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TOULOUSE III

Managing Polling Adaptability in a CIM/WBEM Infrastructure

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Audrey MOUI, Thierry DESPRATS, Emmanuel VINAL, Michelle SIBILLA

SIERA
SERVICE INTEGRATION AND NETWORK ADMINISTRATION

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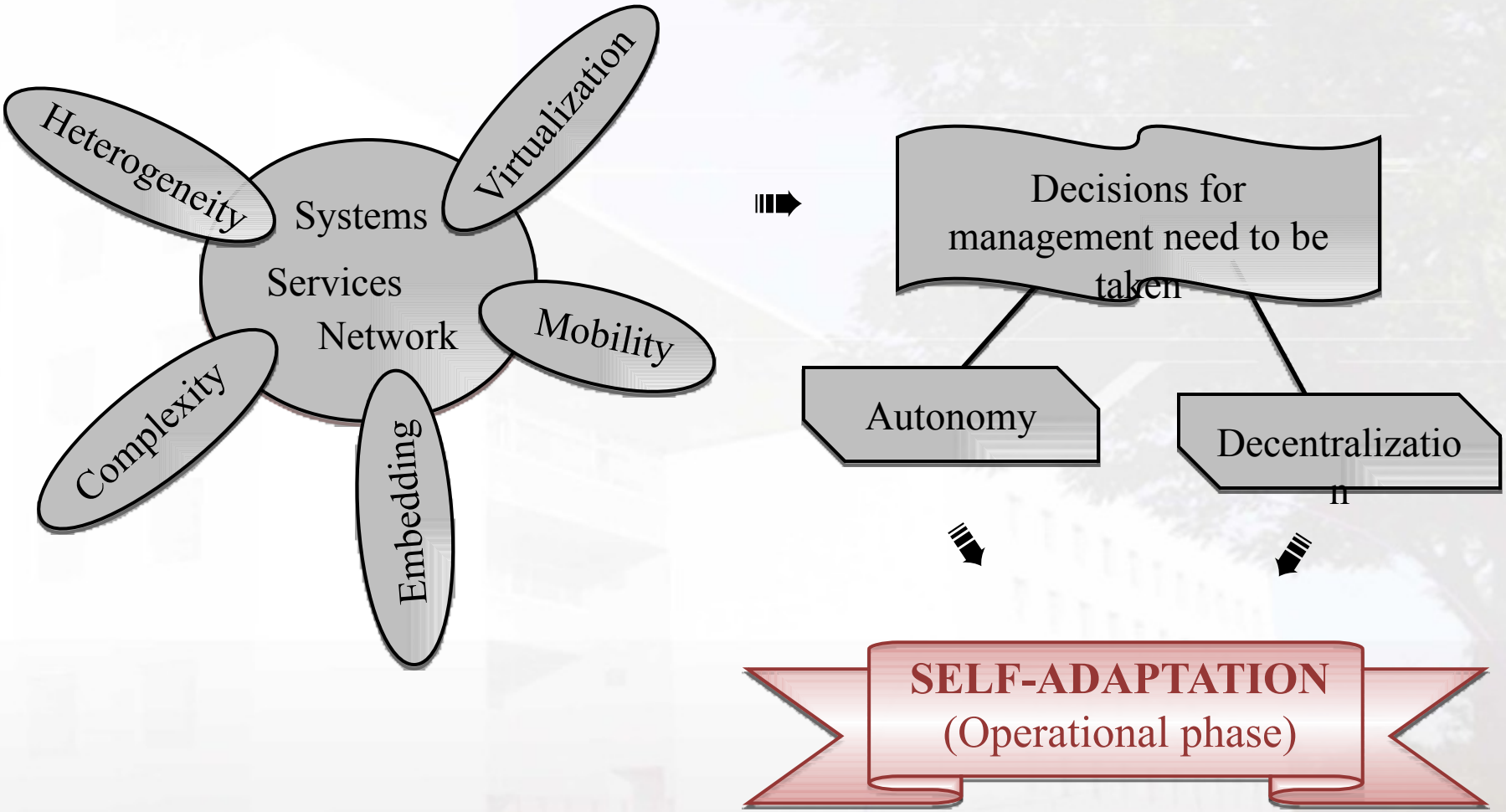
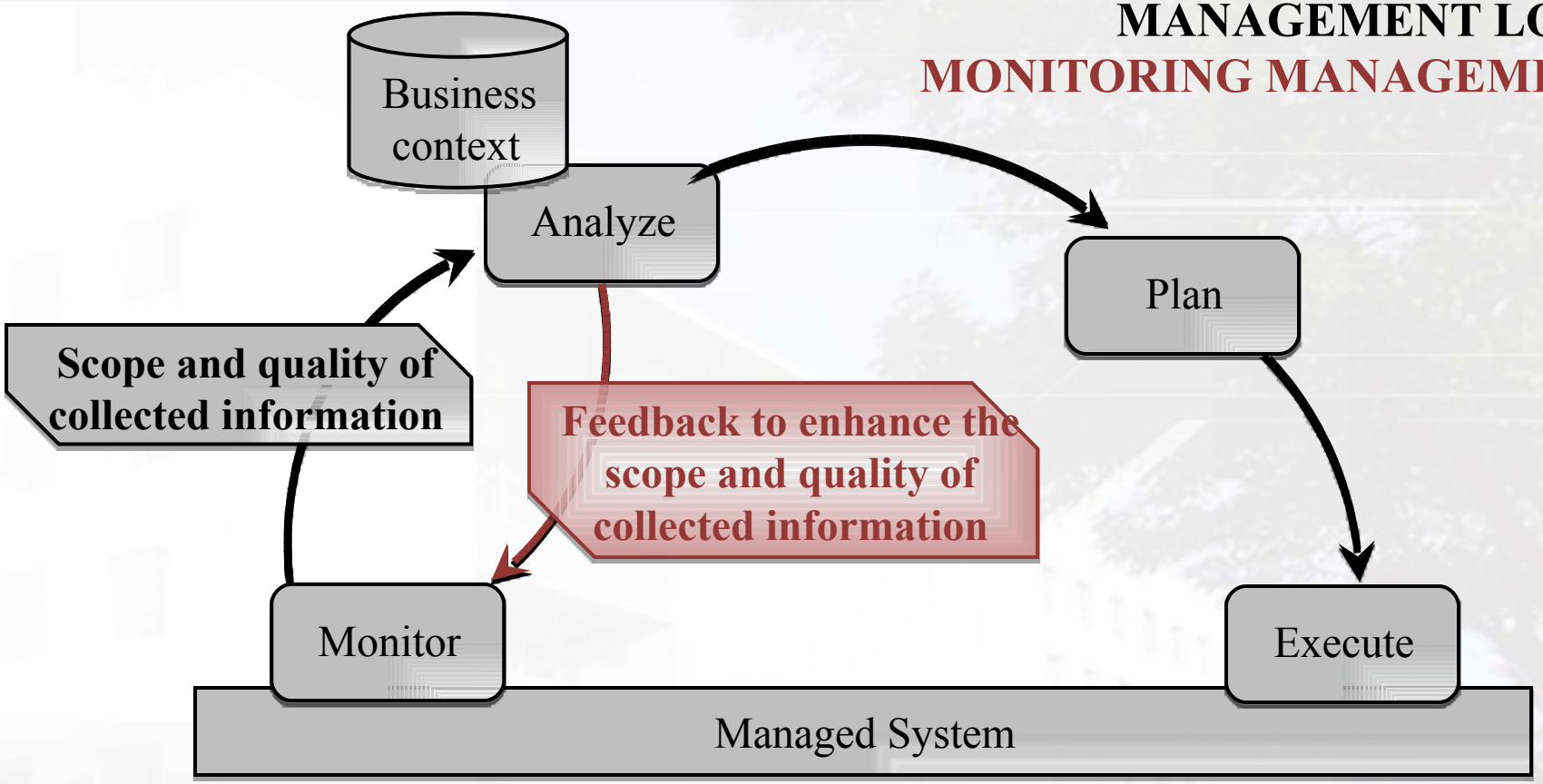
Introduction

