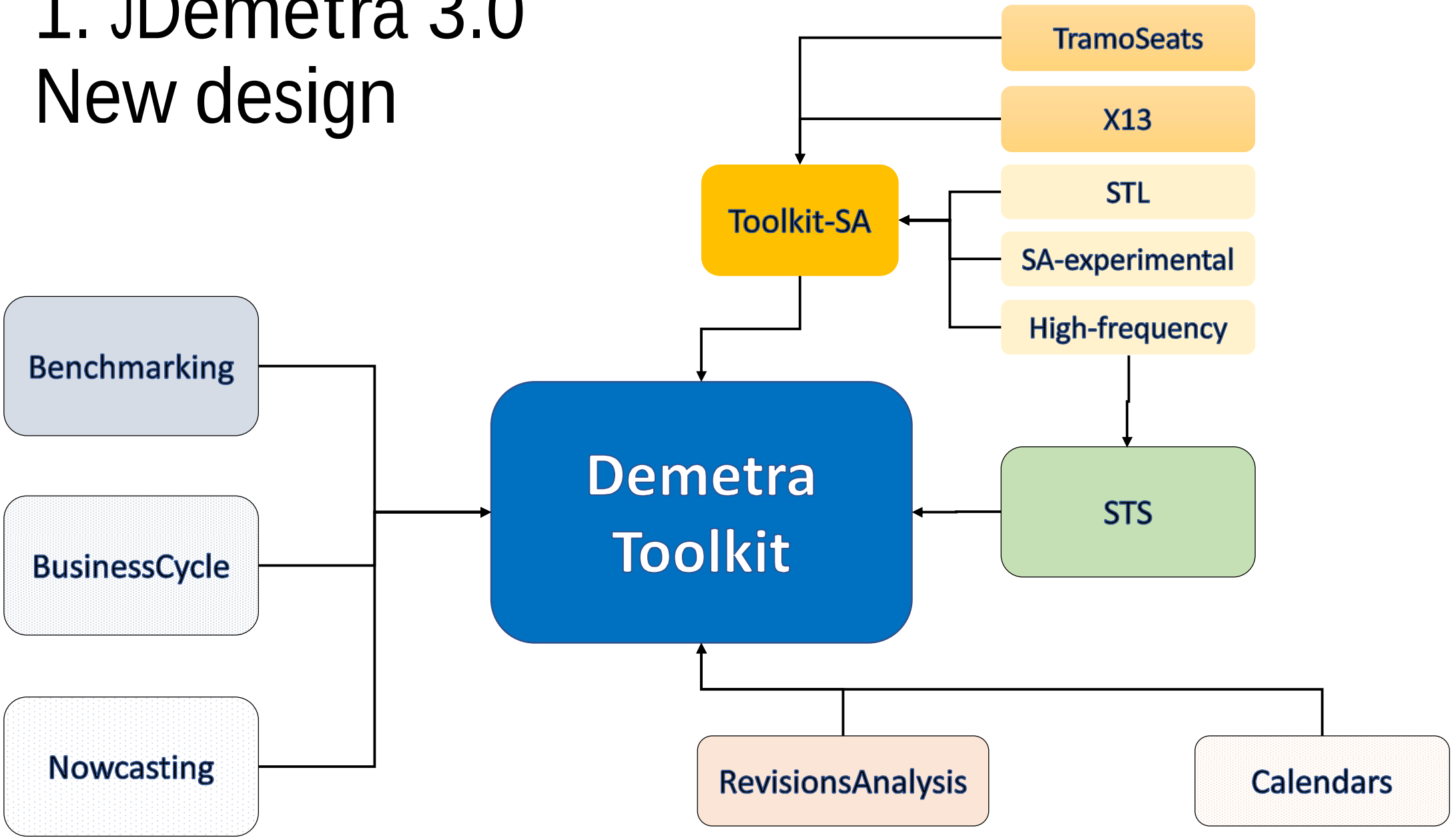
JD+ 3.0

Core algorithms

