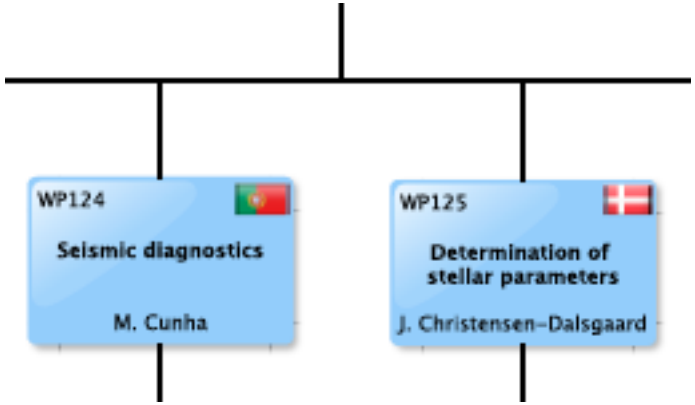
WG4
summary of discussion



WP125

Define procedures (pipeline) to determine mass, radius and age of core-program stars with the accuracy defined by the PLATO requirements (1% on radius; better that 10% on mass; 10% on age for the reference star).

- Different procedures needed depending on the quality of the data **=>** Define selection criteria on which procedure should be selected, for given data

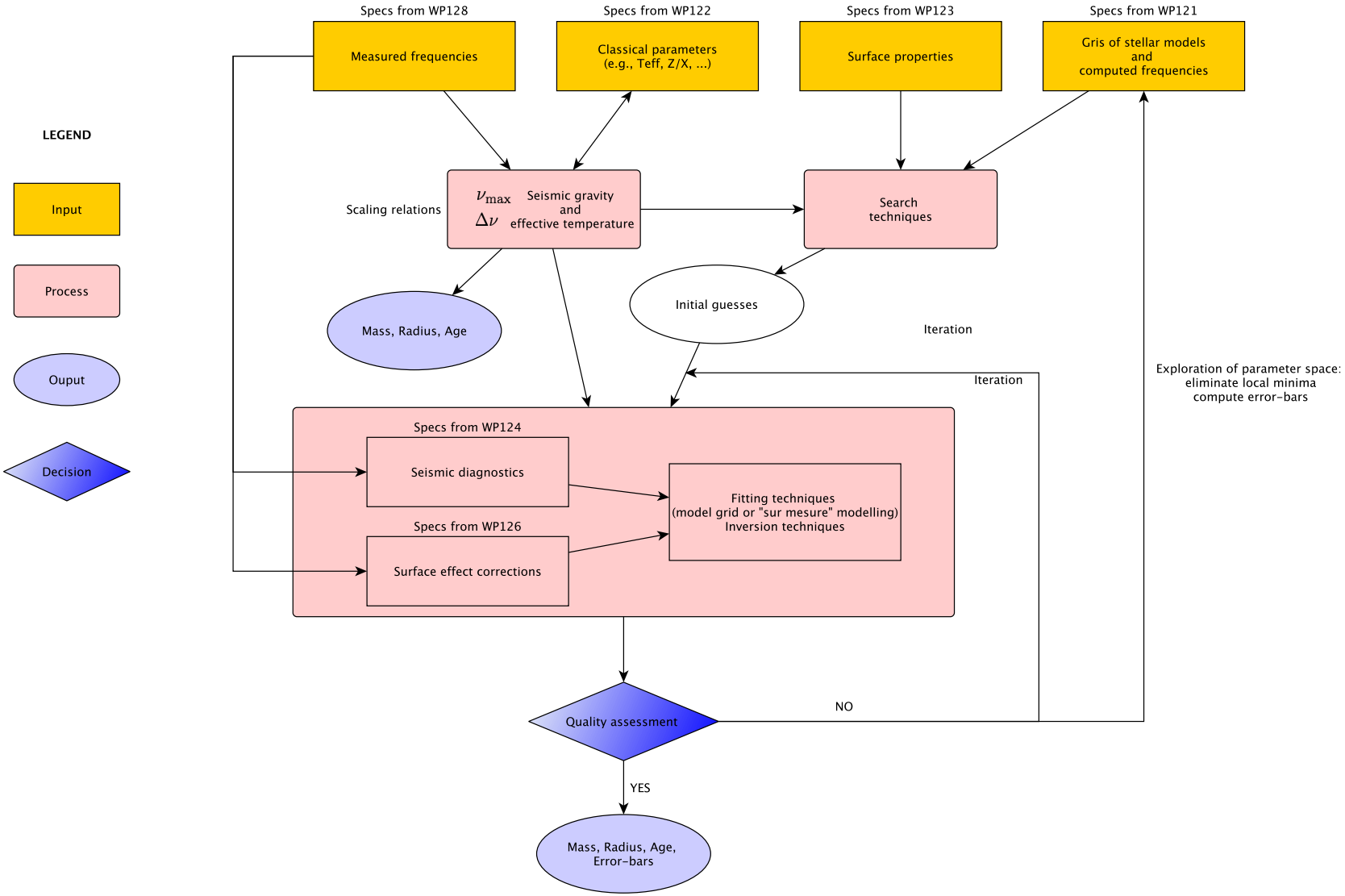
- Get full probability density functions for the derived parameters (aim)