- *General Context*
- *The Monitoring in the Management Loop*

GENERAL CONTEXT



THE MONITORING IN THE MANAGEMENT LOOP

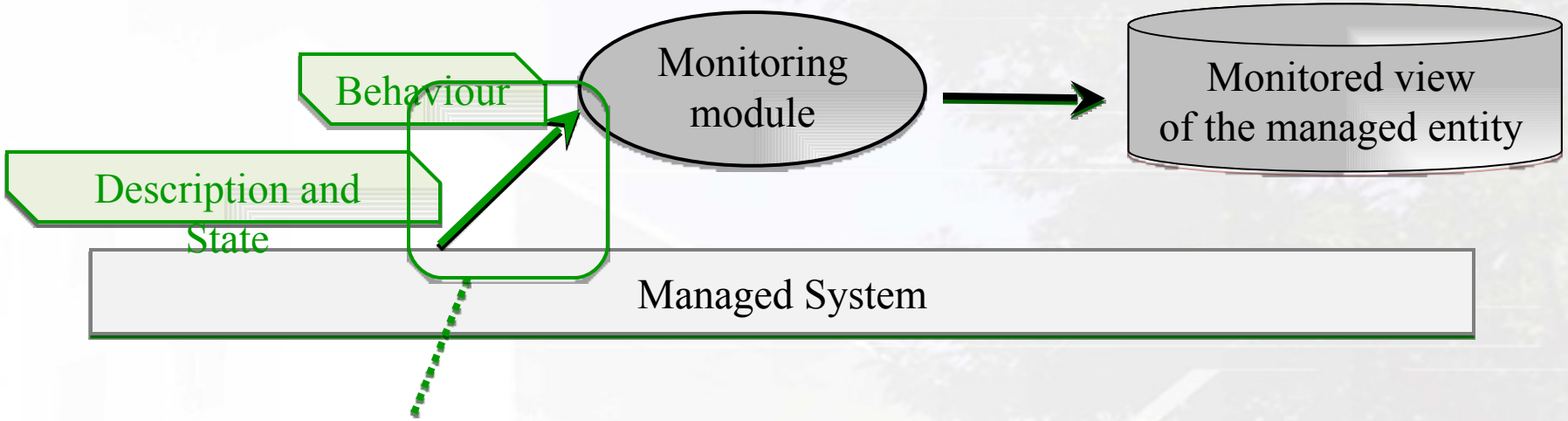


HOW TO MAKE MORE FLEXIBLE AND ADAPTABLE THE MONITORING MECHANISMS?

