



COSMIC-FFP

A summary

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Agenda

- 1. Context - Software size**
- 2. COSMIC-FFP – Key aspects**
- 3. COSMIC-FFP – the field trials**
- 4. A simple example in 4 steps**
- 5. Want to know more ?**
- 6. Conclusion**



Context – Software size



Size of what ...

Project Size

**The total effort,
estimated or actual in
work-hours or staff-
months**

Software size

**the size of the
requirements (functions)
or of the deliverables
(modules, lines of code)**

**HOW BIG
IS IT ?**



Context...



Software size measurement

Context...



TECHNICAL

Mmm... so many programs, so many lines of code...

- **Meaningful to the technical staff,**
- **Meaningless to management,**
- **Poor portability,**
- **Only known precisely when too late to use**

FUNCTIONAL

Mmm... so much functionality delivered to the users...

- **Meaningful to management,**
- **Meaningful to technical staff,**
- **Portable,**
- **Can be measured early on,**
- **Must be independent from effort, method or technology**



The 'Functional Size' of software

- **ISO/IEC/JTC1/SC7 Standard #14143 definition:**

“ Functional Size : A size of software derived by quantifying the functional user requirements”

Context...



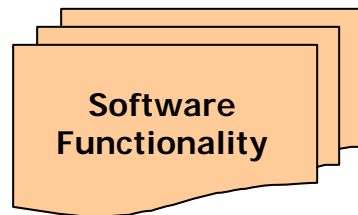
An analogy...



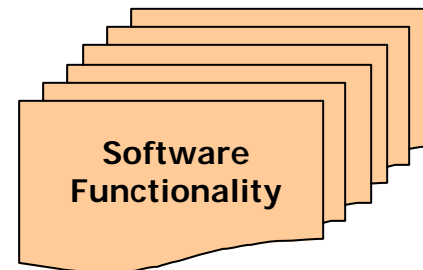
2000 sq. ft.



4000 sq. ft.



500 cfsu



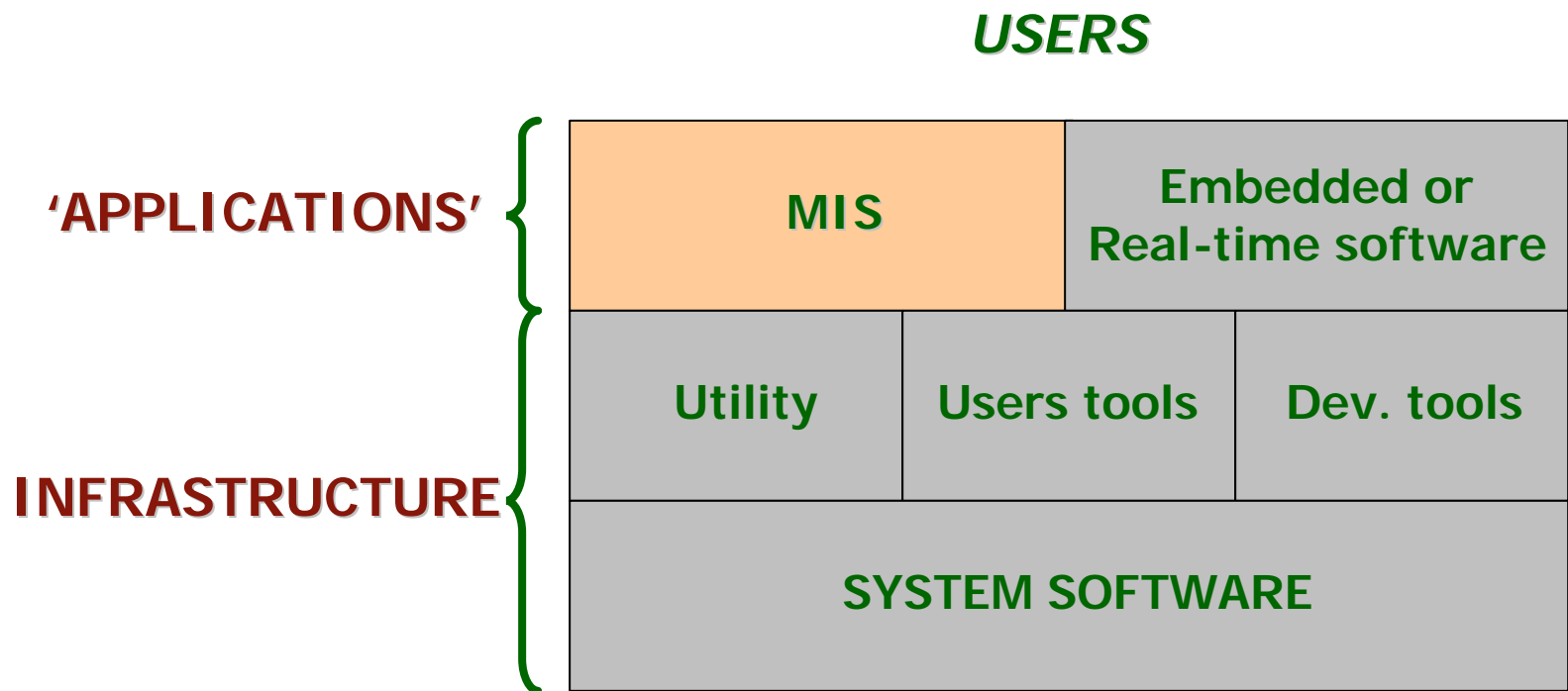
1000 cfsu

Context...



Different kinds of software

Context...

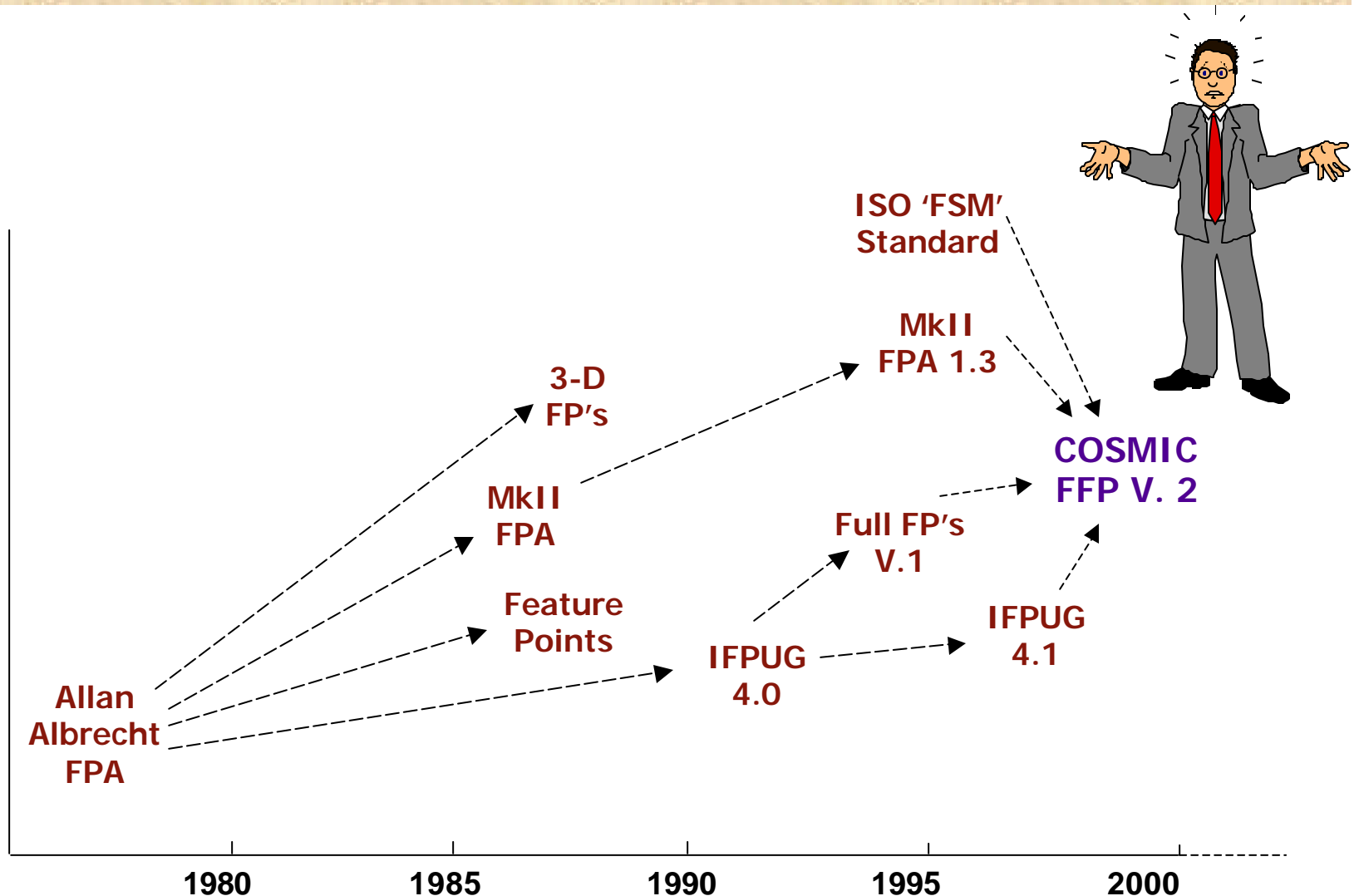


**'MIS' = Management Information Systems,
i.e. Business 'data-rich' software**



"So you want to measure Software Functional Size?"

Context...



