A successful study case of collaboration through PI system: University of Granada and Abbott Lab.

José Miguel Gutiérrez, Juan Antonio Holgado

Agenda

- About University of Granada.
- PI System in Granada University.
- Collaboration between Granada University and Abbott Lab.
- Conclusion

University of Granada

- **Granada** is located in the South of Spain at the foot of the Sierra Nevada mountains.
- Alhambra is a UNESCO World Heritage Site and one of Spain's major tourist attractions.
- The University of Granada was officially founded in 1531 by Carlos I of Spain.

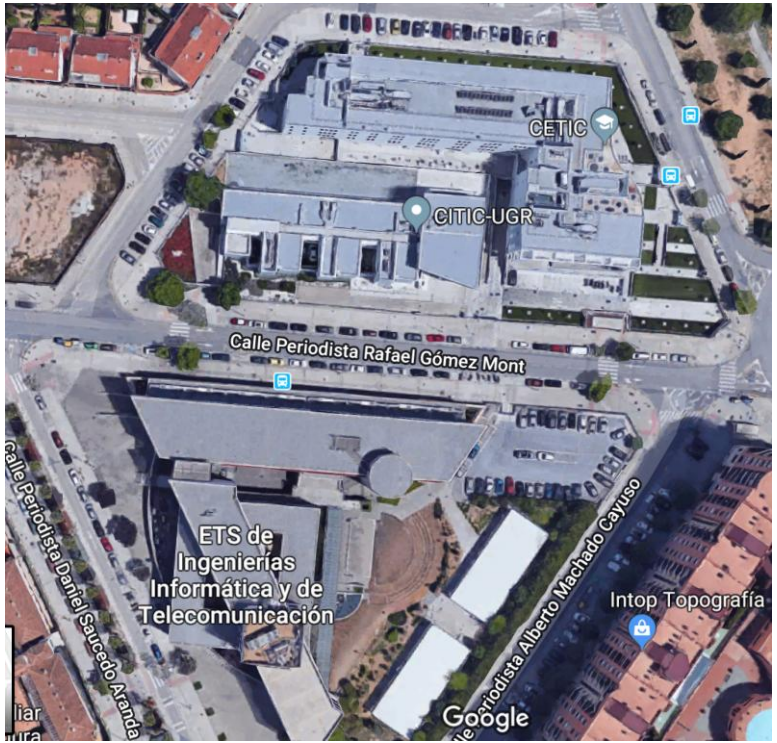
University of Granada (UGR)

- Fourth largest university in Spain
  - 70.000 students and 3500 teachers.
- Popular university for international students (and Erasmus students).
- It is among the top five in Spain according to Shangai and Taiwan rankings.
  - High Positions in Information Science, Computer Science and Engineering, and Mathematics.

Computer & Telecommunications Engineering Campus

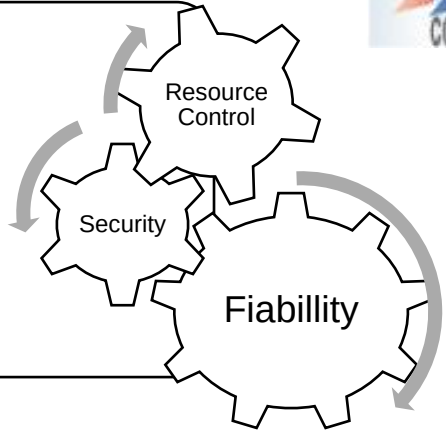
It is based in three pillars:

- Training: ETSIIT with 2.500 students BSc, MSc and PhD.
- Research: CITIC
- Transfer of Research Results: CETIC



Concurrent Systems Research Group

Concurrent Systems Research Group

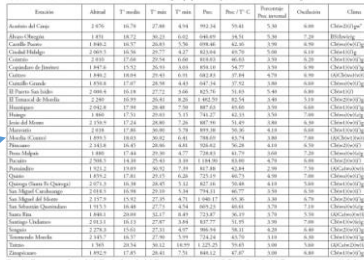


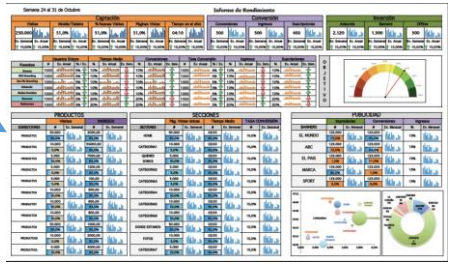
Hardware	Industrial System	Comunications	Middleware Frameworks	Software, semantics and reasoning, final applications.

