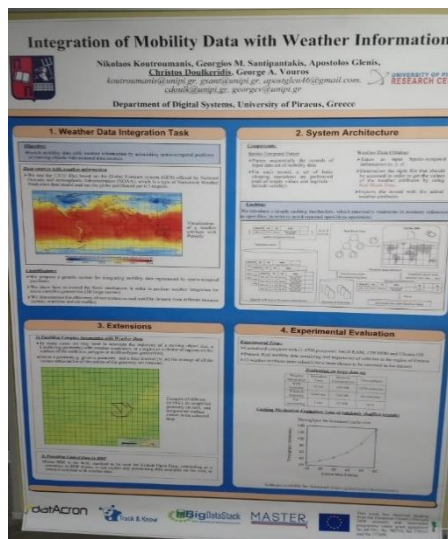
Participation in 4th Annual Nursing, Midwifery and Allied Health Professional Research Conference

On the 14th of May, 2019 Mr. Kieran Lee, a research practitioner at Royal Papworth Hospital, presented a talk based on work being completed in health pilot at the 4th Annual Nursing, Midwifery and Allied Health Professional Research Conference. Attendees were mostly made up of staff from one of the Cambridge University Hospitals, but also many others working in health care from all other the UK. The Track & Know health pilot talk, was well received with wide agreement about the poor road network and almost non-existent public transport in the East of England. As well as offering encouragement for any work that makes health services more assessable and feeding back that the use of pharmacies as test pick up sites will be extremely convenient as lots of people already routinely visit such places as part of their weekly schedule. Please click here for more information.

Participation in 10th EDBT/ICDT Conference and Workshop

Prof. Christos Doulkeridis and his colleagues from UPRC attended the conference held on March 26-29, 2019 in Lisbon, Portugal. Attendees were mostly made up of researchers and practitioners community in the domain of database technology and data theory from all around the world. UPRC researchers presented a research paper about the 'integration of mobility data with weather information'. The main novelty of the method is its applicability to streaming/online mobility data coming as a trajectory from on-board vehicle GPS units. This method is an important part of the Big Data processing toolbox being developed in the Track & Know project. The code for the method is available here and more details about the method can be read from the research paper.

Participation in 23rd Pacific Asia Conference on Knowledge Discovery and Data Mining

Riccardo Guidotti from CNR attended the conference held on April 14-17, 2019 in Macau, China. Attendees were mostly made up of researchers and practitioners community in the domain of computer science and data scientist from all around the world. CNR researchers presented a research paper about the 'Investigating Neighbourhood Generation Methods for Explanations of Obscure Image-Classifiers'. The paper presents a comparison of several grid-based methods that redesign the neighbourhood generation of LIME. This method is an important part of Big Data analytics toolbox being developed in the Track & Know project. The code and paper can be read from here.

Participation in Kunming International Health Forum

Takis Kotis, CEO of CEL attended the event held on 1st December 2018 in China. The Track & Know project was presented as example for innovative approach of Big data applications for health service optimisation. Audience ca. 300, stakeholders from various health care domains - medical, IT, R&D, management, policy makers, industry. Two types of stakeholders showed interest in the future outputs: a) medical (stakeholder category "direct users of the system") - to learn more about OSA service, as the risk factors are increasing in China and b) industry (stakeholder category "result beneficiaries") - anticipating that there will be increasing demand for supplies of diagnostic and therapy equipment and the Big Data analytical approach will help with forecasts of service demands.

Collaboration Visit to two Hospitals in Wuhu, China

On 21st March 2019, Dr Toni Staykova presented "Cambridge Medical Academy (new name of Celeritas) - Research and Innovation" two hospitals in Wuhu China. The name of the hospitals are the Second Affiliated Hospital of Wannan Medical College and the First Affiliated Hospital of Wannan Medical College. From these hospitals around 60 stakeholders who can be the direct users of the system (i.e. Doctors and Administrators) have attended the talk. Audience were interested in learning more about how Track & Know tools can help achieve medical service optimization.

PUBLICATIONS 2019

- Nikitopoulos P., Sfyris G. A., Vlachou, A., Doulkeridis C., Telelis O. (2019) Parallel and Distributed Processing of Reverse Top-k Queries, *In Proceedings of the 35th IEEE International Conference on Data Engineering* (ICDE 2019).
  Download here

- Andrienko N., Andrienko G., Garcia J. M. C., Scarlatti D. (2019) Analysis of Flight Variability: a Systematic Approach, *IEEE Transactions on Visualization and Computer Graphics*, vol. 25(1), pp.54-64.
  Download here

- Liua S., Andrienko G., Wu Y., Cao N., Jiang L., Shi C., Wang Y. S., Hong S. (2019) Steering Data Quality with Visual Analytics: the Complexity Challenge, *Visual Informatics*, vol 2(4), pp.191-197.
  Download here

- Koutroumanis N., Santipantakis G., Glenis A., Doulkeridis C.,Vouros G. (2019) Integration of Mobility Data with Weather Information*, In proceedings of the International Conference on Extending Database Technology (EDBT) and International Conference on Data Theory (ICDT) Workshops 2019*, Lisbon, Portugal.
  Download here

- Guidotti, R, Monreale A, Cariaggi L (2019). Investigating Neighborhood Generation Methods for Explanations of Obscure Image-Classifiers, In: Yang Q., Zhou ZH., Gong Z., Zhang ML., Huang SJ. (eds) *Advances in Knowledge Discovery and Data Mining. PAKDD 2019. Lecture Notes in Computer Science, vol 11439.* Springer, Cham.
  Download here

- Chen S., Andrienko G., Andrienko N., Doulkeridis C., Koumparos A., (2019) Contextualized Analysis of Movement Events, In: T. V. Landesberger and C.Turkay (Eds) *EuroVis Workshop on Visual Analytics (EuroVA), pp: 49- 53, The Eurographics Association.* ISBN: 978-3-03868-087-1, DOI: 10.2312/eurova.20191124.
  Download here
  (This publication received the "EUROVA 2019 best paper award")