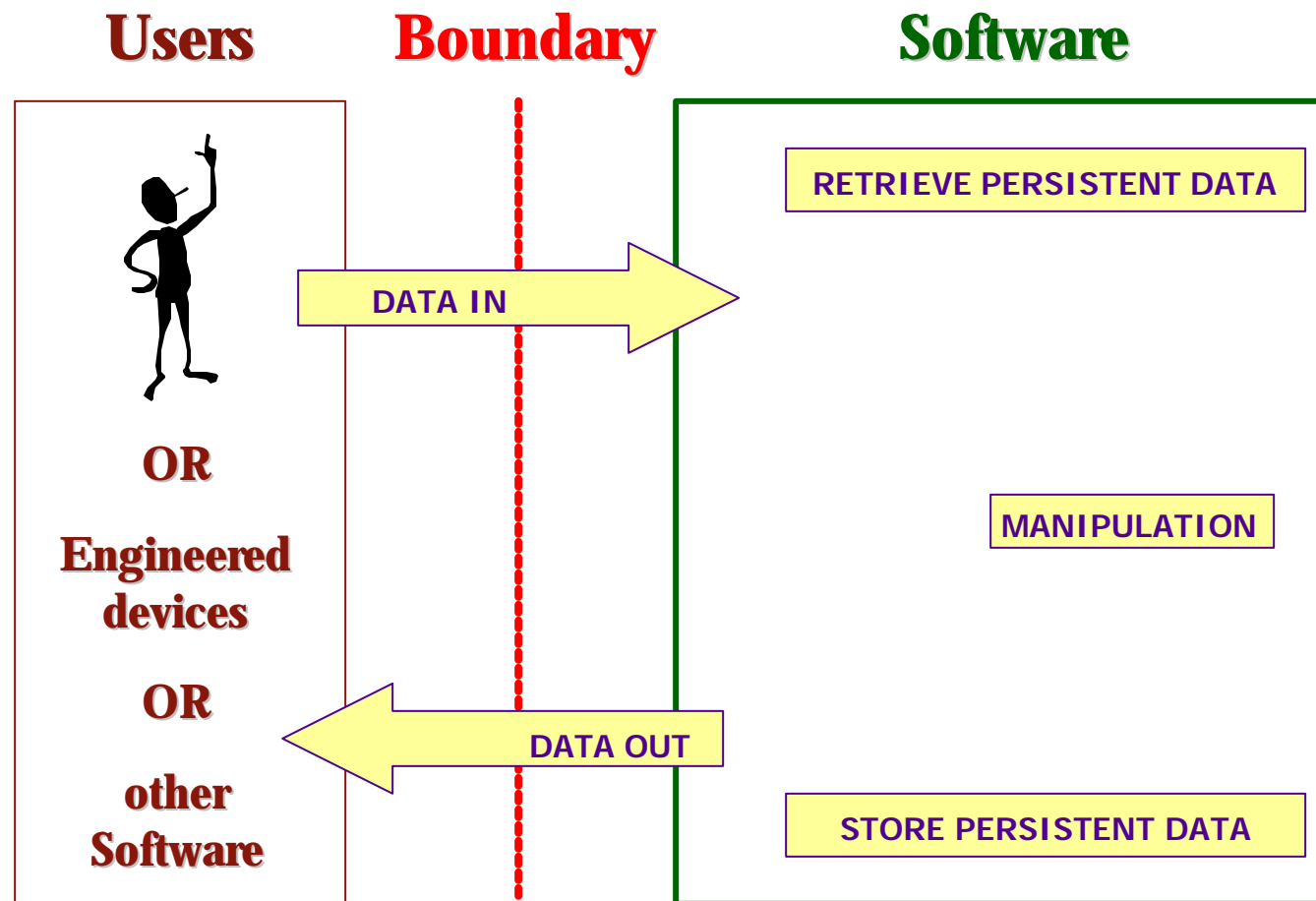


COSMIC-FFP – Key aspects



Software context model

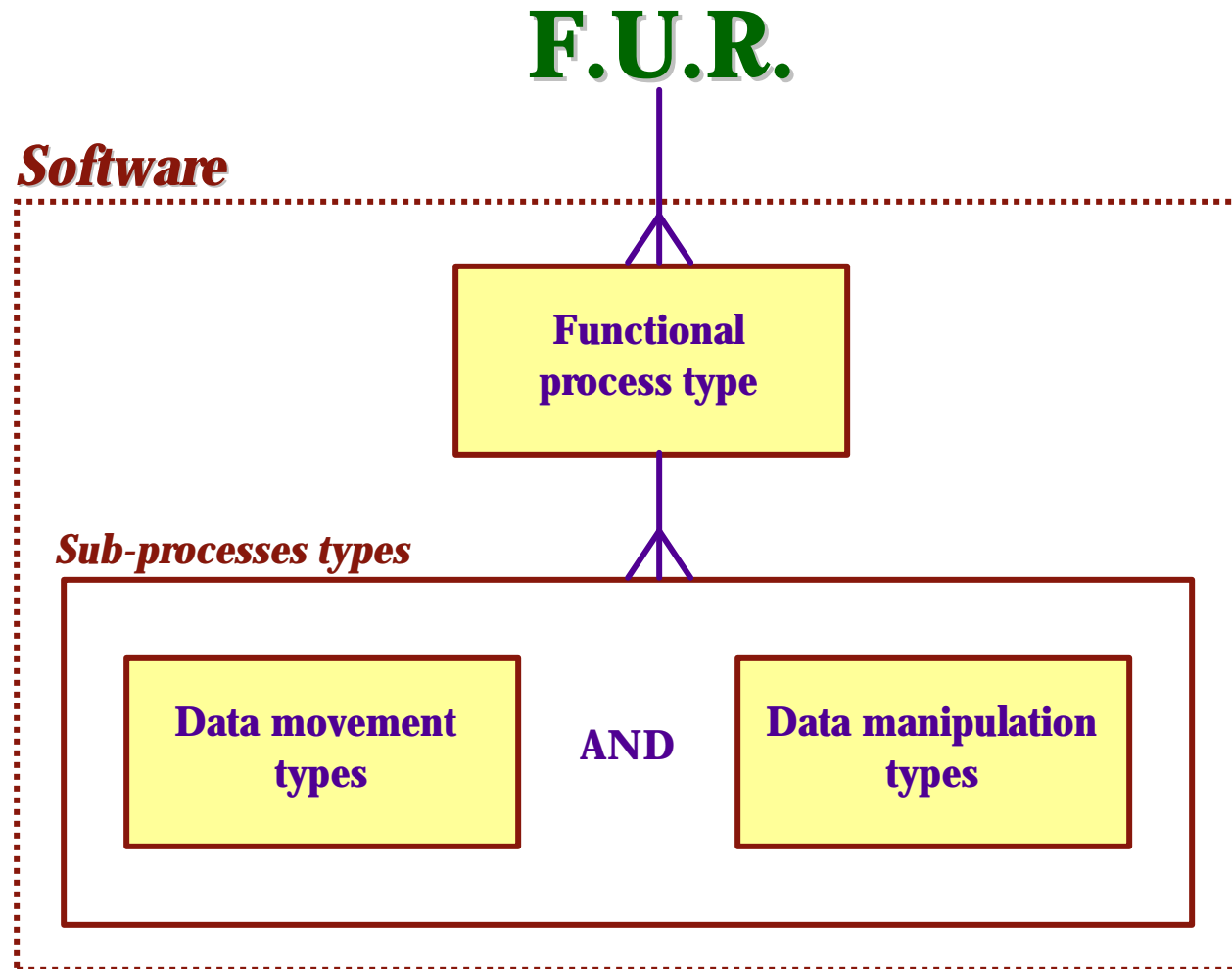
COSMIC FFP – Key aspects





COSMIC Software model

COSMIC FFP – Key aspects



Functionality = Data movements and Data manipulations



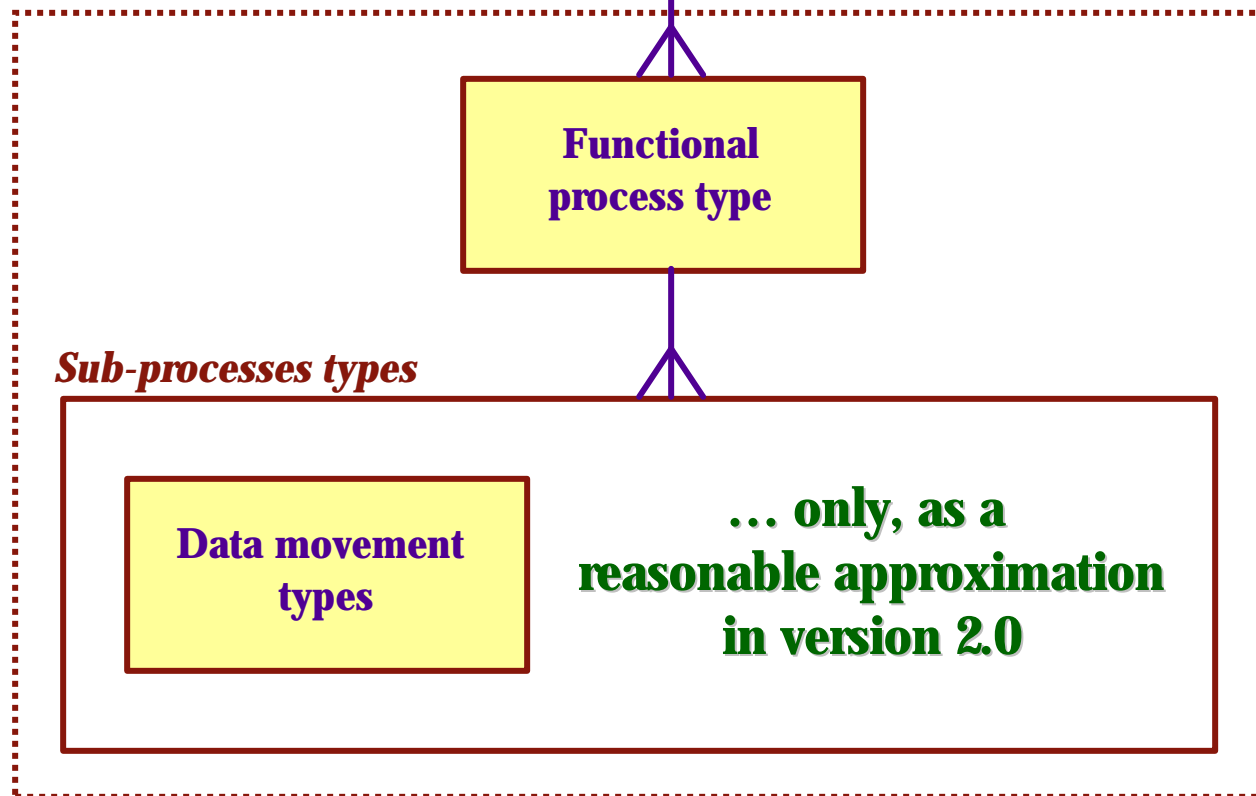
Software model (v. 2.0)

COSMIC FFP – Key aspects

F.U.R.

Note: discussion on handling algorithms presented later on

Software



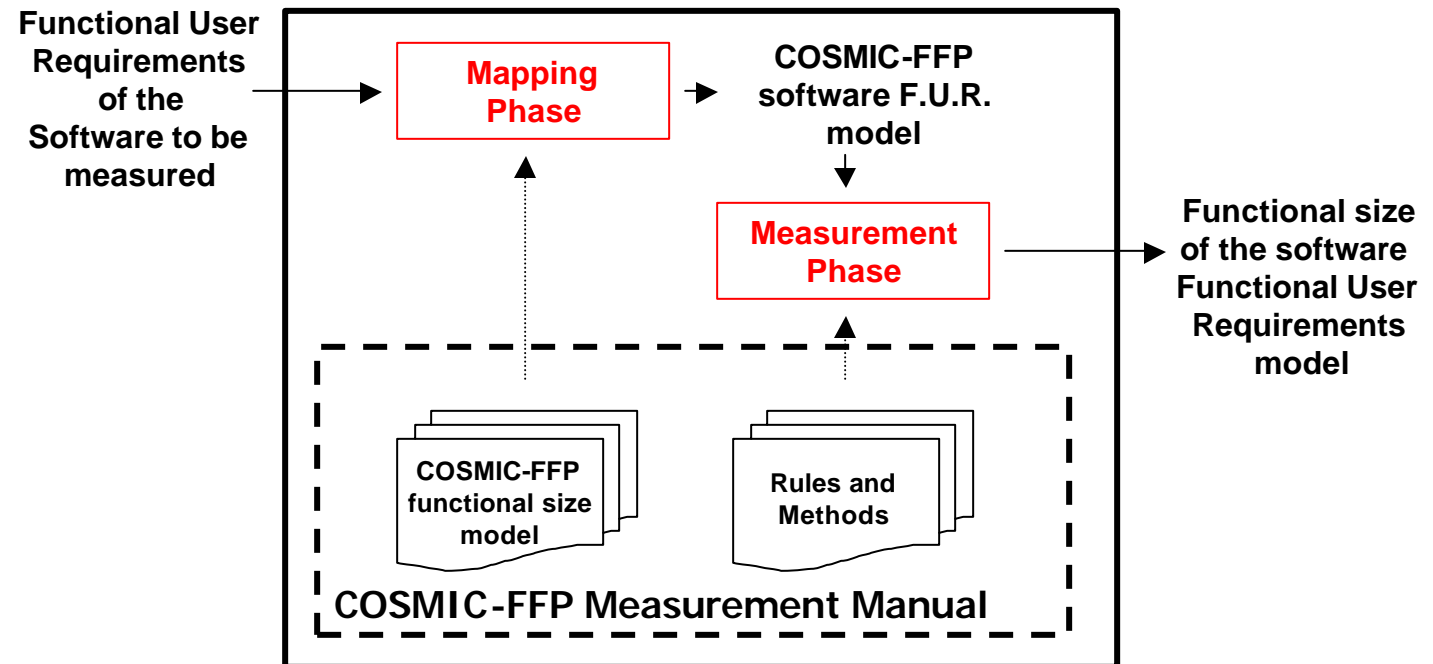
Functionality = Data movements + some processing