PI System in UGR

- PI System is an essential platform to centralize and historize data in industrial environments.

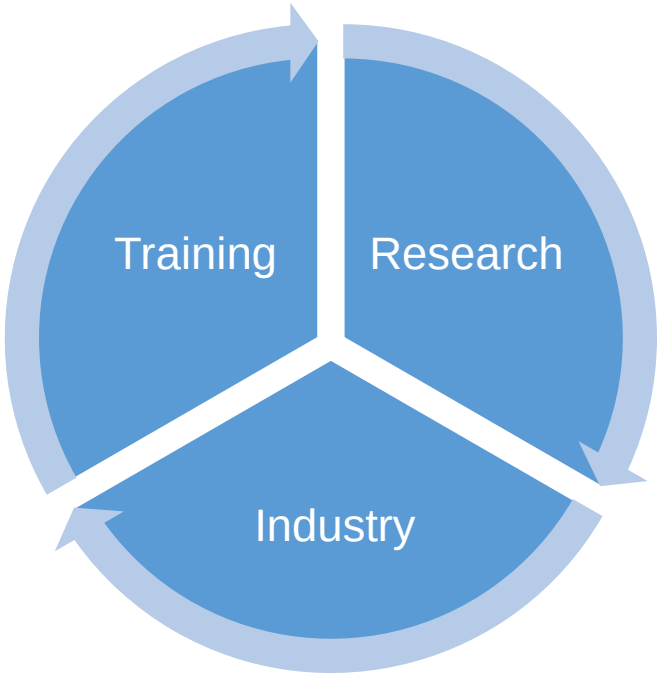
PI System



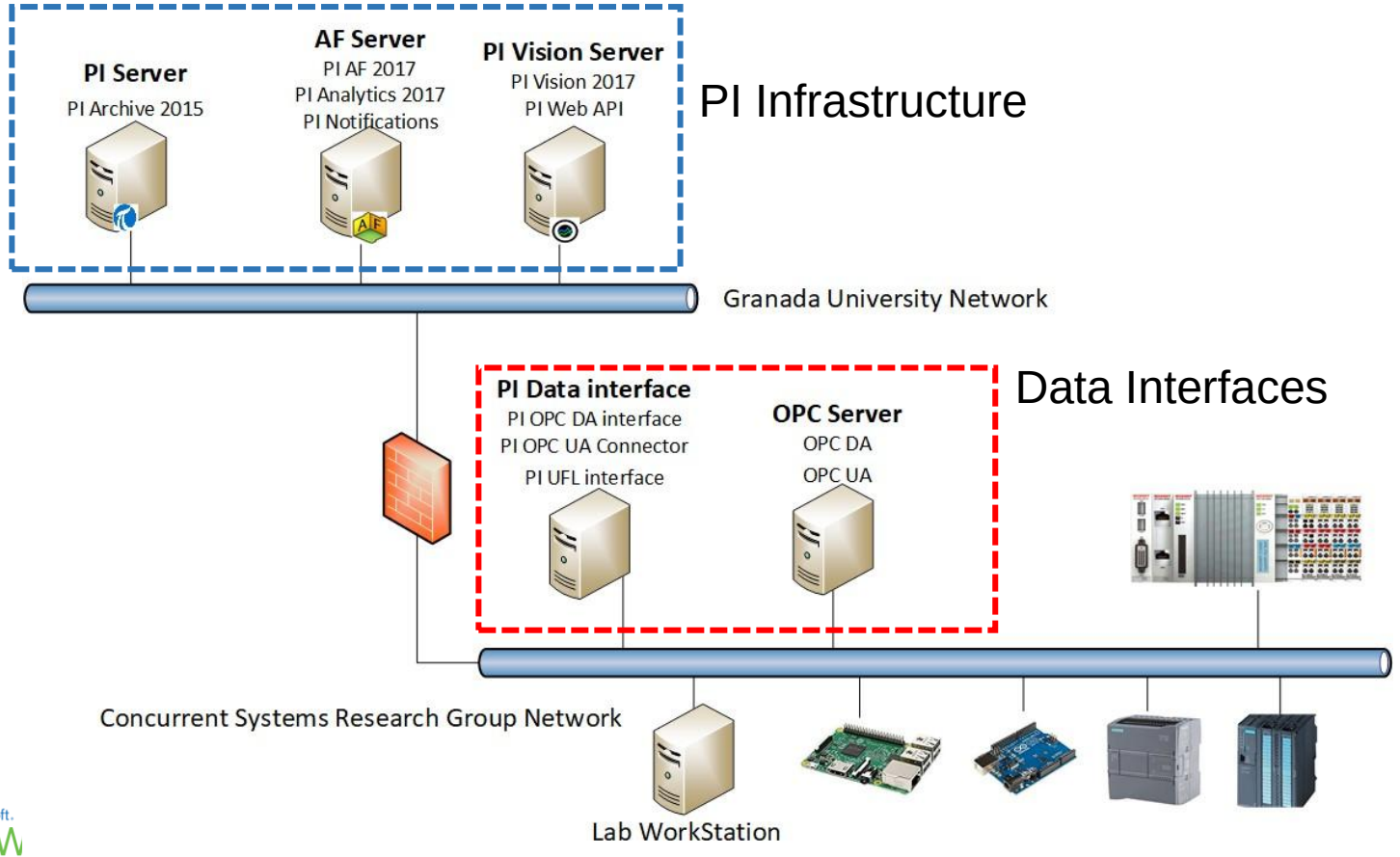


PI System in UGR

- The collaboration between OSISoft and UGR for PI System platform is applied in the University on three dimensions:
  - Training
  - Research
  - Industry experience



PI System in UGR: The infrastructure



PI System in UGR: Training

Training of PI system infrastructure is performed at different levels to BSc and MSc students of telecommunications and computer science:

- Specific seminars about PI system infrastructure (PIVision, …) applied to real industrial case study