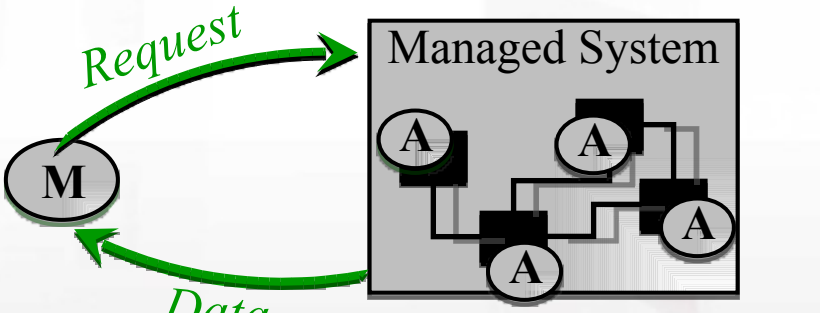
Characterization of Polling Adaptability

- *Monitoring Characterization*
- *Polling Configurability*
- *Polling Adaptability*

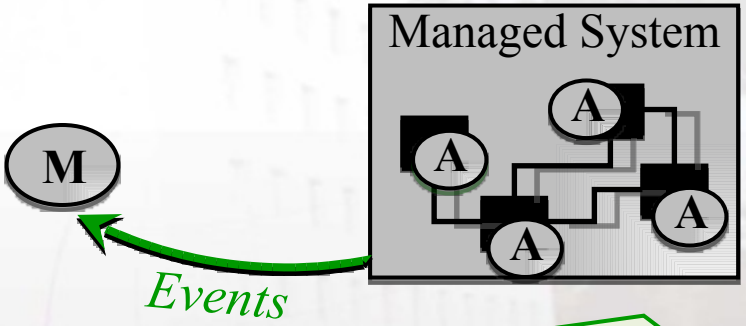
THE MONITORING ACTIVITY



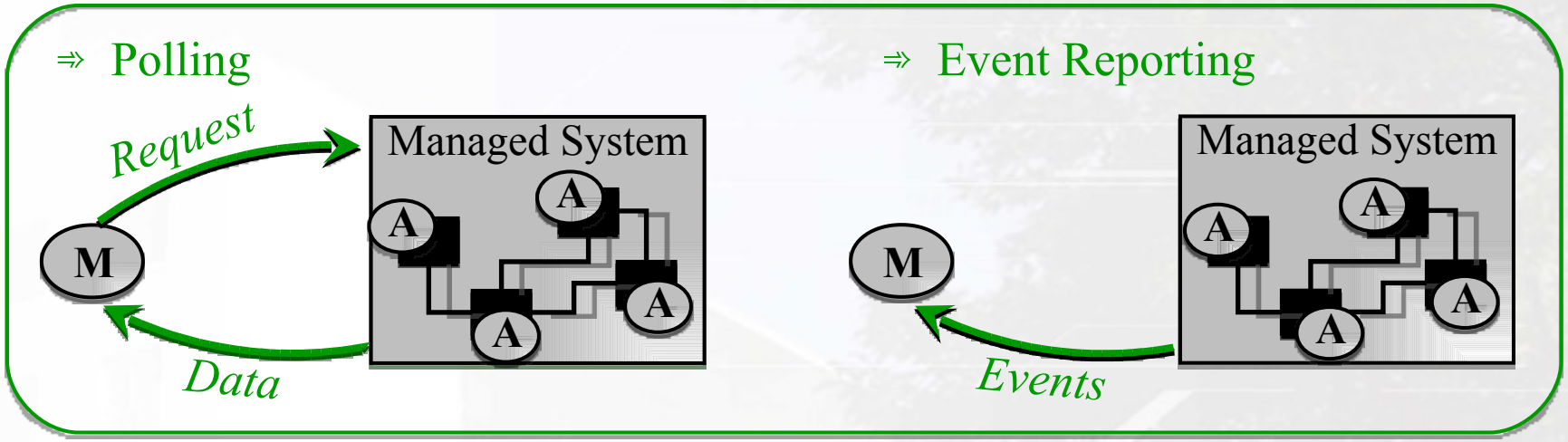
⇒ Polling

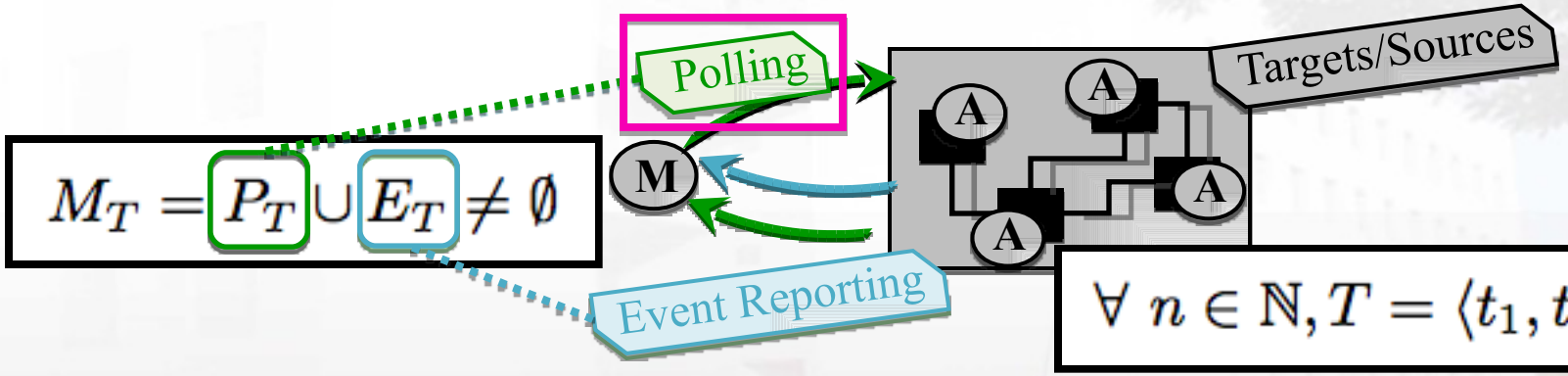


⇒ Event Reporting