Overview of the model

COSMIC-FFP Measurement Manual, p. 12

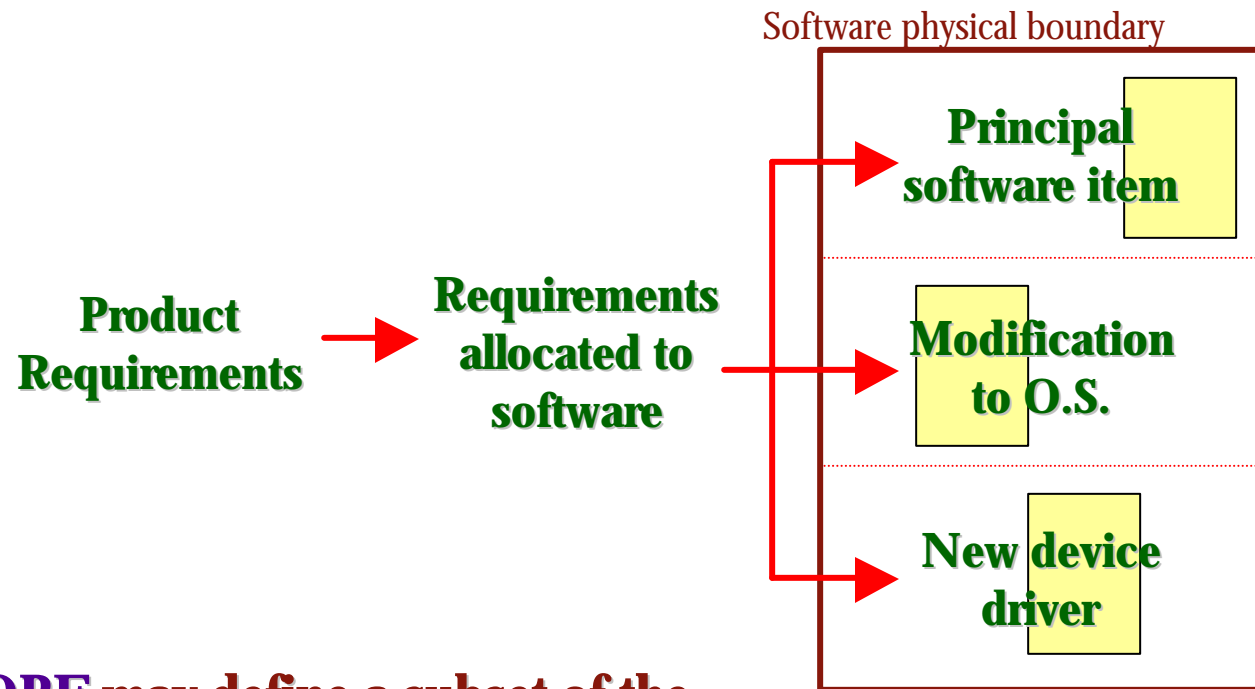
COSMIC FFP – Key aspects





Measurement scope

COSMIC FFP – Key aspects



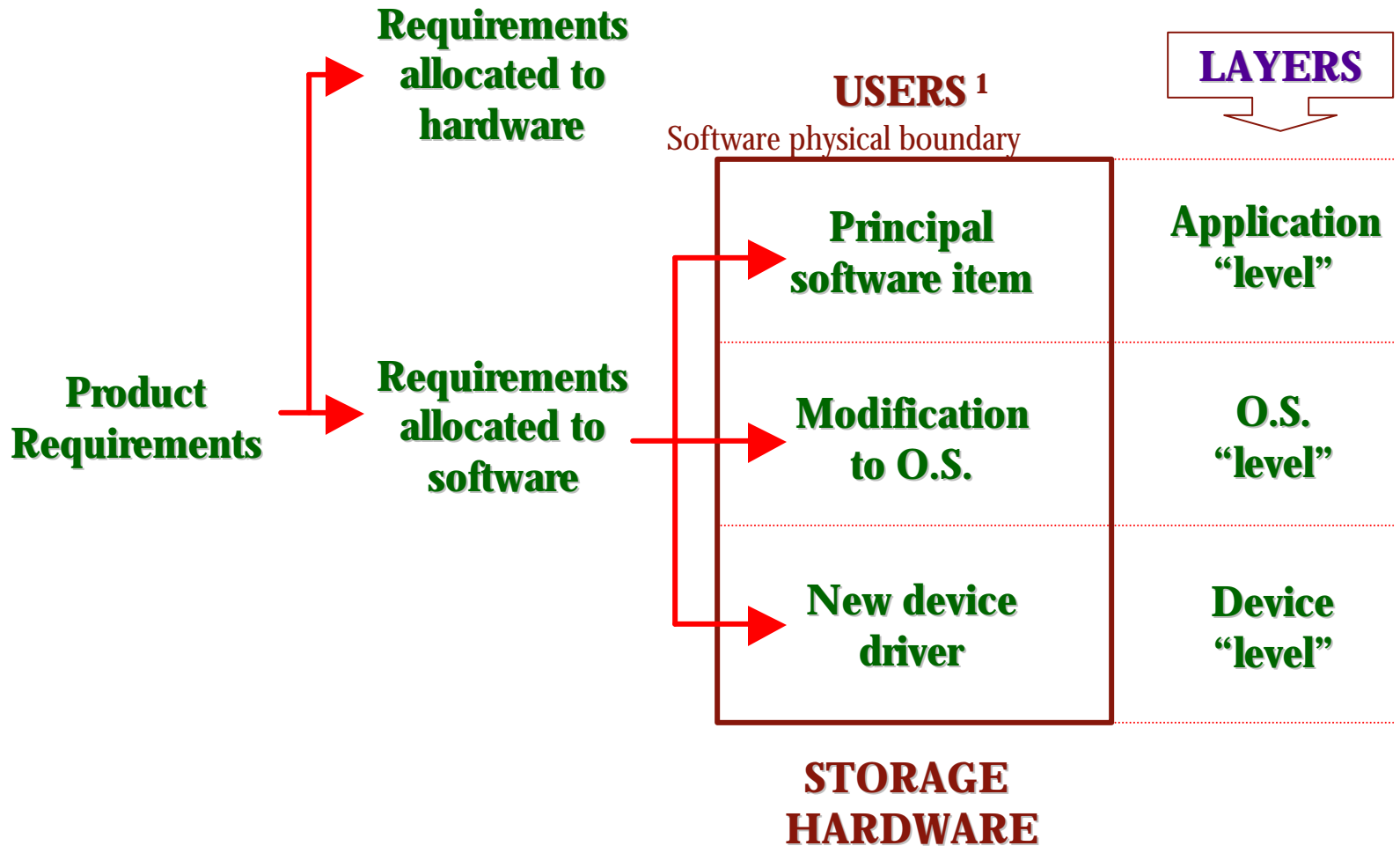
SCOPE may define a subset of the software to be sized

If the **PURPOSE** is for estimating or for performance measurement, size the various components separately



Software layers

COSMIC FFP – Key aspects

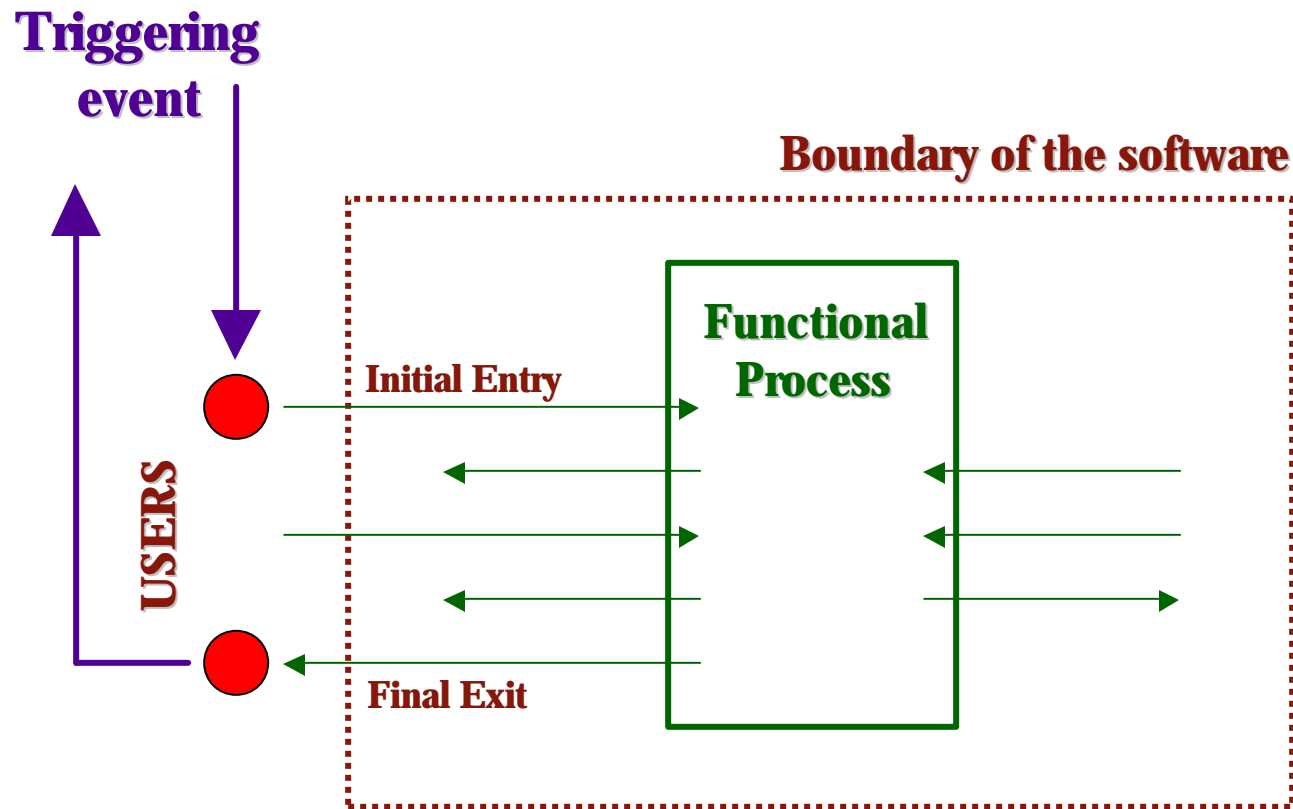


1: Human, engineered devices or other software



Identifying functional processes

COSMIC FFP – Key aspects



NOTE:

→ Data movement. A data movement moves attributes belonging to a single data group.