- Application of PI in MSc courses of IoT and Industry 4.0.
- Preparation of BSc and MSc End Projects applied to industry problems.

PI System in UGR: Our research interests

- Mechanisms and strategies to improve integration and interoperability in industrial systems (e.g., OPC-UA, Cloud, IIOT).

- Methods and Techniques that facilitate the Modeling of industrial systems (e.g. MDE, code generation).

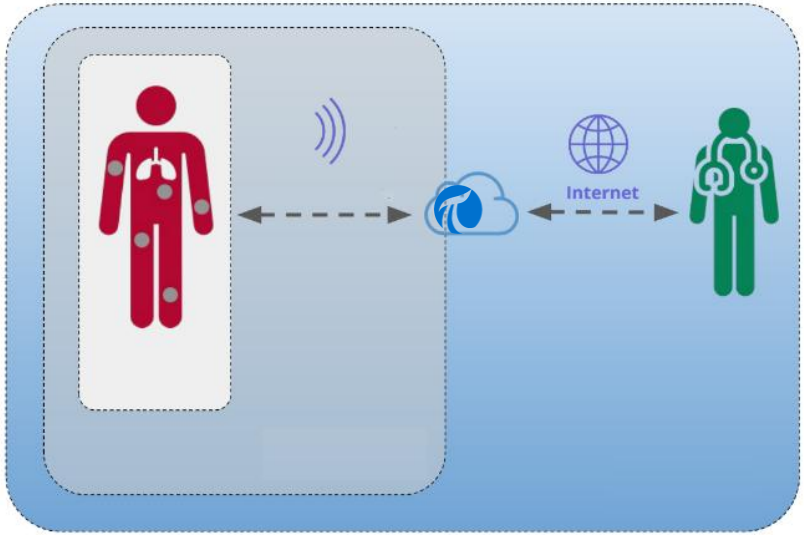
PI System in UGR: Our research interests

- Improvement of operational intelligence of industrial processes for the maintenance, control and supervision based on artificial intelligence (predictive methods, …)

- Application to the development of continuous monitoring systems applied to health, sport and digital homes.