MONITORING CHARACTERIZATION

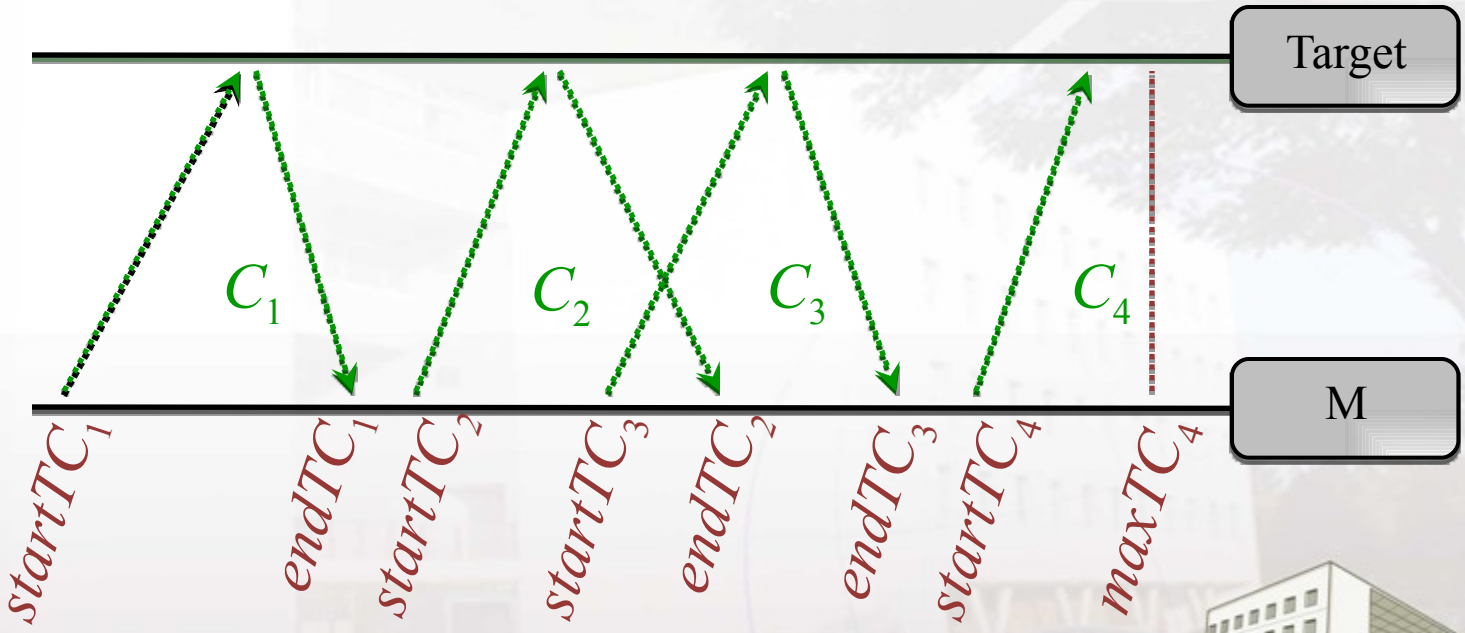




$$C_f = \{inst\,(Pa_{mdf})\} \cup \{inst\,(Pa_{\neg mdf})\}$$

POLLING DEFINITION

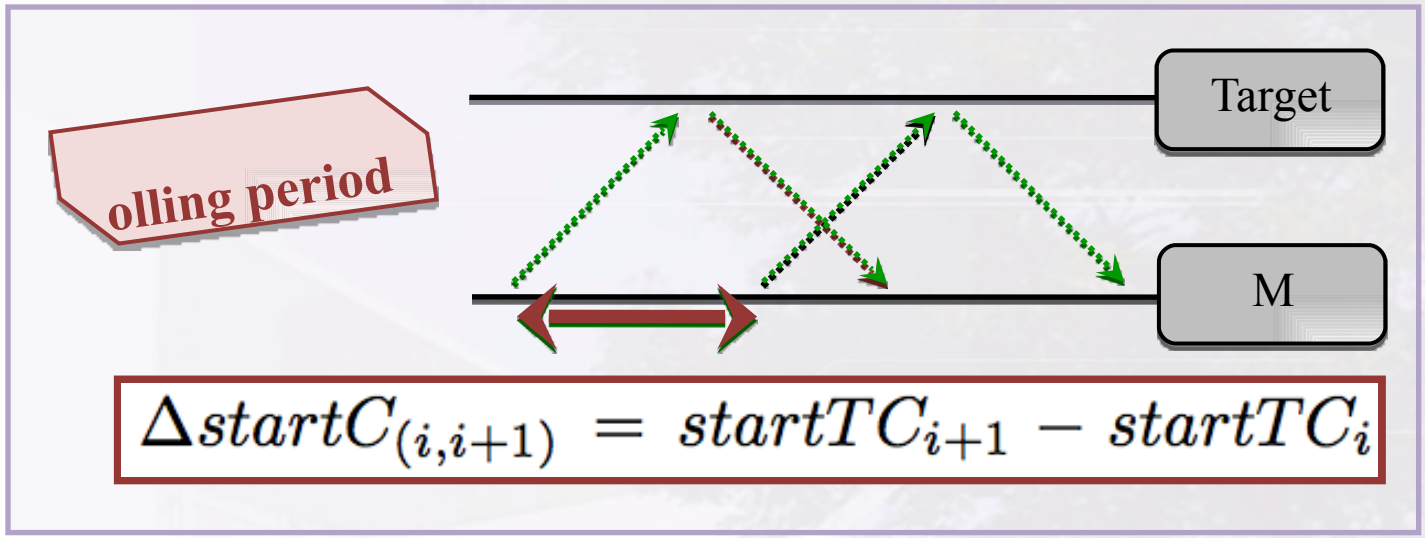
$$\forall\, i \in \mathbb{N}, P_T = \langle C_1, C_2, ..., C_i \rangle$$
$$\text{such that } \forall\, i, startTC_i < startTC_{i+1}$$