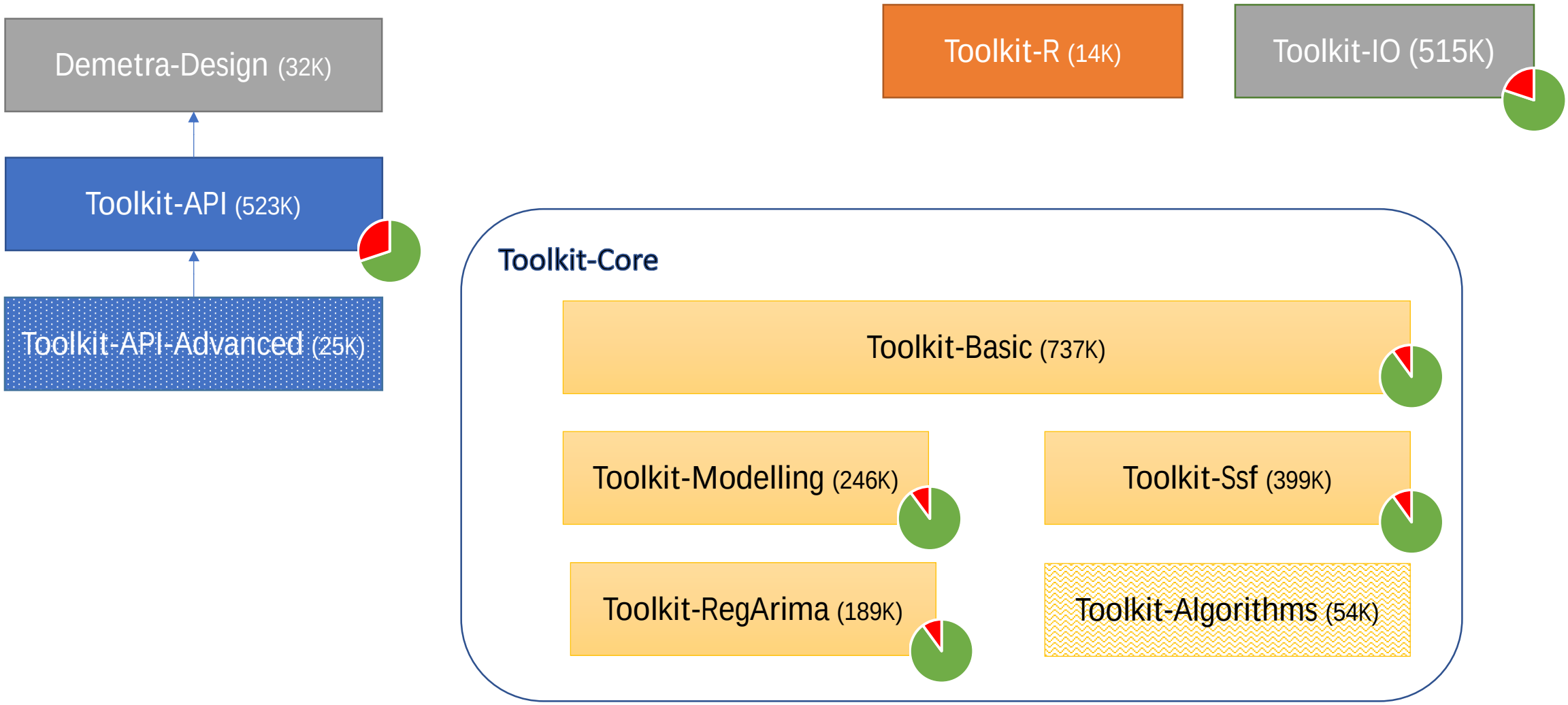
What’s new in JD+ 3.0?