PI System in UGR: Real Application

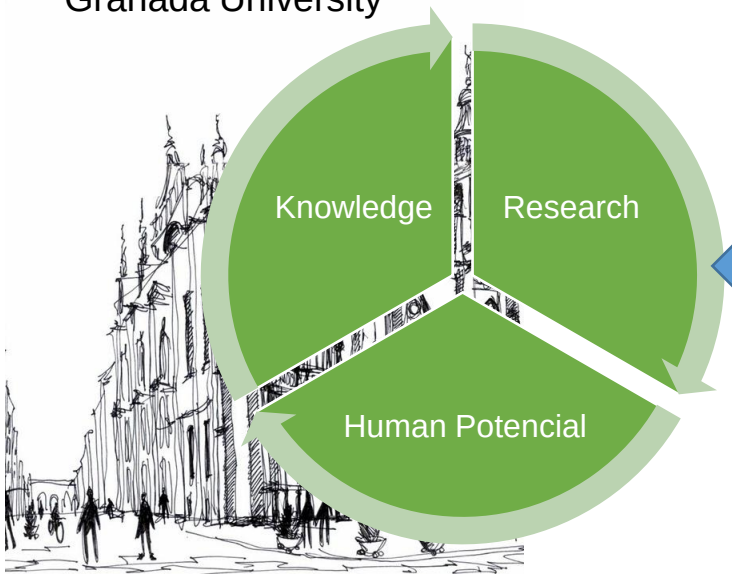
- A continuous patient monitoring system was developed using PI for monitoring biodata signals of chronical diseases:
  - Biodata are collected from wearable devices.
  - Biodata are stored and processed for medical inspections
- This work was presented in the last EMEA Users Conference 2017 in London.



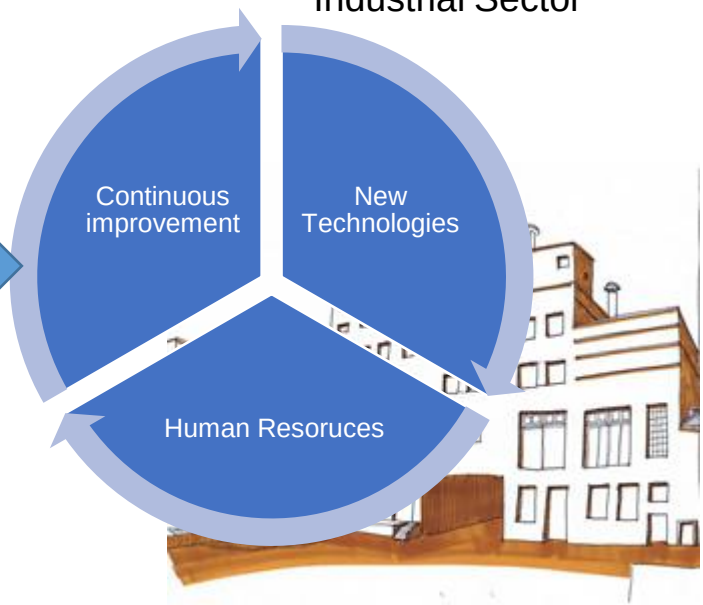
https://www.osisoft.com/Presentations/IoT-in-Healthcare--Using-the-PI-System-for-Continuous-Patient-Monitoring/

Collaboration between UGR and Abbott Lab.

Granada University



Industrial Sector



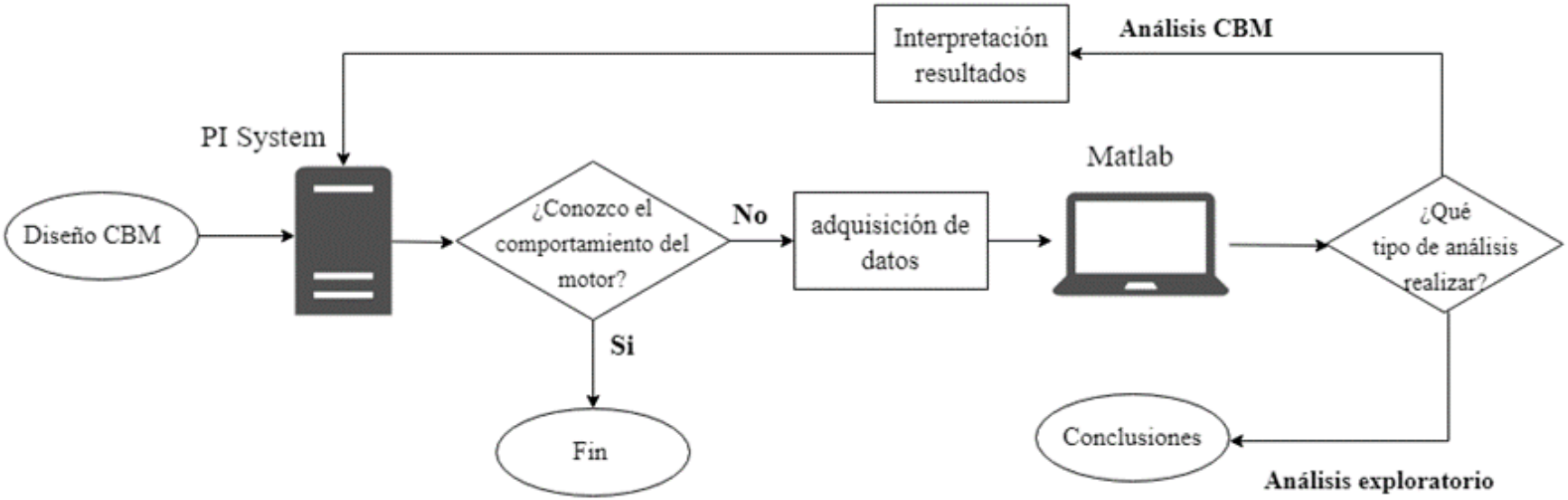
UGR-Abbott Lab: Condition-Based Maintenance