Summary

COSMIC FFP – Key aspects

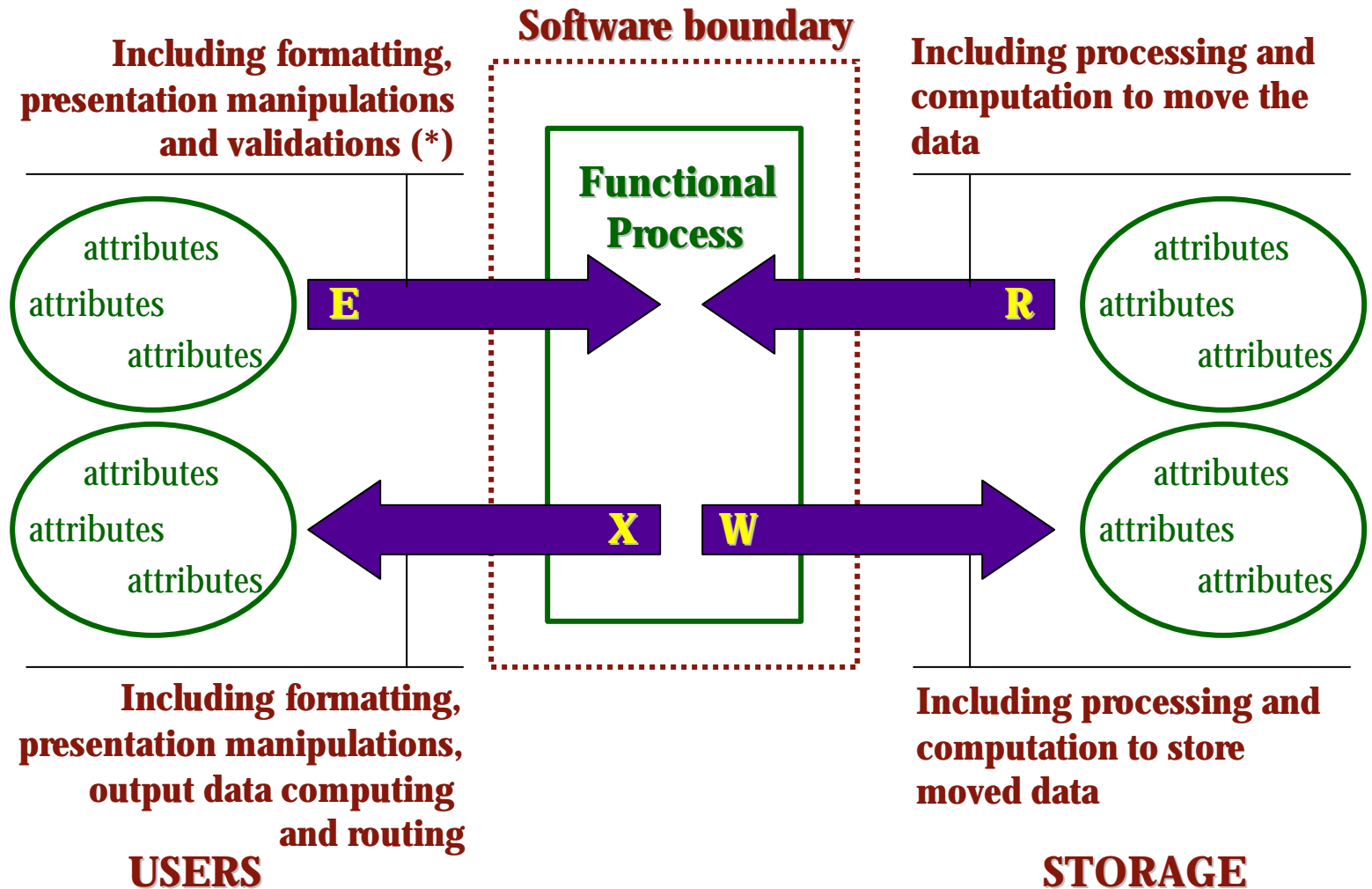
Software boundary

	Data group	Data group	Data group	Data group	Data group	Data group	Data group	Data group	Data group	Data group	Data group	Data group	Data group	Data group	Data group
Functional process															
Functional process															
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Identifying sub-processes types

COSMIC FFP – Key aspects



(*) Excluding validation required by reading persistent data



Unit of measure

COSMIC FFP – Key aspects

- **Unit of measure: COSMIC Functional Size Unit (cfsu).**
- **Yardstick (by convention):**
1 cfsu = 1 elementary data movement,
- **Base Functional Components (BFC): entry (E), exit (X), read (R) and write (W)**
- **Therefore each BFC receives 1 cfsu.**



Aggregation function

COSMIC FFP – Key aspects

- **FFP results can be aggregated at the desired level of detail by arithmetically adding the size units assigned to sub-processes.**
- **There is no upper limit to the functional size of a functional process.**
- **The aggregation function is scalable. A functional size figure can thus be obtained for functional constructs (process, layer, ...) composed of sub-processes.**



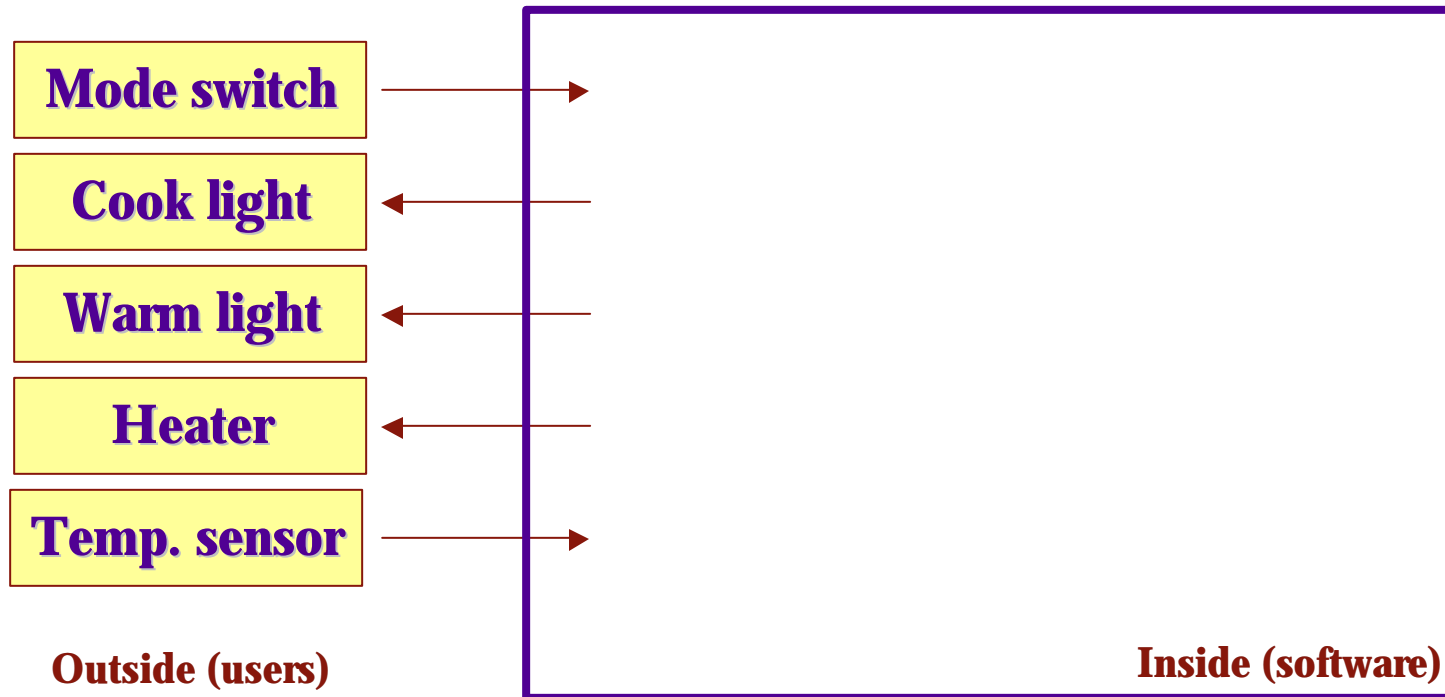
A simple example in 4 steps

- **1. Identification of external interactions ,**
- **2. Identification of functional processes,**
- **3. Analyzing functional processes interactions,**
- **4. Apply measurement function**



External interactions...

What are the devices interacting with the software ?



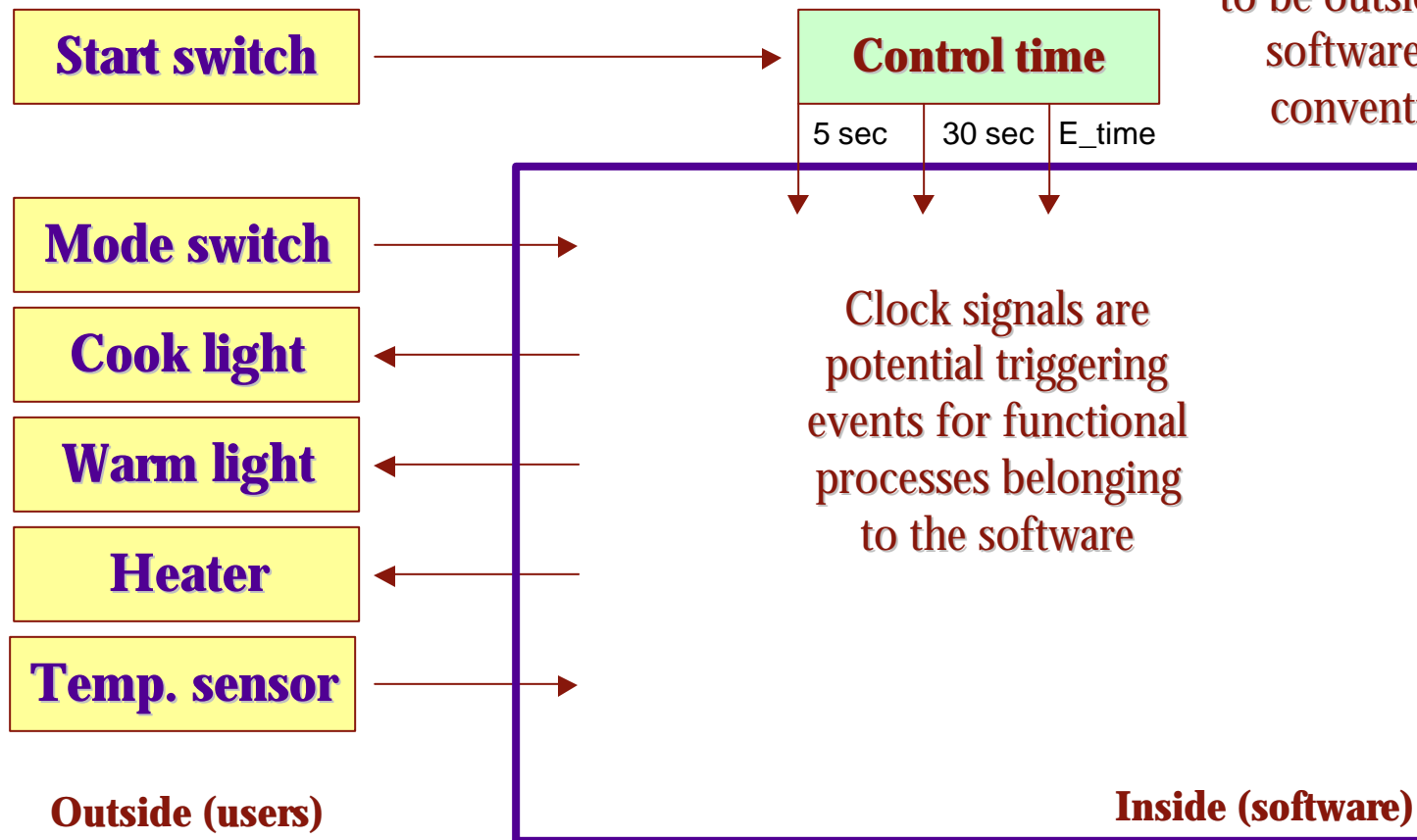
Step 1



Functional processes...

The rice-cooker operation is controlled by time...