- Additional time series domains
  - New concepts
- Design
  - API / implementation / IO
- New algorithms
- Enhanced interaction with external tools/technologies
  - New I/O mechanism

1. JDemetra 3.0 New design



Demetra Toolkit (2700K)



1.1 Main blocks (I)

- Toolkit: low-level algorithms
  - Matrices, polynomials, optimization, stats, distributions, time series, calendars, ...
  - ARIMA modelling, ssf, , RegArima...
- Toolkit-SA:
  - Generic SA routines (diagnostics...)
  - TramoSeats, X13
  - STL
  - Experimental modules
    - High-frequency, alternative filters

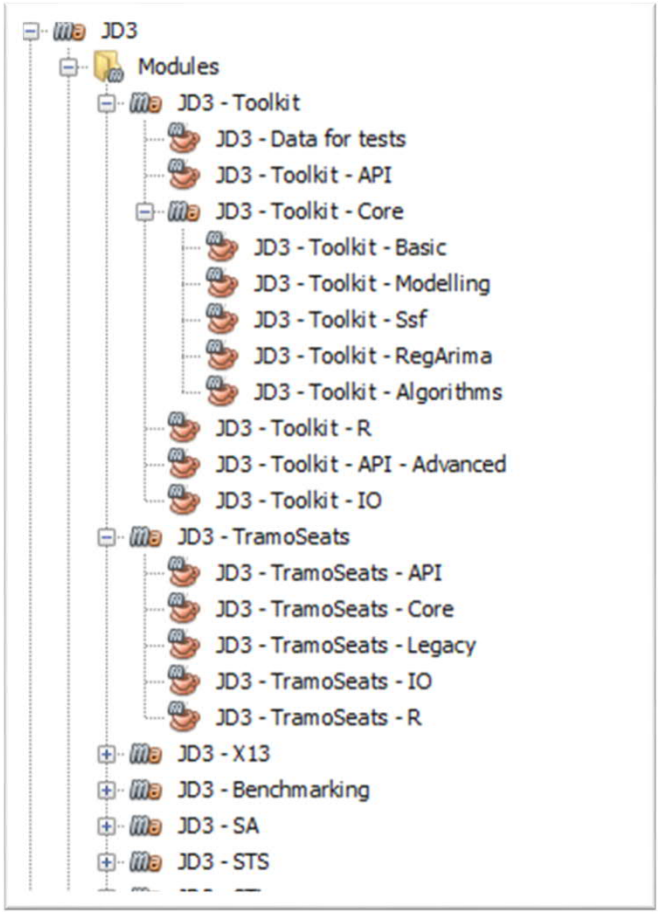
1.1 Main blocks (II)

- STS (structural time series)
- Toolkit-Benchmarking
- Business cycle
  - HP, Modified HP
- Nowcasting (TODO)
  - DFM…
- Calendars
  - Moving holidays, special calendars (Chinese…)
- Revisions analysis
  - ->Eurostat

1.2 JDemetra 3.0. New design (cont.)

- 15 projects
  - Separate release schedules
- 70 modules

- TODO
  - Graphical interfaces
    - JD+ GUI
    - Plug-ins
  - R modules
  - WEB-services