- Evaluate the possible faults of induction motors of the drying towers by means thermal and vibration analysis to prevent any malfunction.

- Design a predict model to improve the maintenance of induction motors.

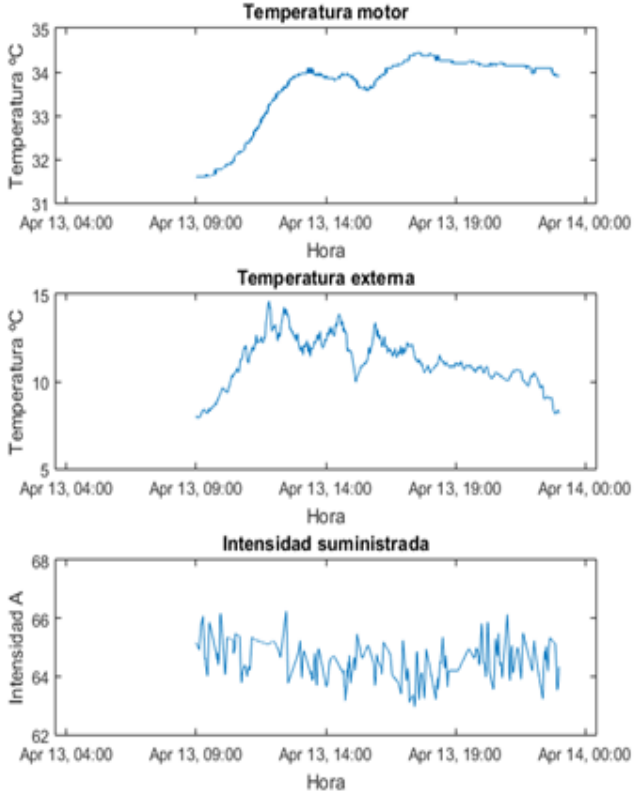
UGR-Abbott Lab: Condition-Based Maintenance

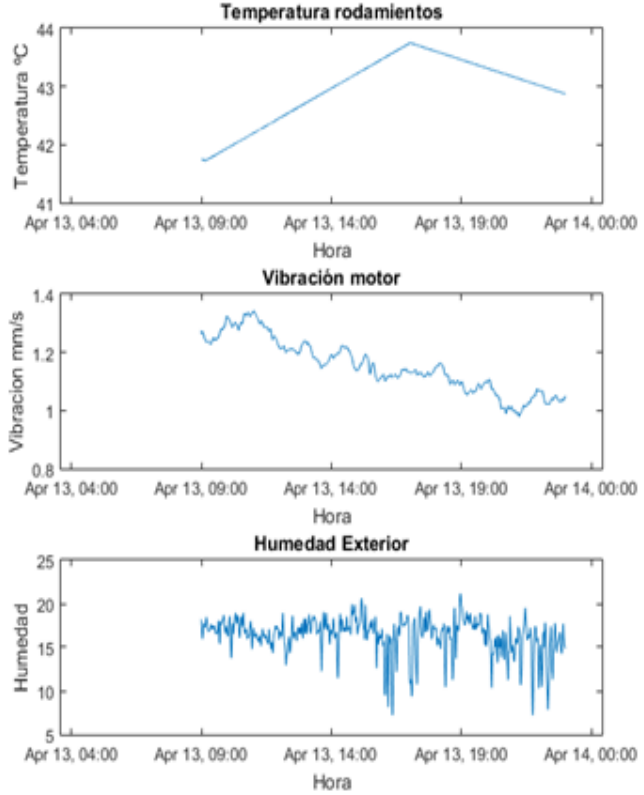
- Methodology:



UGR-Abbott Lab: Condition-Based Maintenance

- Multivariant Analysis in MATLAB from data extracted from PI



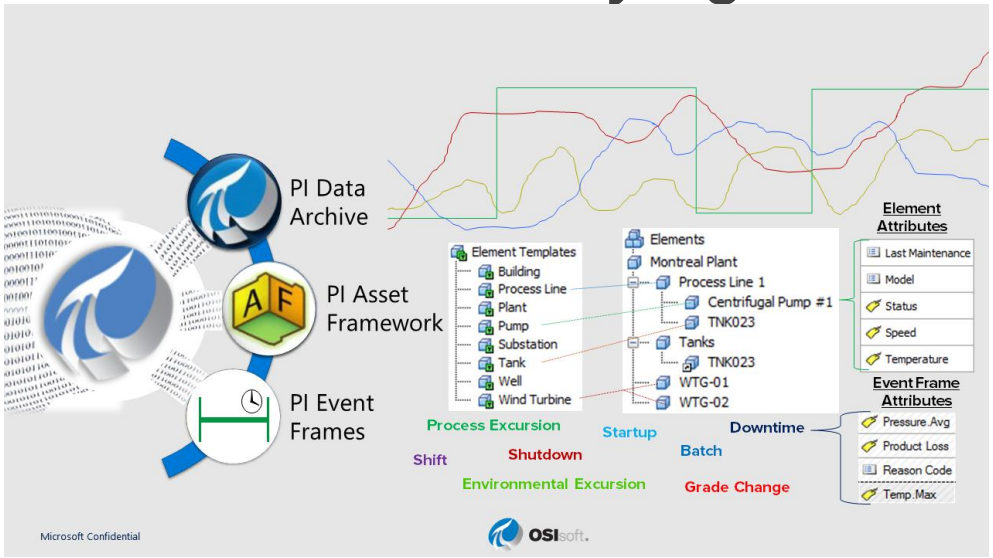


UGR-Abbott Lab: Condition-Based Maintenance

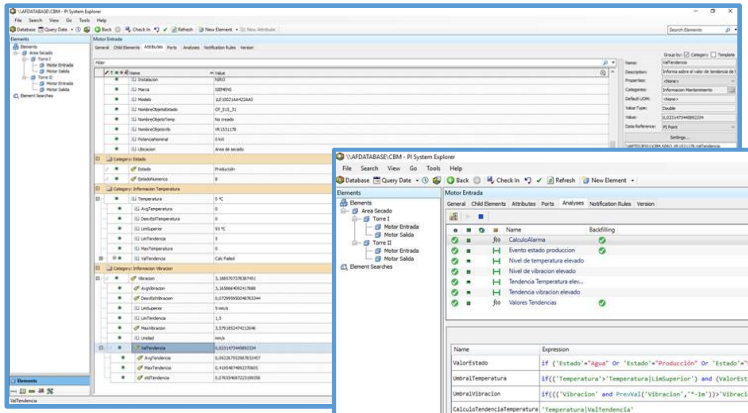
- Analysis Results:
  - Initial multivariant analysis does not give significative correlations
  - Determination of the conditions (warning and critical) using unidimensional statistics analyzing data from different days.

UGR-Abbott Lab: Condition-Based Maintenance

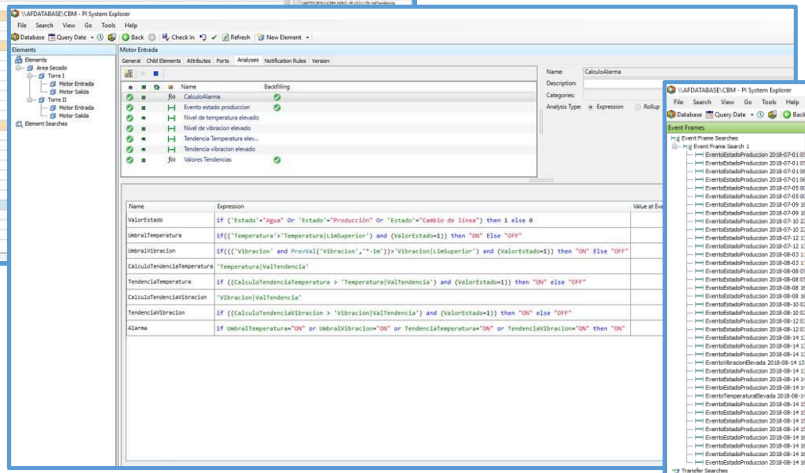
- From analysis, a CBM is modelled to four induction motors of the drying towers



