Industrial Internet Hackathon

GE Healthcare Challenge

# Dosewatch

DoseWatch is an enterprise-wide dose management solution designed to automatically collect and analyze patient radiation and iodine exposure across multi-facility, multi-modality, and multi-vendor imaging environments.

DoseWatch enables healthcare professionals to monitor the radiation exposure and contrast media injection dose of their patients, evaluate their practices and make improvements so that the right dose is used to provide the best patient outcome.

* **Drive Awareness Across Modalities & Devices** with cumulative dose tracking. DoseWatch works across health systems to assess radiation dose delivered to patients undergoing a variety of imaging procedures.
* **Optimize Performance** with analytics tools to find the right balance between image quality and dose. DoseWatch helps you improve patient care, while minimizing risk.
* **Enable Compliance** with reporting capabilities for radiation safety personnel, internal stakeholders, patients, external governing bodies, and regulatory authorities.

# Dosewatch Explore

DoseWatch Explore is a web-based, cloud deployed\*, introductory dose management software to track, analyze and report practice-level data for GE CT systems. This software collects radiation dose data directly from your GE CT scanner, then summarizes and presents the data via a web application. With this introductory offering you can start to make initial improvements around dose management to help drive changes in your organization that can ultimately improve patient care with respect to radiation doses.

# The challenge

GE Healthcare challenge for the industrial internet hackathon is to build a prototype on Predix which can answer the following question: for a given configuration of a patient profile, medical imaging procedure, and medical imaging asset model where do I stand compared to other professionals / hospitals in terms of delivered radiation dose?

You can create an innovative way to process or to visualize this data.

# Dataset

|  |  |
| --- | --- |
|  | Keys that allows 3 level analysis |
|  | Dose units |
|  | Image acquisition parameters. Linked to one series of one protocole and influencing the radiation dose |
|  | Parameters for filtering |

## Dosewatch\_study.csv

|  |  |  |
| --- | --- | --- |
| **Column Name** | **Description** | **Unit** |
| id | ID of the record | - |
| study\_datetime | Date and Time of the beginning of the study (started on the console) | - |
| ae\_key | Application Entity (DoseWatch internal key) Machine | - |
| aet | Application Entity Title | - |
| facility\_description | Facility name configured within DoseWatch | - |
| facility\_key | Facility (DoseWatch internal key) | - |
| protocol\_name | Protocol name | - |
| dose\_length\_product\_total | Sum of Dose Length Product (DLP) over all series in the study | mGy.cm |
| total\_number\_of\_irradiation\_events | Number of irradiating acquisitions (no reconstruction) | - |
| protocol\_key | Protocol Key (DoseWatch internal key) | - |
| ctdi\_vol\_max | Maximum across all series of the mean series CTDIvol. | mGy |
| ctdi\_alert\_level | Alert threshold on Computed Tomography Dose Index (CTDI) | - |
| dlp\_alert\_level | Alert threshold on Dose Length Product (DLP) | - |
| tni\_alert\_level | Alert threshold on Number of irradiating acquisitions | - |

## Dosewatch\_serie.csv

|  |  |  |
| --- | --- | --- |
| **Column Name** | **Description** | **Unit** |
| id | ID of the record | - |
| study\_key | Key refering to study table | - |
| series\_number | Dosewatch Internal Key | - |
| series\_description\_name | Series descritpion name | - |
| exposure\_time | Time of x-ray exposure in msec | msec |
| average\_xray\_tube\_current | Average x-ray tube current used in the collection of the data | mA |
| nominal\_single\_collimation\_width | Nominal single collimation width | mm |
| ctdi\_vol\_mean | Average Computed Tomography Dose Index for the imaging series | mGy |
| maximum\_xray\_tube\_current | Maximum x-ray tube current | mA |
| ctdiw\_phantom\_type | Phantom type used for the estimation of CTDIvol | - |
| nominal\_total\_collimation\_width | Nominal total collimation width | mm |
| dose\_length\_product | Series Dose Length Product | mGy.cm |
| xray\_tube\_voltage | Applied X-Ray Tube voltage at peak of X-Ray generation, in kilovolts; | kV |
| pitch\_factor | The ratio of the table speed per rotation and the total collimation | - |
| scanning\_length | Length of the table travel during the entire tube loading. Note: Scanning Length might be longer than the programmed acquisition length (Length of Reconstructable Volume | sec |
| ten\_times\_noise\_standard\_deviation | 10 (ten) times the image noise (standard deviation), or 10 (ten) times the Noise Index. | - |
| table\_height | The distance in mm of the top of the patient table to the center of rotation; below the center is positive. | mm |
| exposure | The exposure expressed in mAs, for example calculated from Exposure Time and X-ray Tube Current. | mAs |
| iterative\_recon\_level\_percent | The percentage blend of adaptive statistical iterative reconstruction (ASiR) with filtered back projection (FBP) | % |
| series\_type | Contains the attributes defining the CT acquisition mode | - |