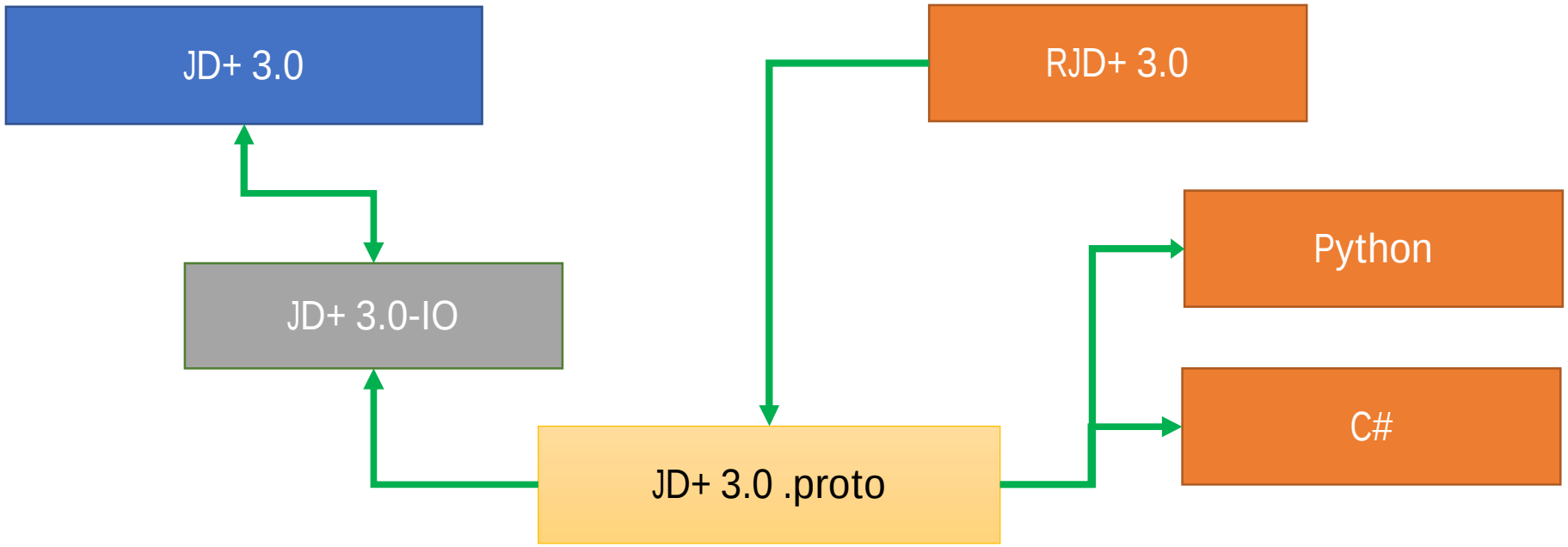


2. Many new algorithms

- Time series
  - General time series (also daily, weekly, irregular periods, time points…)
- Matrix computation (→Lapack-like)
  - More stable algorithms
- Polynomials (roots…)
  - More robust algorithms (needed for high-frequency series)
- State space framework
  - Numerous improvements (multivariate models…)
- …
- Conclusion: many details changed → Need for advanced testing

3. JD+ 3.0 and Protobuf

- Protobuf (see https://developers.google.com/protocol-buffers)
  - Protocol buffers are Google's language-neutral, platform-neutral, extensible mechanism for serializing structured data



3.1 JD+ 3.0 and Protobuf (cont.)

- Proper definition of the I/O
- Same interface for all languages
- Automatic code generation
- High-performance

Fastest=1	RJD+ (rJava)	RJD+ 3.0 (Rprotobuf)
Tramo (TRfull)	5	1
TramoSeats (RSAfull)	8	1.5
RegArima (RG5)	6	2
X13 (RSA5)	11	3

```
message NIIDTests{
    /* Normality */
    StatisticalTest mean = 1;
    StatisticalTest skewness = 2;
    StatisticalTest kurtosis = 3;
    StatisticalTest doornik_hansen = 4;

    /* Independence */
    StatisticalTest ljung_box = 5;
    StatisticalTest box_pierce = 6;
    StatisticalTest seasonal_ljung_box = 7;
    StatisticalTest seasonal_box_pierce = 8;

    /* Randomness */
    StatisticalTest runs_number = 9;
    StatisticalTest runs_length = 10;
    StatisticalTest up_down_runs_number = 11;
    StatisticalTest up_down_runs_length = 12;
```

4. Short term actions

- Tests of the main routines
  - TramoSeats, X12: some differences are unavoidable (should be < 10% of the series)
  - Benchmarking, temporal disaggregation
  - Through their R-interface

- Validation of the I/O messages
  - Currently only for TramoSeats, X12
  - What do you really need?

- R packages:
  - RJDemetra3, RJDBench (examples in testrjd3 and testrjdbench), currently on https://github.com/palatej