UGR-Abbott Lab: Design of CBM

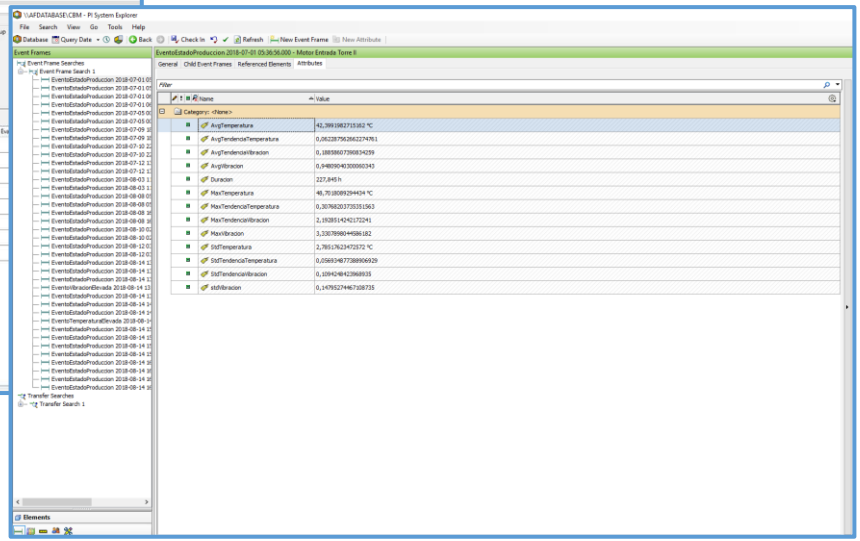


AF Database



AF analytics

Event Frame



UGR-Abbott Lab: Design of CBM

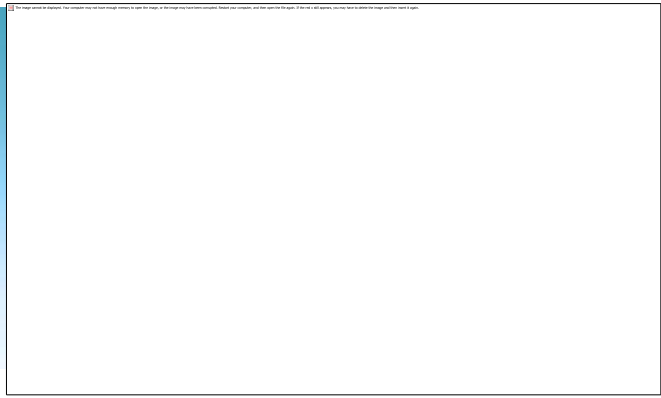
Conclusions

- PI gives important advantages to the research of UGR.
  - PI gives a storage of big data volumes that can be analysed in real-time.
  - PI can be complemented by other research tools such as R or MATLAB.
  - PI helps the centralization and management of data generated by different research projects.

- PI is a perfect infrastructure that helps the knowledge transfer between university and industry.
  - Industrial data can be acceded to improve the operational intelligence or maintenance.

University of Granada

A successful study case of collaboration through PI system



CHALLENGE

Improve the research of UGR in industrial systems and helps the collaborations with local industry companies to transfer knowledge.

- Set solid relationships with local industry.
- Conceptualize new researches and develop new technologies applicable to industrial area towards industry 4.0
- Publish these researches in high-impact research journals

SOLUTION

Osisoft (PI) can become the nexus for finding and set collaborations with industry

- PI provide a data environment that can be exchanged by both parties (university and industrial companies).
- Each party (UGR and Abbot Lab) can be decoupled promoting independent research studies

RESULTS

Preliminary results can be significant and profitable by both parties.

- Best professional training for students in industrial area.
- Valuable research results are achieving in UGR.
- A prototype of a tool for conditioned based maintenance for Abbott Lab. was develop by a BSc End of Project.

- José Miguel Gutierrez Guerrero
- Phd Student
- University of Granada
- jmgutierrez@ugr.es

- Juan Antonio Holgado Terriza
- Professor
- University of Granada
- jholgado@ugr.es

Questions?

Please wait for the **microphone**

State your **name & company**

Please rate this session in the mobile app!