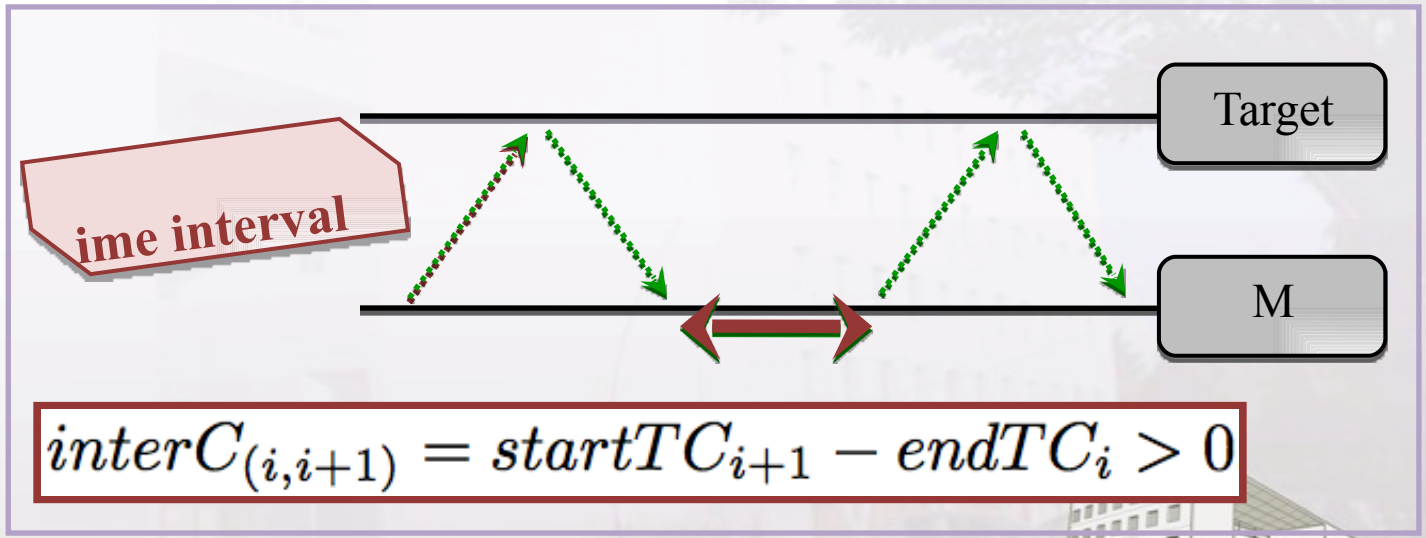
1ST PARAMETER: EXECUTION MODE

Execution Mode

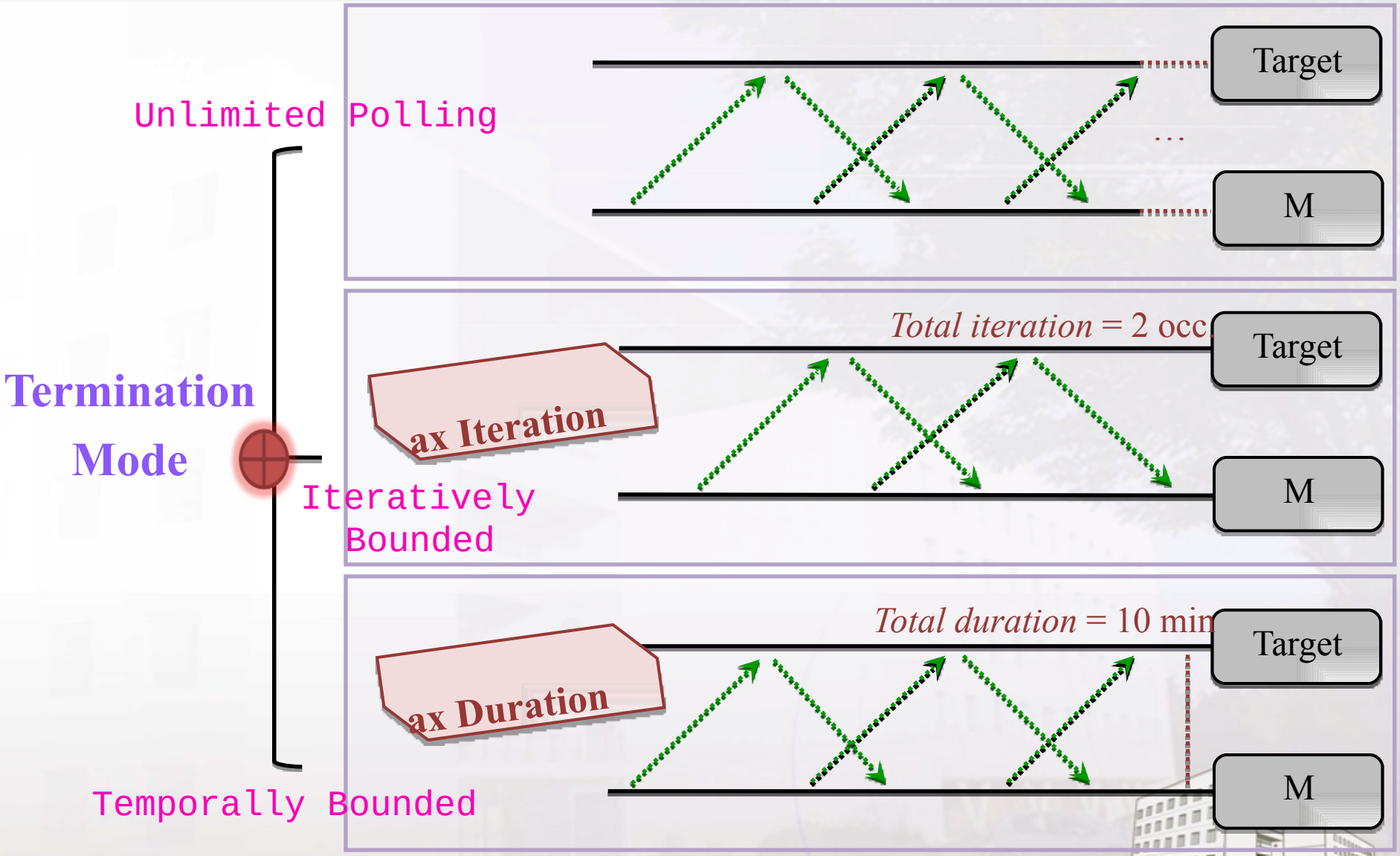
Periodic



NoOverlapping



2ND PARAMETER: TERMINATION MODE



