[The KG1LH\_py code KG1LH\_py] Requirements Specification

Version 1.0

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# Executive Summary

## Project Overview

The code KG1LH\_py The KG1LH\_py code is written in Python 3.5, for the manual/automatic calculation of the line averaged density (LAD), intersections with the last closed magnetic surface and the tangent flux surface for a given line of sigth

## Purpose and Scope of this Specification

This code is intended to be used by KG1V ROs and other people authorized to handle KG1 data.

In scope

This document is intended as being an introduction to the The KG1LH\_py code, with reference to further documentation on KG1 system and the KG1R\_py code as required. It is also a snapshot of the code in its current state (as July 2019), that will help with any further development as required. The code can be found on Gitlab [here](mailto:git@git.ccfe.ac.uk:bviola/kg1lh_py.git). Documentation has not been released yet.

Out of Scope

It is outside the scope of these specification to describe how KG1 system works

# Product/Service Description

The The KG1LH\_py code kg1lh\_py code is a new code written in Python designed to eventually replace the current THE KG1LH\_PY CODE Fortran code for the production of KG1L and KG1H data. THE KG1LH\_PY CODE The KG1LH\_py code is used to manually/automatic (via batch job submission) produce KG1L and KG1H PPF data for the line-averaged density of the 8 different KG1 channels

This new code has to be released as soon as possible as to replace the old Fortran code.

## Product Context

THE KG1LH\_PYcode is related to KG1\_py and KG1V\_IDL codes. The old Fortran code running intershot reads in PPF data from the KG1V data acquisition system. However, the new updates on the KG1V hardware make very difficult to maintain and update the Fortran code, hence the decision to rewrite it in Python.

## User Characteristics

The users of this code are:

* KG1 Responsible Officer (RO): is the responsible of the diagnostic. This user is authorized to write public KG1 ppf. He authorizes changes to hardware and software related to KG1.
* Users authorized to write KG1 public ppfs: users that after training have been authorized to write KG1 public data and can correct frinje jumps in the signals. Some of these users can make changes to software related to KG1
* Trainees: users that are training to manipulate KG1 data. They are not allowed to write public KG1 ppfs, only private PPFs.

## Assumptions

Users of these code are required to have expertise KG1 data format. In particular they:

* Know the difference between line integrated density (LID) and line averaged density (LAD)
* Know how to compute LADs

The code is written in Python 3 and will run on the Freja/Hemindall clusters using python/3.5.1.

## Constraints

* The code:
* Is written in Python 3 (ver 3.5.1)
* will operate with data coming all KG1 acquisition systems
* will be run only by users authorized by KG1 RO

## Dependencies

* This code will require a secure connection to Freja cluster to run

# Flow Chart

# Requirements

Priority Definitions

The following definitions are intended as a guideline to prioritize requirements.

* Priority 1 – The requirement is a “must have”
* Priority 2 – The requirement is needed for improved processing, and the fulfillment of the requirement will create immediate benefits
* Priority 3 – The requirement is a “nice to have” which may include new functionality

| Req# | Requirement | Comments | Priority | Date Rvwd | Reviewed / Approved |
| --- | --- | --- | --- | --- | --- |
| 1 | Will operate with data coming from all KG1 acquisition systems (kg1v,kg1r and kg1c) |  | 1 | 23/07/19 |  |
| 2 | Will run from terminal |  | 1 | 23/07/19 |  |
| 3 | Can run as bash script |  | 2 | 23/07/19 |  |
| 4 | Will have a test mode to avoid overwrite public data |  | 1 | 23/07/19 |  |
| 5 | Will compute line averaged densities for all channels | . | 1 | 23/07/19 |  |
| **6** | will use as input line averaged densities (LIDs) and EFIT data |  | 2 | 23/07/19 |  |
| **7** | Data can be plotted for quality checks |  | 1 | 23/07/19 |  |
| 8 | Code will be parallelized to increase speed and performances |  | 2 | 23/07/19 |  |
| 9 | Code will have return codes to be used in chan1 for monitoring purposes |  | 1 | 23/07/19 |  |
| 10 | Code must keep a log of all the processed data and tracing/cancel changes |  | 1 | 23/07/19 |  |
| 12 | user can select to read data from a list of “authorized users”: this is a list of user chosen by the RO that can write KG1 ppfs |  | 1 | 23/07/19 |  |
| 13 | Code will not run if the this not at least one KG1 lid validated (status flag must be 1,2 or 3) |  | 1 | 23/07/19 |  |
| 14 | if the user running the code is a trainee (or is not in the list of authorized users) he will no be able to save public data. | Trainee can save only private data | 1 | 23/07/19 |  |
| 33 | all logging messages are displayed in the terminal |  | 3 | 23/07/19 |  |

## Usability

## Performance

### Capacity

Include measurable capacity requirements (e.g., the number of simultaneous users to be supported, the maximum simultaneous user load, per-user memory requirements, expected application throughput)

The code can be run simultaneously by different users as each wil have its own temporary data.

### Availability

### Latency

## Manageability/Maintainability

### Maintenance

The maintenance of the code at the date of writing this document is of Bruno Viola.

The code has been written in modules and classes allowing maximum portability, manageability and maintainability

The code is available on a GIT repository so, all users with access can pull from the repository and download their local copy of the code.

Only developers can push to the master branch

### Operations

## System Interface/Integration

### Protection

KG1 public data can be written only by authorized users.

Only the RO can authorized users.

The master branch of the repository is protected from accidental pulls.

## Data Management

## Standards Compliance

## Portability

# User Scenarios/Use Cases

# Deleted or Deferred Requirements

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Req# | Requirement | Status | Comments | Pri | Date Rvwd | Reviewed /Approved |
|  |  |  |  |  |  |  |

# APPENDIX

The appendixes are not always considered part of the actual Requirements Specification and are not always necessary. They may include

* Sample input/output formats, descriptions of cost analysis studies, or results of user surveys;
* Supporting or background information that can help the readers of the Requirements Specification;
* A description of the problems to be solved by the system;
* Special packaging instructions for the code and the media to meet security, export, initial loading, or other requirements.

When appendixes are included, the Requirements Specification should explicitly state whether or not the appendixes are to be considered part of the requirements.

1. Definitions, Acronyms, and Abbreviations
2. References
3. Organizing the Requirements