Clock are considered to be outside the software by convention

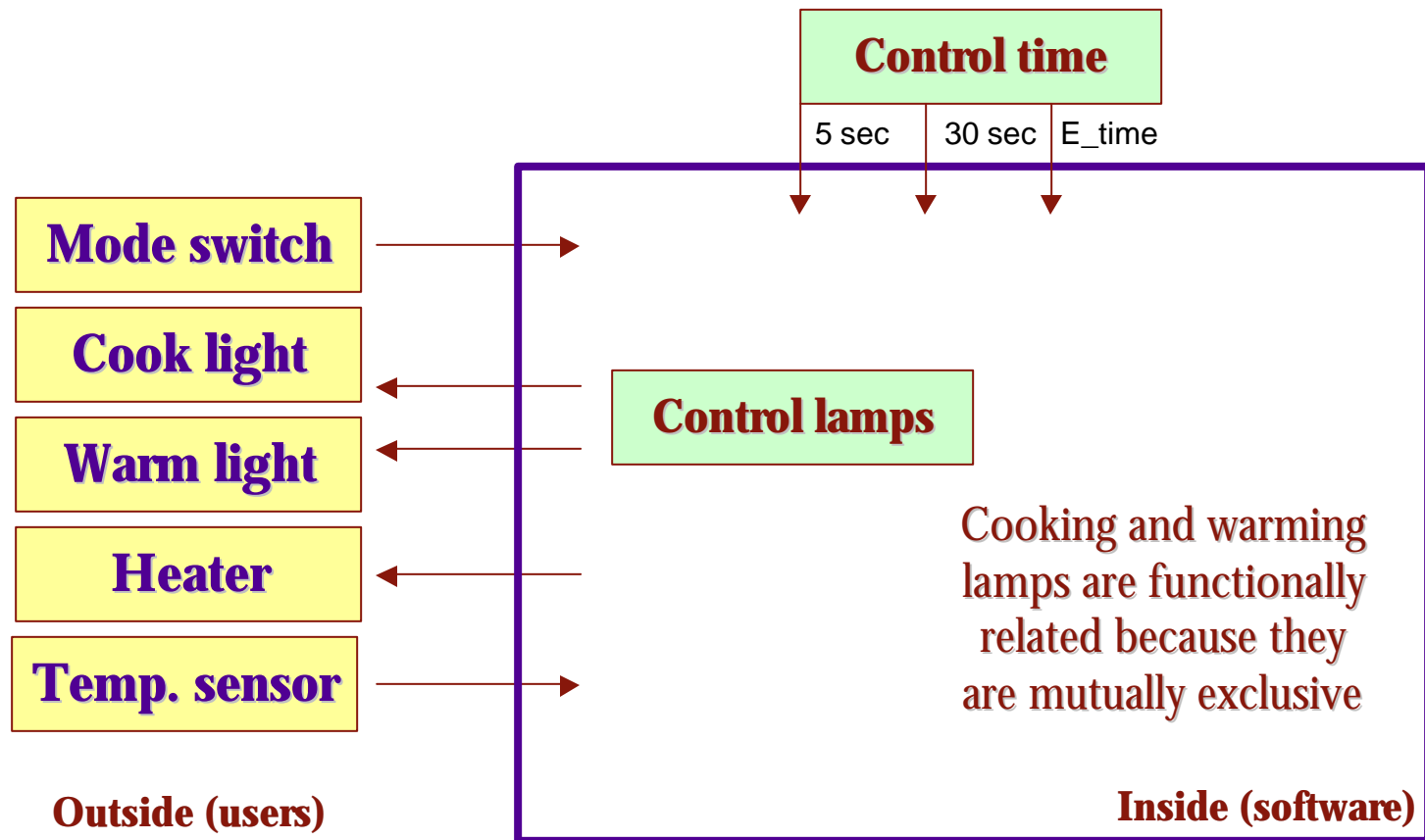


Step 2



Functional processes...

The rice-cooker state is communicated via two lights...

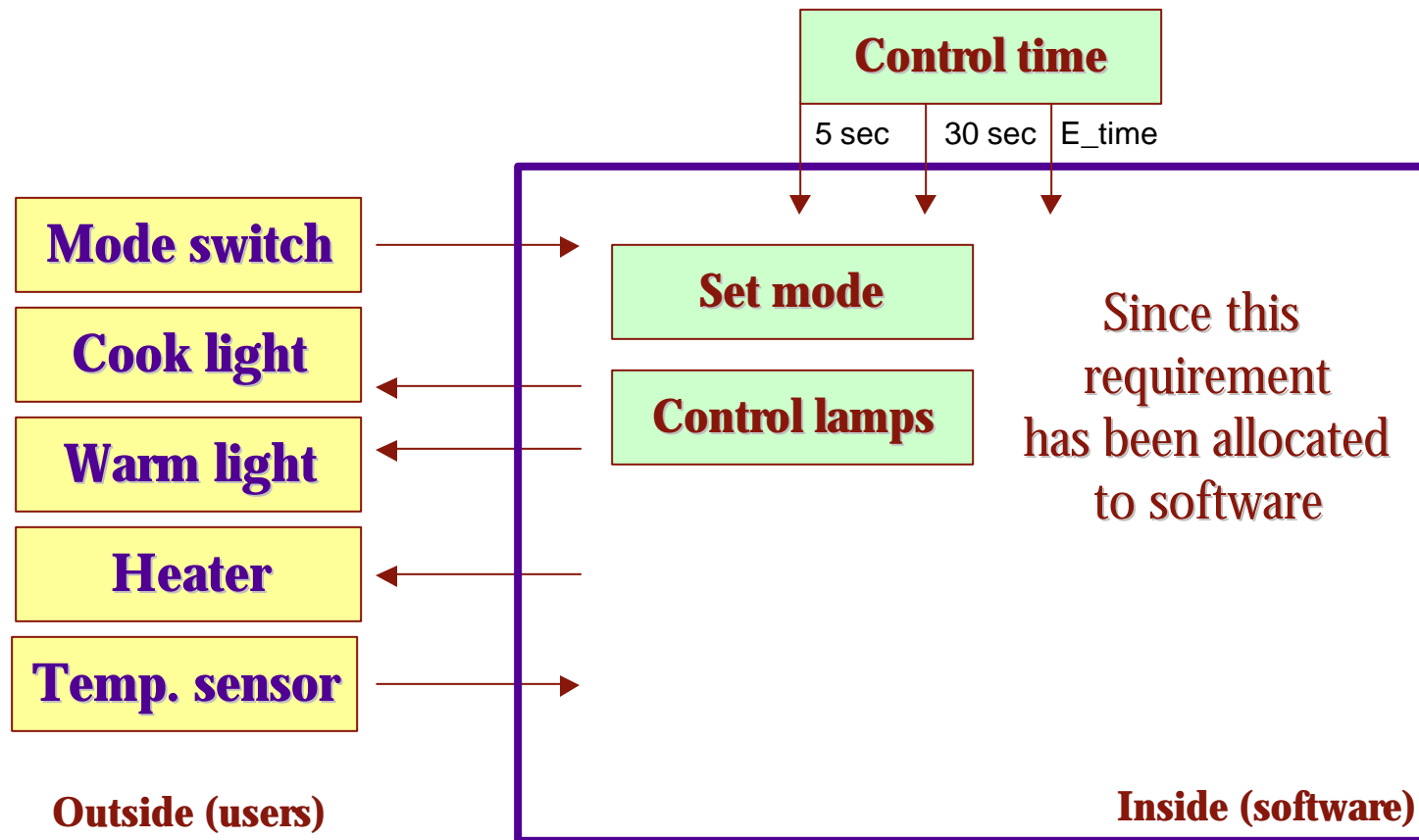


Step 2



Functional processes...

Lights operation is governed by the cooking mode...

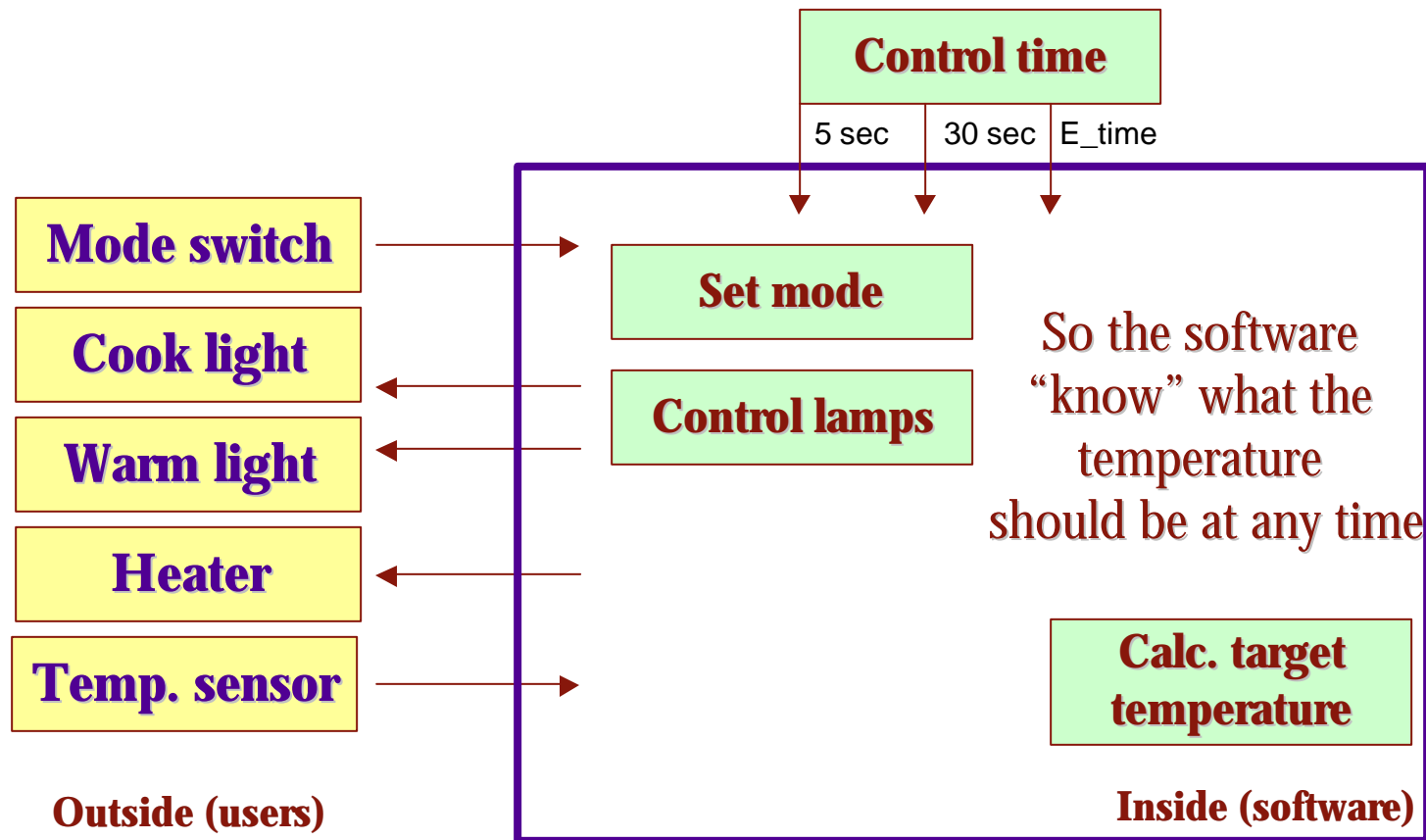


Step 2



Functional processes...

Temperature controlled according to a pre-determined time profile...

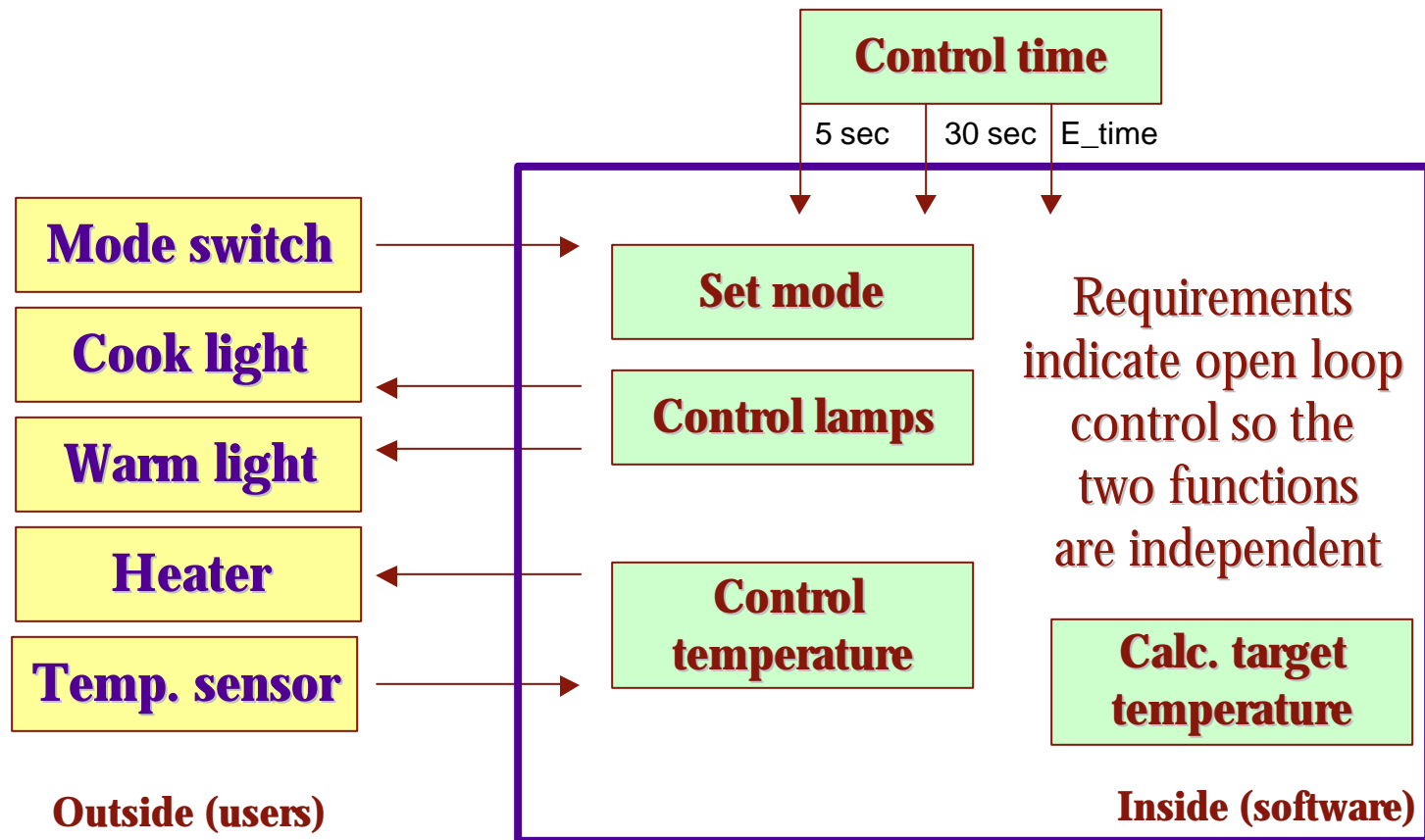


Step 2



Functional processes...