3RD PARAMETER: WAITING TIME AND PRODUCTIVITY

Productive Request

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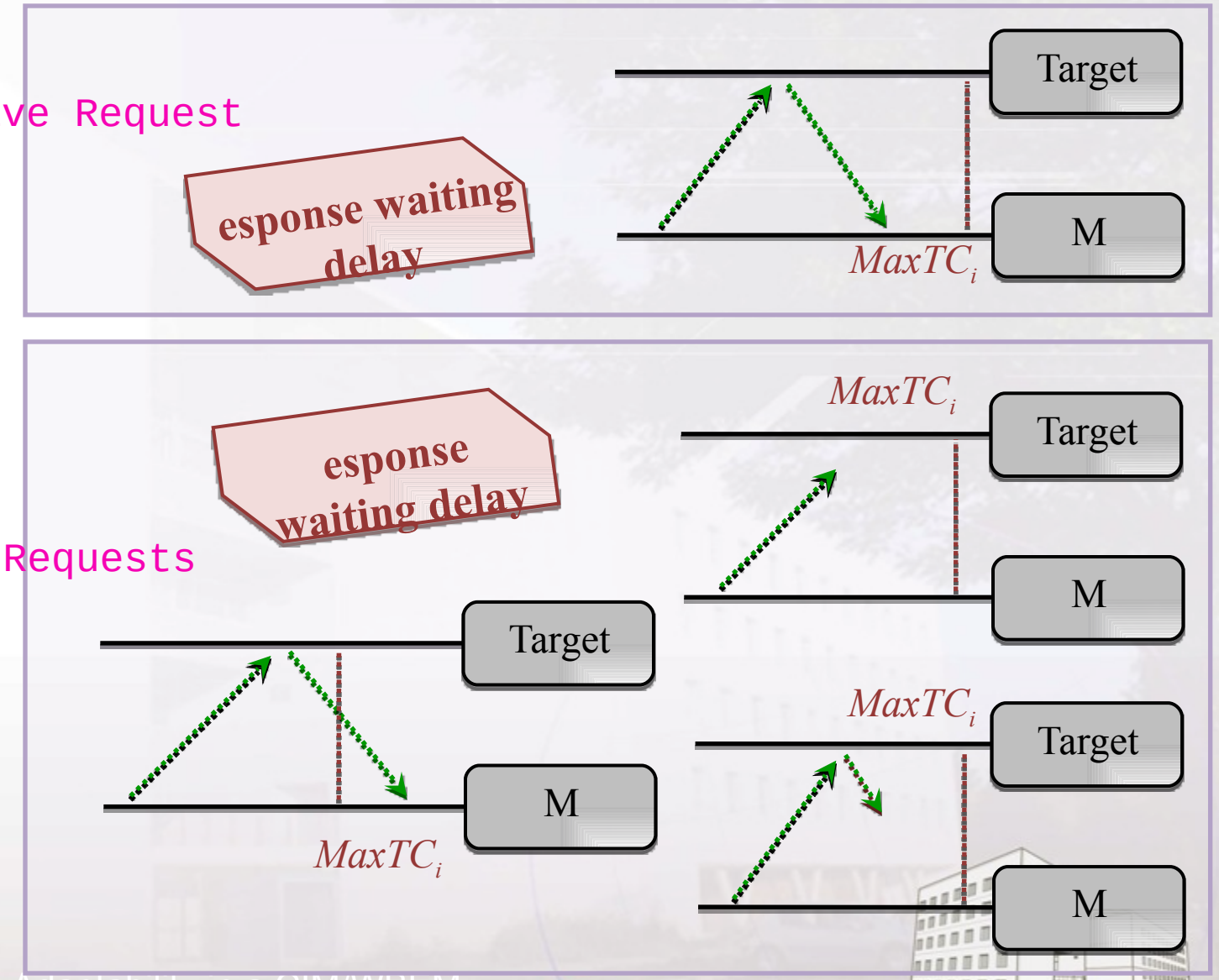
Unproductive Requests