Estimates of current performances with existing data (hare-and-hounds), respectively

-- Radius: ~ 2 %; (1.5%)
-- Mass: ~ 5 %; (4%)
-- Age: >~10 % for reference star (22%)

WP125

Define procedures (pipeline) to determine mass, radius and age of exoplanet hosts with the accuracy defined by the PLATO requirements (1% on radius; better that 10% on mass; 10% on age for the reference star).



WP125

Interfaces:

Input data

WP128: Well-characterized global oscillation parameters, and/or frequencies

WP122: Well-characterized non-seismic quantities (T_eff, [Fe/H] or more detailed characterization of composition, log g, L)

WP123: Surface rotation

>> All, optimally with Probability density functions (PDFs)

Input procedures and modelling

WP121: Stellar modelling tools, grids of stellar models

WP123: Procedures for chromogyrochronology, age inference from activity

WP124: Procedures for analysis of global seismic parameters and of individual frequencies

WP126: Physically motivated correction for near-surface effects

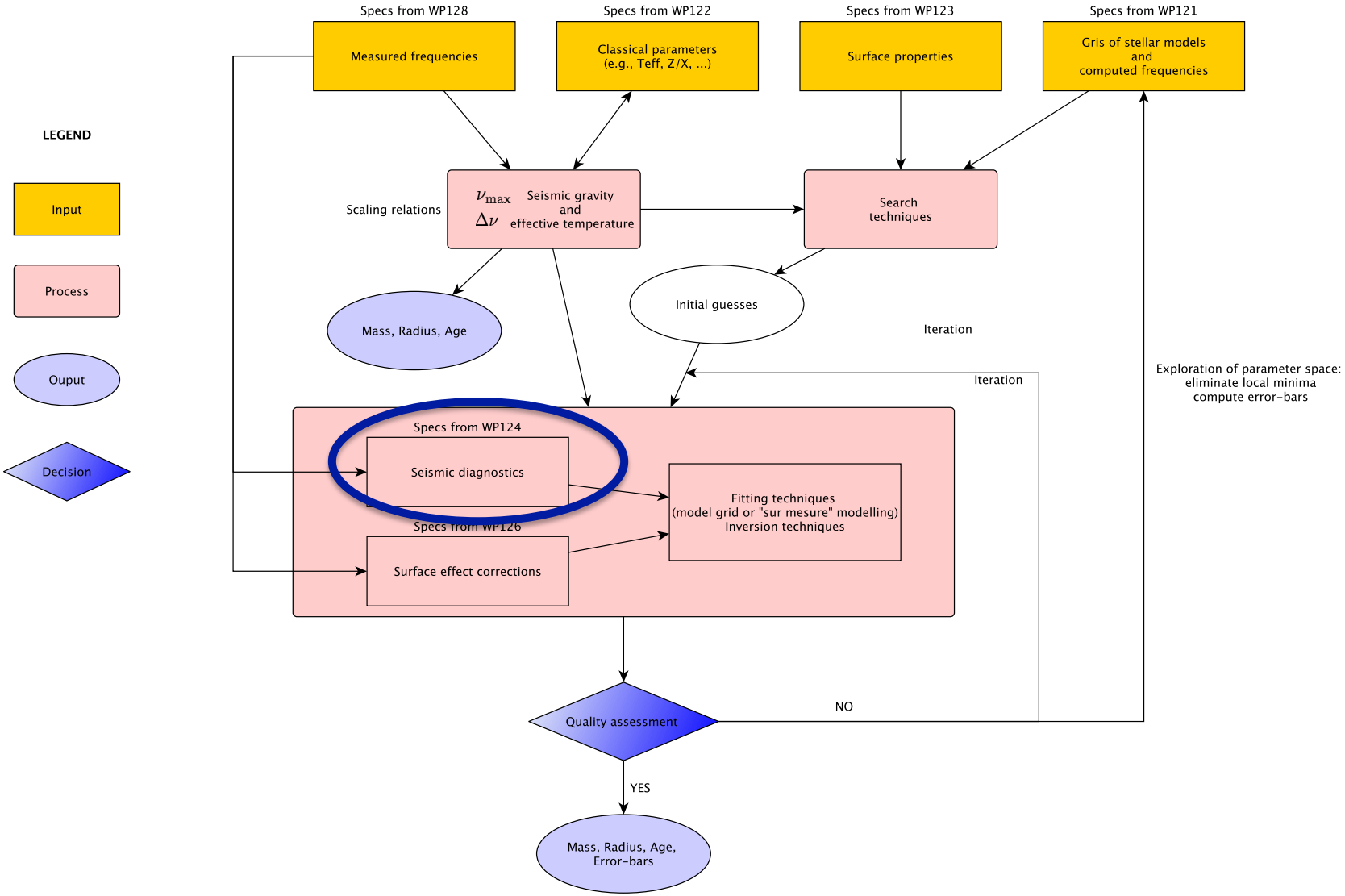
WP124

Define forward, inverse and glitch-related procedures for determining stellar radii, masses, and ages for stars of the core program, from a combination of seismic and non-seismic data.

- Procedures should be fully characterized in terms of their performances and conditions of applicability.
- Direct use of scaling relations is not considered under this WP

WP124

Define forward, inverse and glitch-related procedures for determining stellar radii, masses, and ages for stars of the core program, from a combination of seismic and non-seismic data.



WP124

Interfaces:

Input data

WP128: Well-characterized global oscillation parameters, and/or frequencies

WP122: Well-characterized non-seismic quantities (T_eff, [Fe/H] or more detailed characterization of composition, log g, L)

>> All, optimally with Probability density functions (PDFs)

Input procedures and modelling

WP121: Stellar modelling tools, grids of stellar models

WP126: Physically motivated correction for near-surface effects

Procedures to be considered

- Scaling relations

  (R and M) – no models, but need validation / calibration; uncertainties are larger than the requirements

- Forward methodologies

  (R, M , and age) – use models (grids or on-demand);

  -- Different ways to explore the parameter space (global /local; providing / not providing pdfs)

  -- Different sets of observational constraints

  -- Different ways to weight seismic and non-seismic constraints in the fittings.