And the heater is controlled according to the difference actual/target...

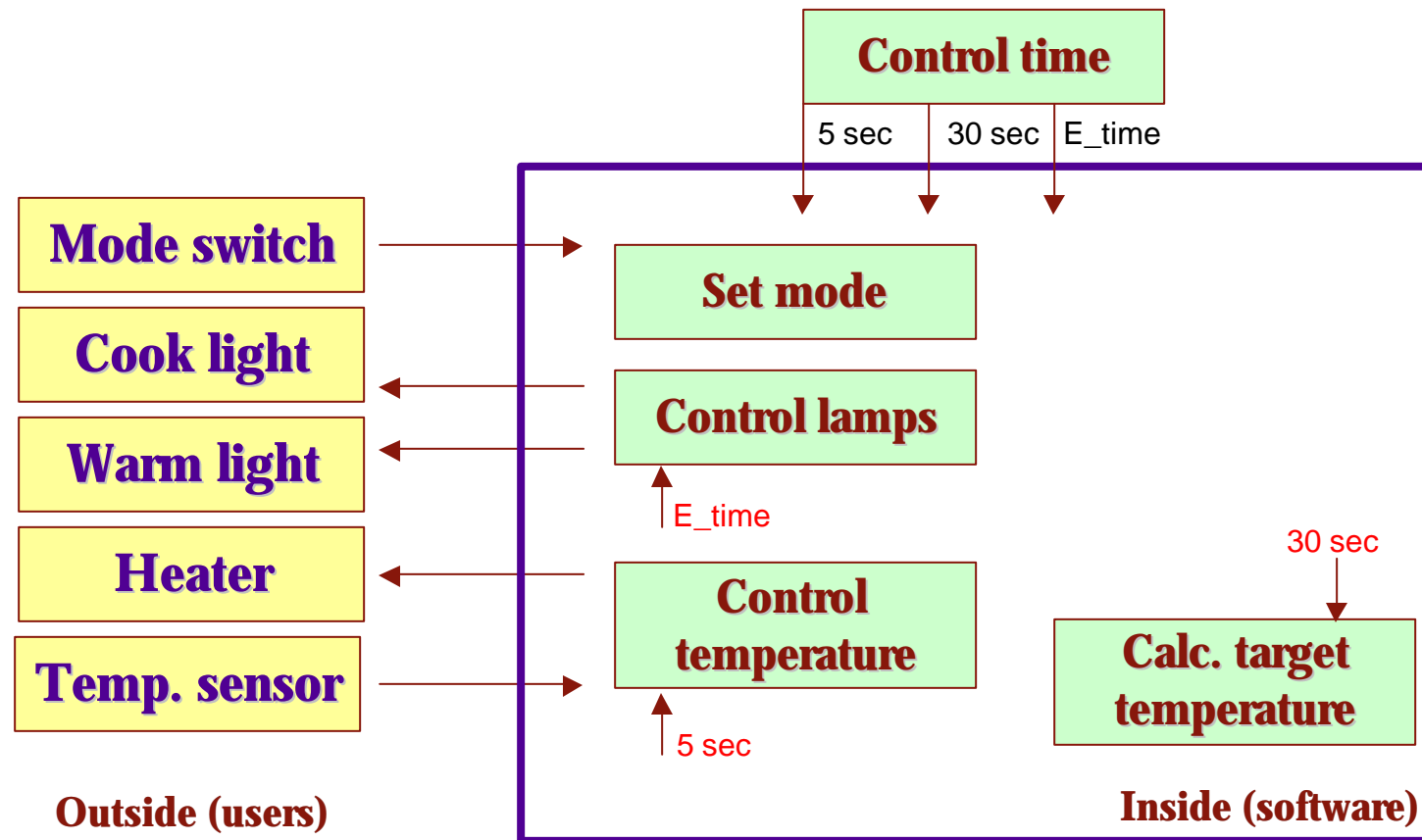


Step 2



Processes interactions...

Starting with time triggered processes...

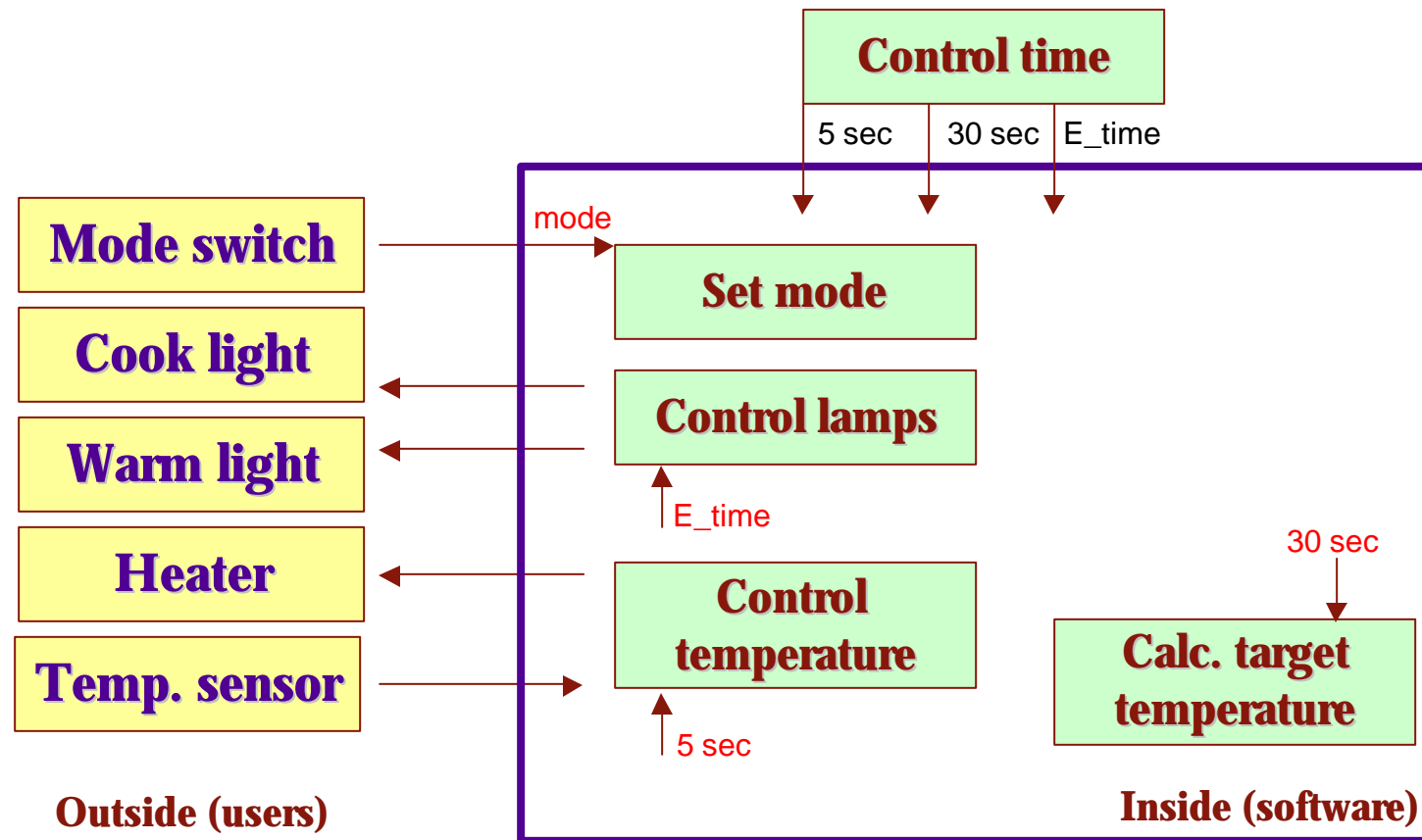


Step 3



Processes interactions...

Then with processes triggered by other events...

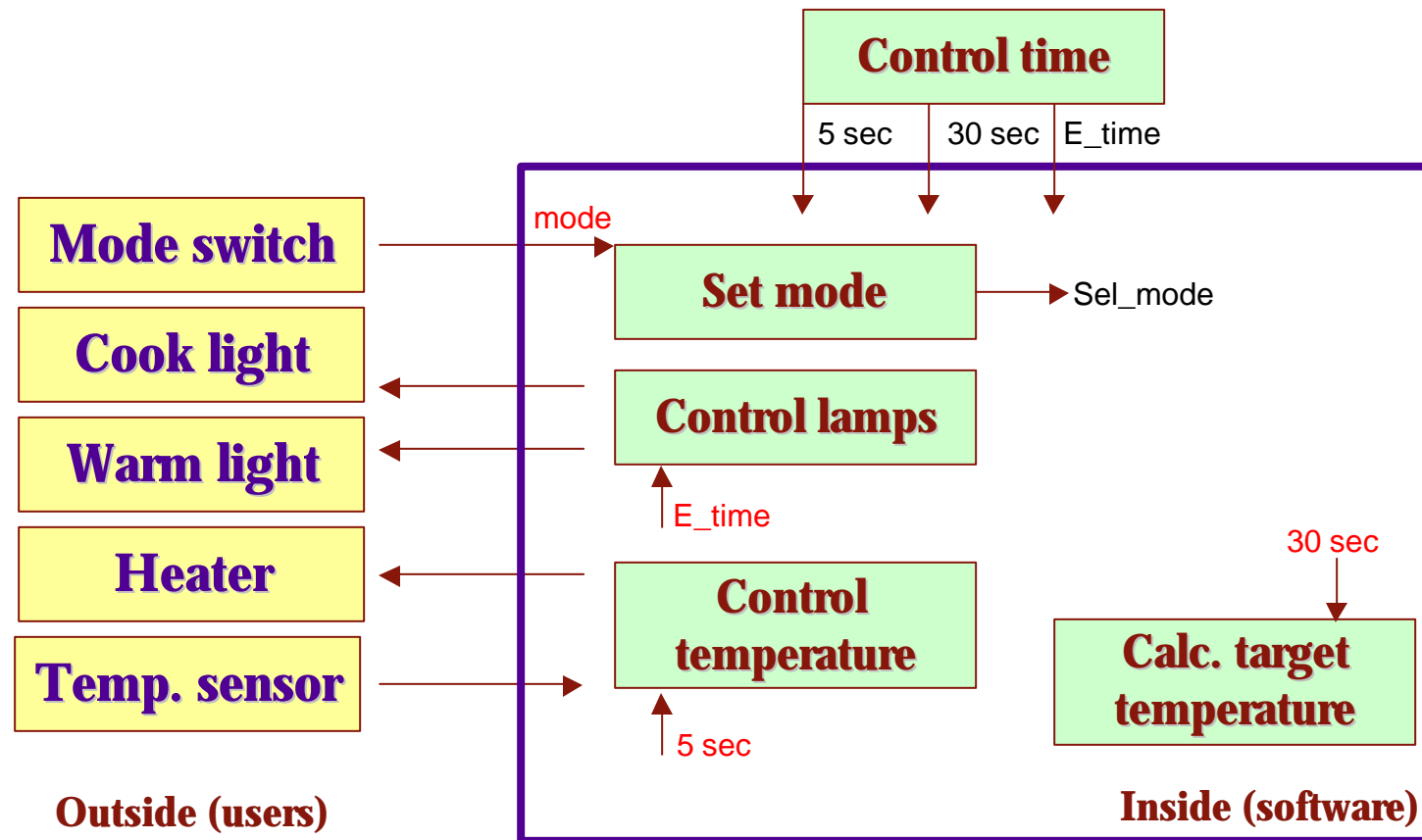


Step 3



Processes interactions...