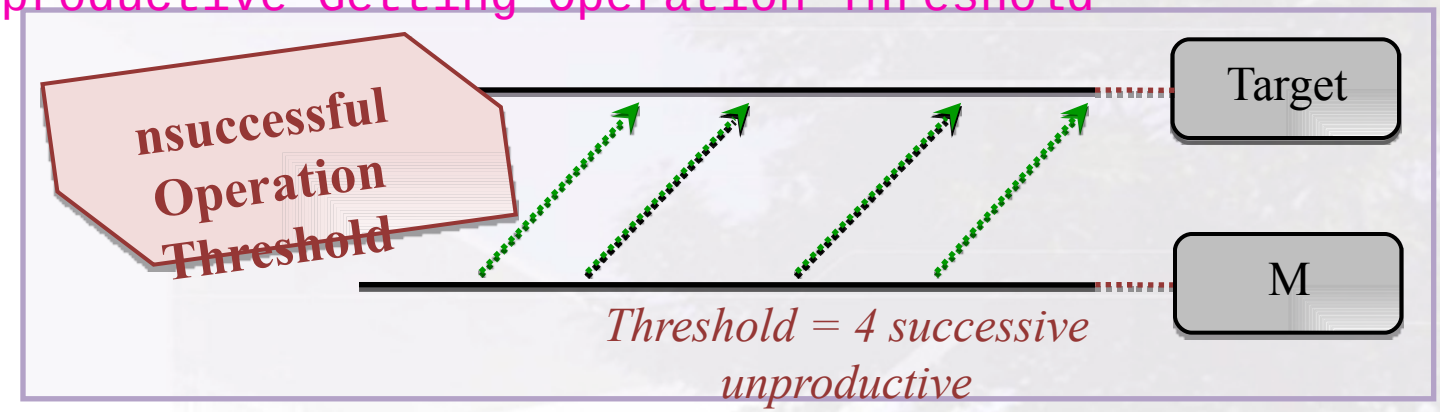


4TH PARAMETER: AUTONOMOUS TERMINATION MODE

uccessive Unproductive Getting Operation Threshold

utonomous Termination ode

Off



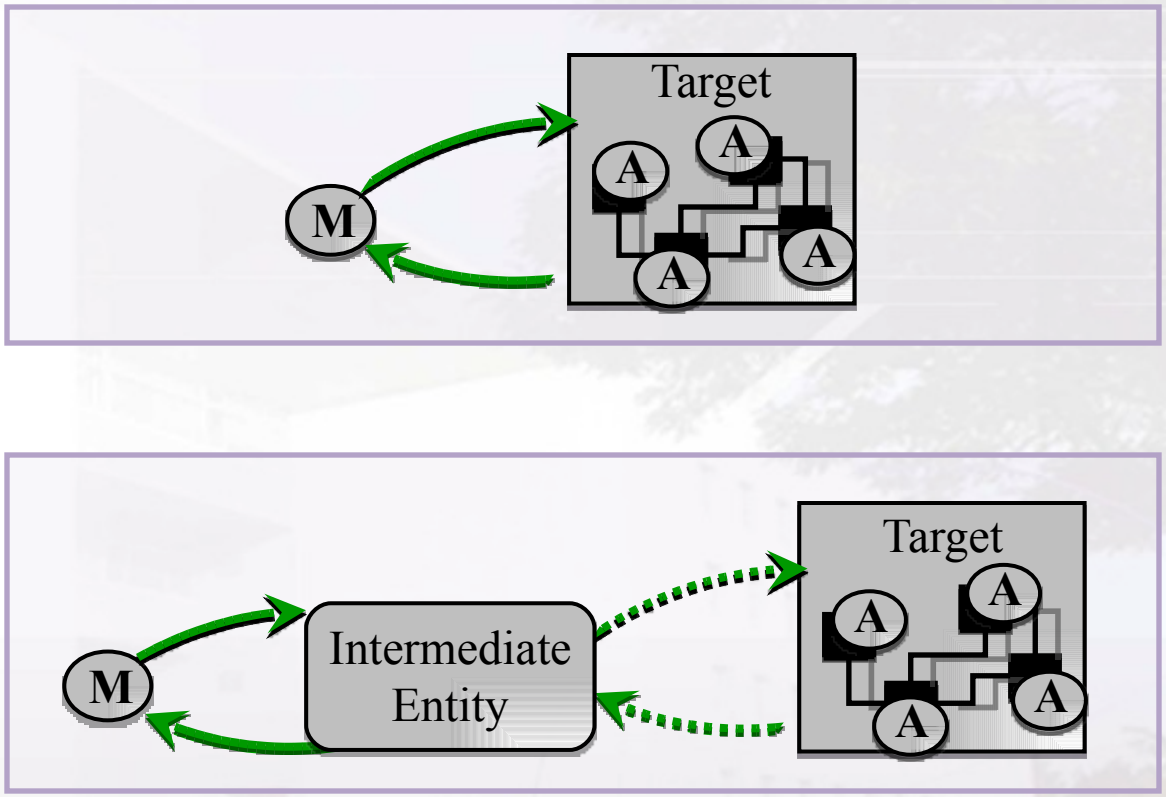
nproductive Getting Operation Maximum Rate

5TH PARAMETER: REQUEST MODE

irect and
From the
Source
Polling

equest
Mode

ocal
Polling



POLLING CONFIGURABILITY: PARAMETERS

Selector parameters (Types enum)		
Label	Value	M
Execution mode	Periodic	✓
	NoOverlapping	
Termination mode	Unlimited	✗
	Iterative	
	Temporal	
Autonomous termination mode	Off	✗
	ThresholdSuccImp	
	RateImp	
Request mode	Source	✗
	Local	