- Inverse methodologies

  (M, if R is known independently; also age and acoustic radius indicators) – step out of the space of models, but require good reference models; models are requires to translate "indicators" into the needed stellar properties.

- Glitch-related methodologies

  (Acoustic depth of sharp structural variations; envelope helium abundance indicator; size of mixed region in convective cores) – potentially provide model-independent determinations, but not directly of the quantities we want!

Note: besides the mass, products from inverse and glitch related methodologies provide:

1. Consistency checks for the results of forward modelling
2. Potentially additional constraints for the forward modelling

Some identified questions (Q) and actions (A)

Q: What is the best way to 'guarantee' a global search (avoid converging to local minima) and a proper pdf characterization of the derived M, R, and age?

Q: Seismic and non-seismic data: how to combine them in the fits (weights)?

Q: How to make use the outputs from inverse and glitch-related procedures (iteration with forward modelling)?

Q: What procedure(s) to use given a certain quality of the data ?

Q: Non-seismic data requirements: redundancy, impact of precision. Would pdfs on the non-seismic data be available and would it make a difference to have them (also correlation between Teff and metalicity uncertainties)?

Q: Can we define a "minimal" model grid that could provide reliable estimates for the parameters (also related to interpolation between models)?

Some identified questions (Q) and actions (A)

A: Hare-and-Hounds exercise using simulated PLATO data

A: Test the impact of changing uncertainty in non-seismic data (Teff; metalicity, etc)

A: Test the impact of changing the grid characteristics in grid-based forward modelling (includes comparing results from grid modelling with those from optimization procedures)

A: Characterize the uncertainties on the parameter inference for subgiants (e.g. from methods that make use of mixed modes); Reliable approach for the uncertainty estimation.

A: Validate the accuracy on the radius and mass determinations derived from different methods (including scaling relations) against stars with well determined R, M.

Should identify a list of benchmark stars for R and /or M independent determinations in the PLATO field of view for post-validating of procedures using PLATO seismic data. Post-validation to be done also with observations from clusters.