Let's now look at the Set mode process...

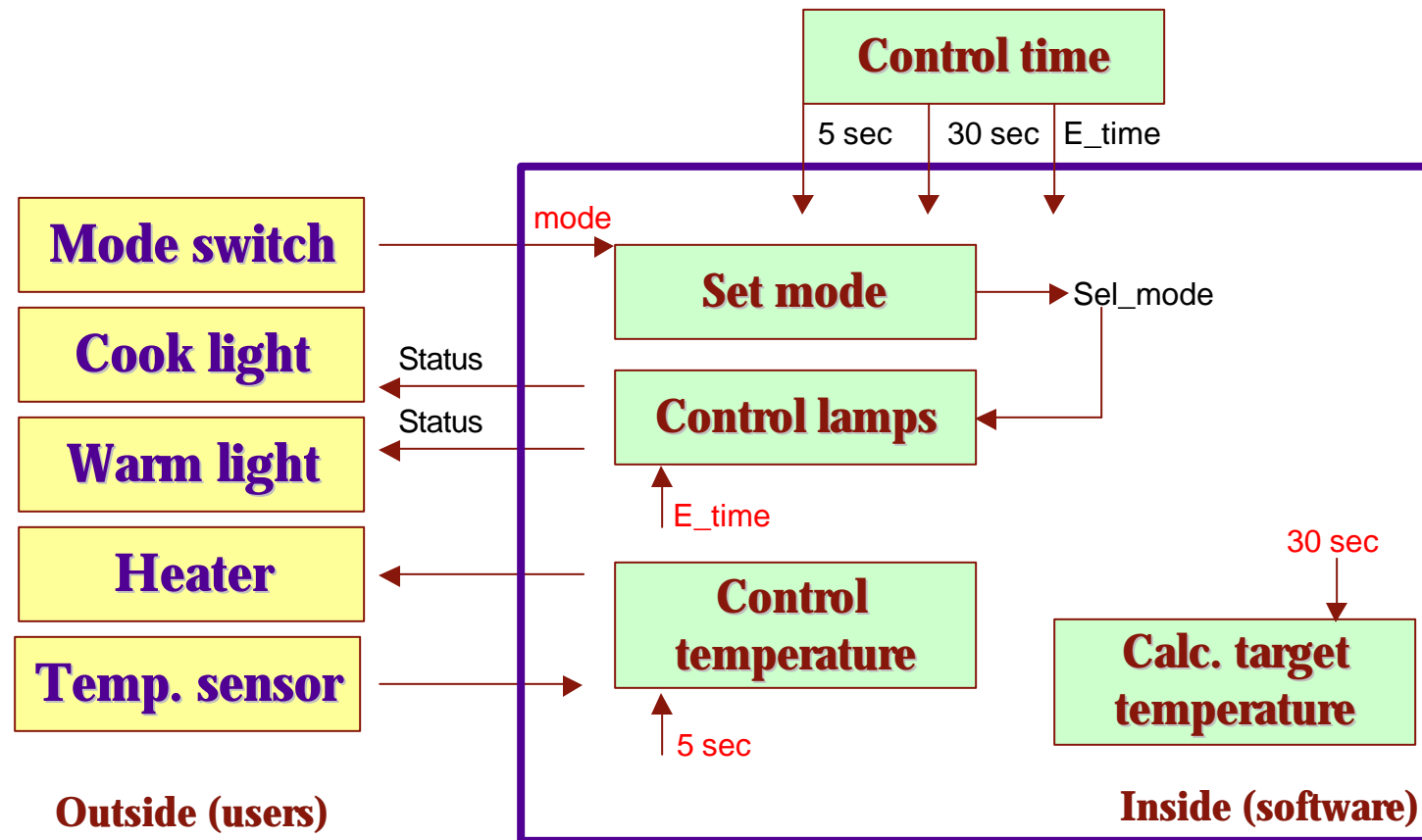


Step 3



Processes interactions...

Let's now look at the lights control process...

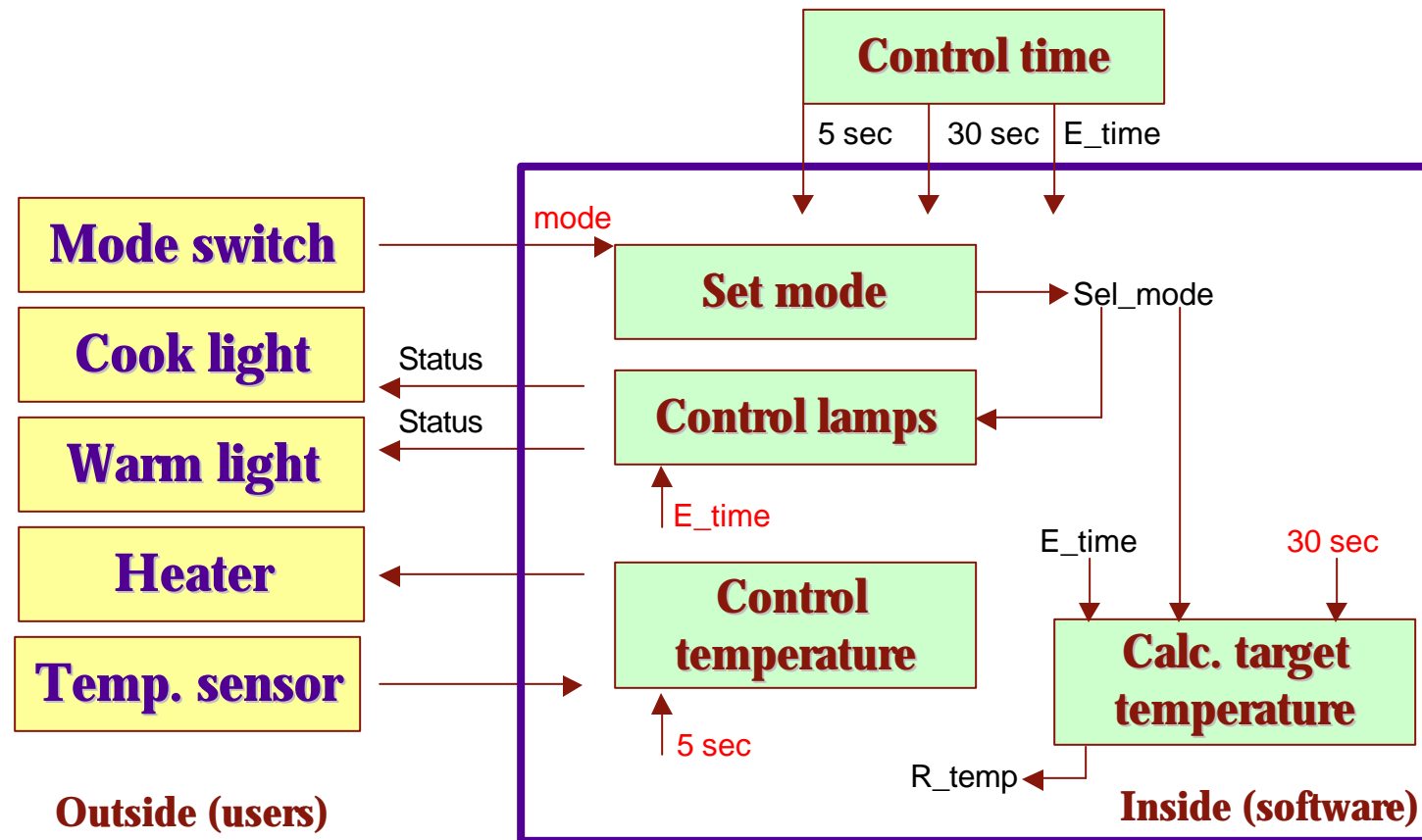


Step 3



Processes interactions...

Let's now look at the "Calculate target temperature" process...

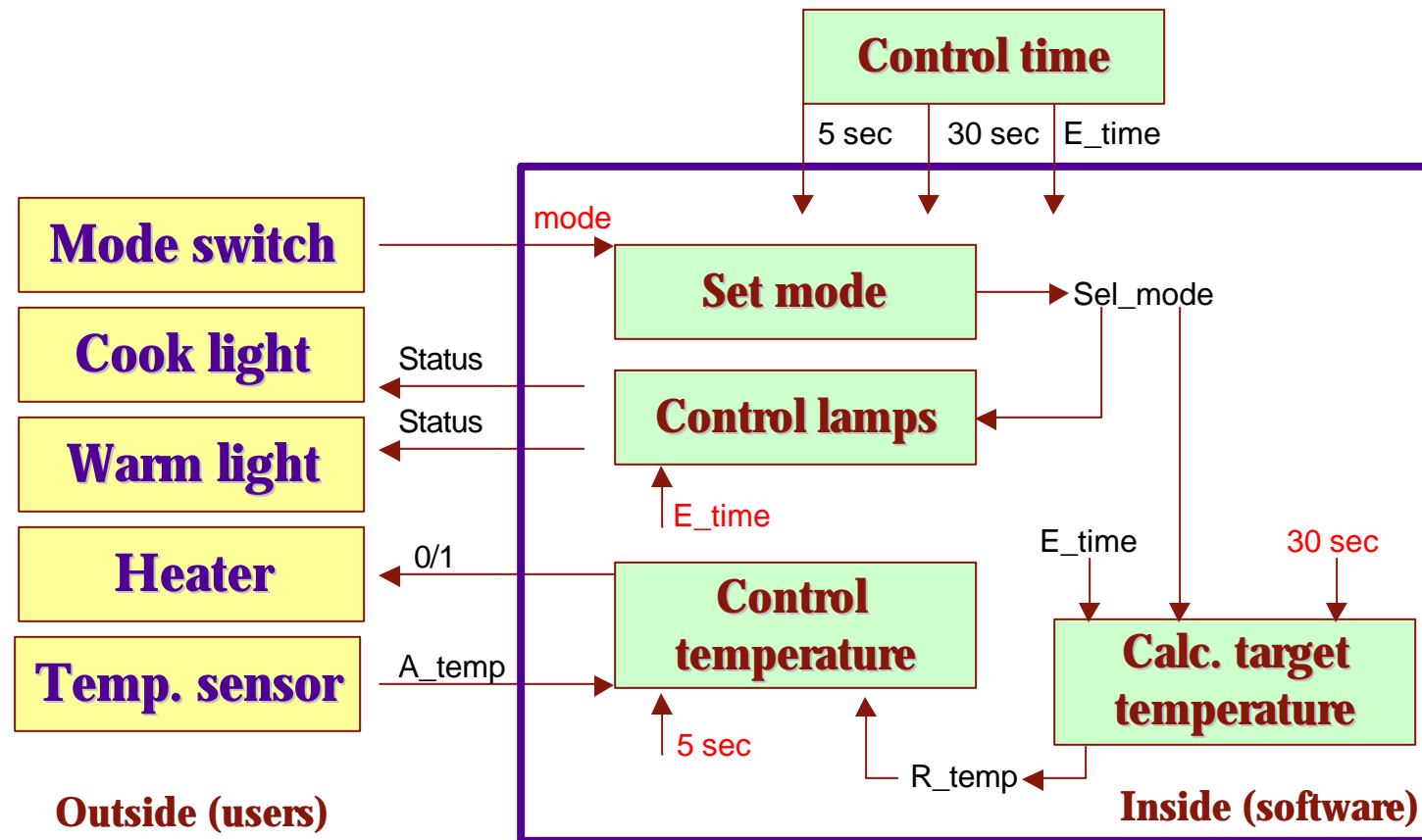


Step 3



Processes interactions...

Let's now look at the "Control temperature" process...

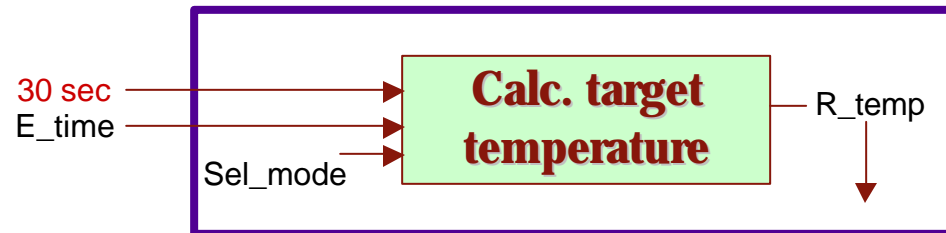


Step 3



Measurement ...

The calculate target temperature functional process...



ID	Triggering event	Sub-processes	Functional size
30sec	Yes	ENTRY	1 cfsu
E_time		ENTRY	1 cfsu
Sel_mode		READ	1 cfsu
R_temp		WRITE	1 cfsu

Step 4



Measurement ...

Summary

Layers	F. Process	Entry	Exit	Read	Write	TOTAL
-	Set Mode	1	-	-	1	2 cfsu
-	Control lamps	1	1	1	-	3 cfsu
-	Calc. target temp.	2	-	1	1	4 cfsu
-	Control temp.	2	1	1	-	4 cfsu
TOTAL		6	2	3	2	13 cfsu

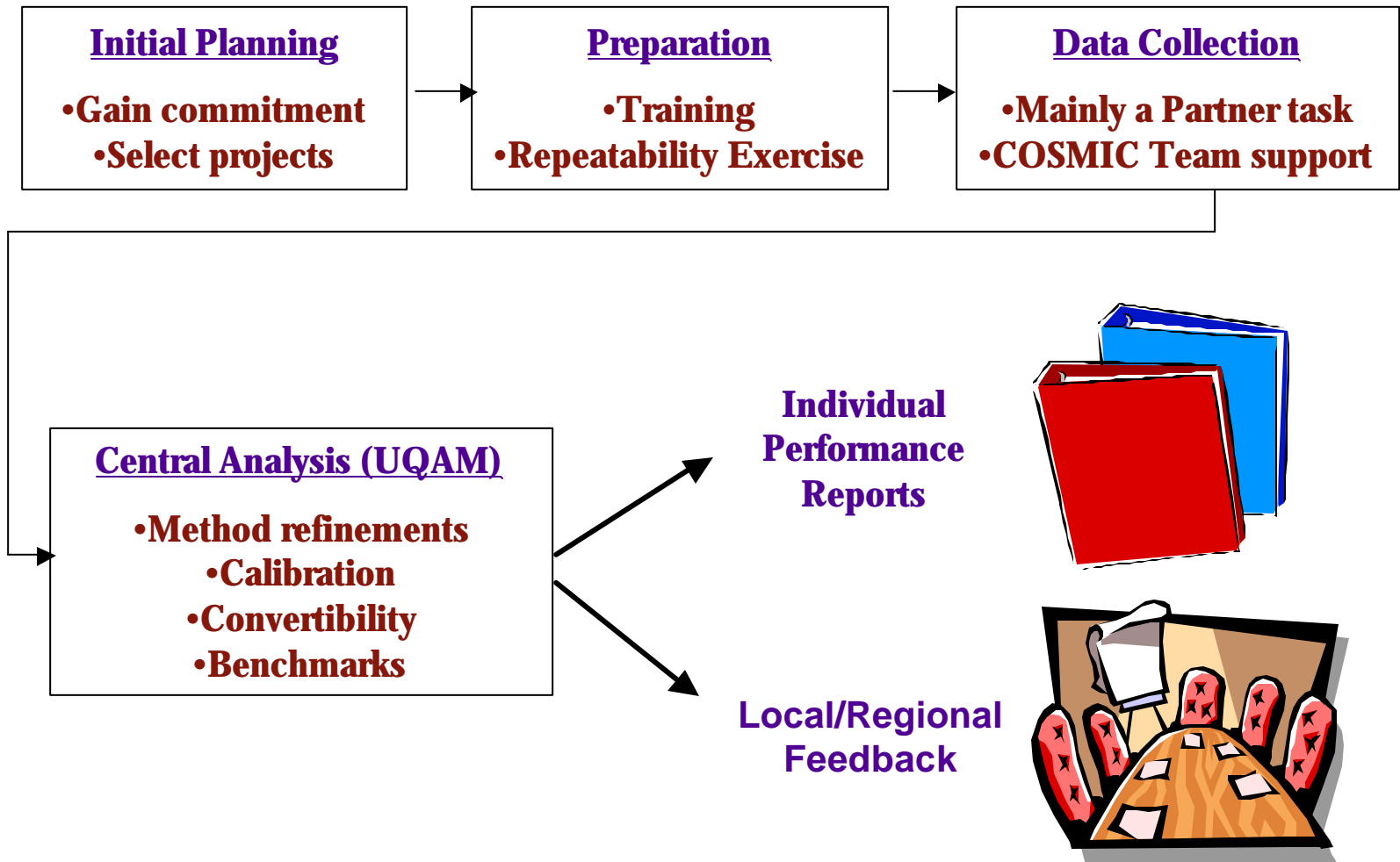
Step 4



COSMIC-FFP – the field trials



The Field Trials process

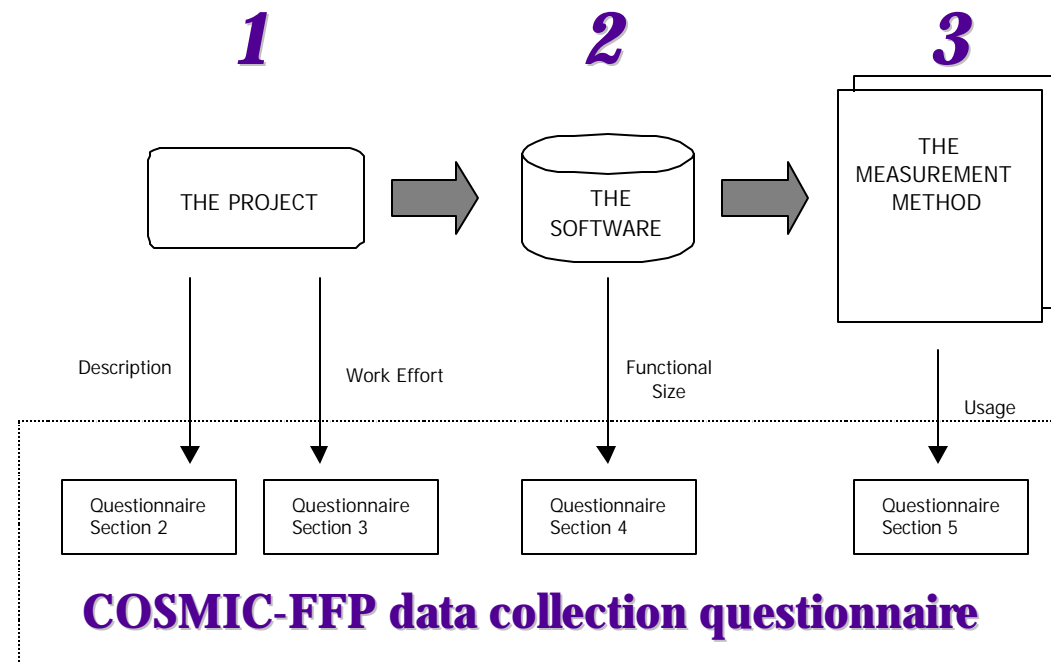


Field Trials



Overview

GOAL: Standardize a minimum subset of data for later benchmarking and improvement of the measurement method...



... based on the framework already developed by ISBSG

Field Trials



Project data

Project

- The organization (type of business),
- Type of software,
- Type of project (dev., maintenance, ...),
- Development and target platform,
- Duration

Effort

- Effort recording method
- Completeness of effort data
- Confidence in effort data
- Level of effort
- High level breakdown of effort

Field Trials



Want to know more ?



Publications

Already published:

23 papers already published by COSMIC team members or by independent authors.

Downloadable for free at:

www.lrgl.uqam.ca/ffp.html

Coming months:

FESMA Conference, October, Madrid, Spain

COCOMO Conference, October, Los Angeles, USA

ACOSM Conference, November, Sydney, Australia

ESCOM Conference, April 2001, London, UK

Want to know more ?...



Research underway

Want to know more ?...

- **Inter-measurer consistency study (P. Nolin, UQAM with Hydro Quebec);**
- **Conversion from FFP V1, MkII and IFPUG (V. Ho, UQAM)**
- **Early COSMIC-FFP (Chapter 7) - UQAM & R. Meli (Italy)**
- **Correlation of expert view of functionality with COSMIC FFP size, using AHP (G. Wittig, E. Rudolph, Australia)**
- **Procedure for UML-based specifications (V. Bevo, UQAM)**
- **Automatic measurement from source code (V. Ho, UQAM)**
- **Size contribution of Technical and Quality requirements (C. Lokan, Australian Defence Academy & UQAM)**
- **Other aspects of size - algorithmic complexity N. Kecici (USNRC), F. Bootsma, (Nortel) planning to study**
- **Supporting requirements identification with CBR approach (J.M. Desharnais, UQAM)**



Tools and Benchmarks

Want to know more ?...

- **Hierarchy Master - FFP v. 1 fully supported, V. 2 in development (J. Ng, Australia)**
- **Sphera - measurement support and estimating tool for V. 2 in development (R. Meli, Italy)**
- **Commitment to deliver Field Trial results to ISBSG**

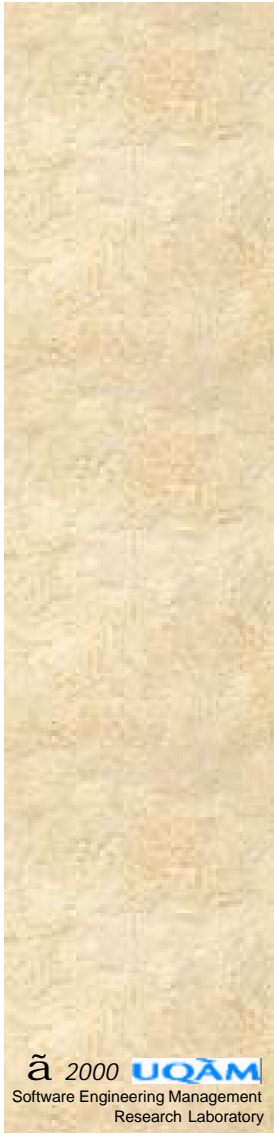


On the Web...

Want to know more ?...

➤ Complete documentation on the Web

- ✓ **Concepts and definitions,**
- ✓ **Measurement Manual,**
- ✓ **Publications,**
- ✓ **<http://www.lrgl.uqam.ca/ffp.html>**
- ✓ **<http://www.cosmicon.com>**



Conclusion



Final remarks...

- **COSMIC-FFP** was designed for **ISO compliance**,
- **COSMIC-FFP** has been designed **FOR** the industry, **WITH** the industry,
- **COSMIC-FFP** is an **open and transparent** initiative, fully documented and easily available.

Conclusions