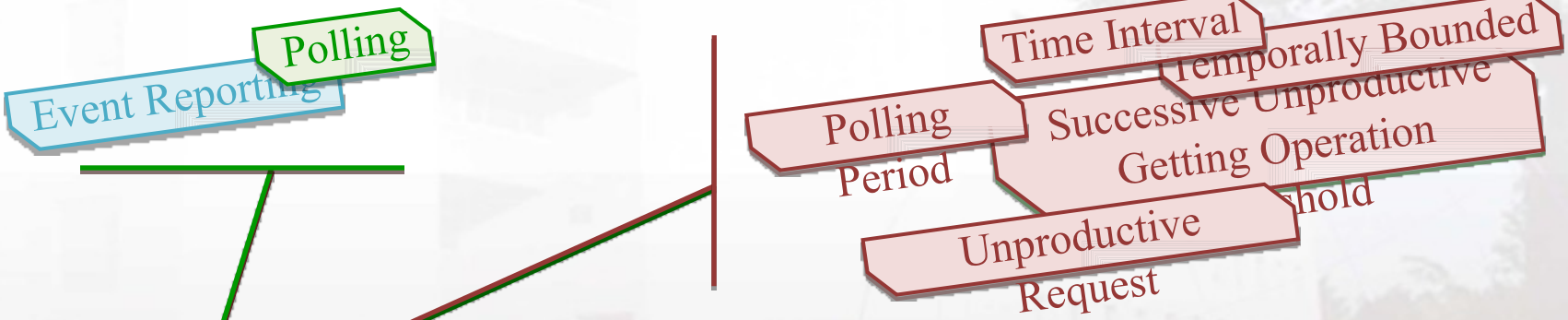
Other parameters		
Label	Type	M
Answer delay	ulong	✓
Polling period →	ulong	✓
Request delay →	ulong	✓
Maximal number →	ulong	✓
Total duration →	ulong	✓
Succ. unprod. op. →	ushort	✓
Unprod. op. max. rate →	float	✓

POLLING ADAPTABILITY EXPRESSION

- **Adaptability** occurs when at least **one parameter changes** : the **monitoring state turns into another state**

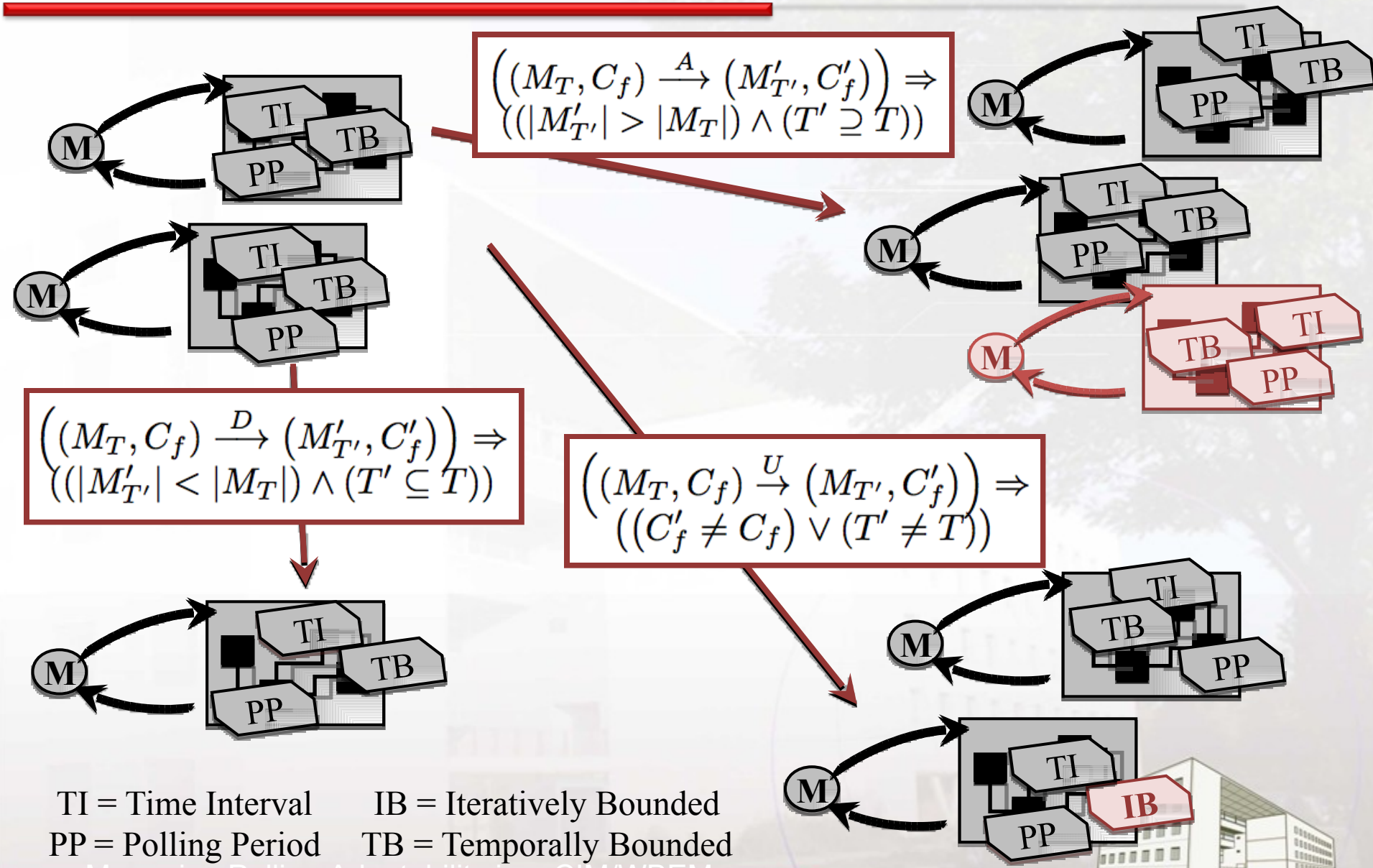
$$\delta_S = S \rightarrow S'$$

- A **monitoring strategy** is the association between the **mechanisms** and their **configurations**



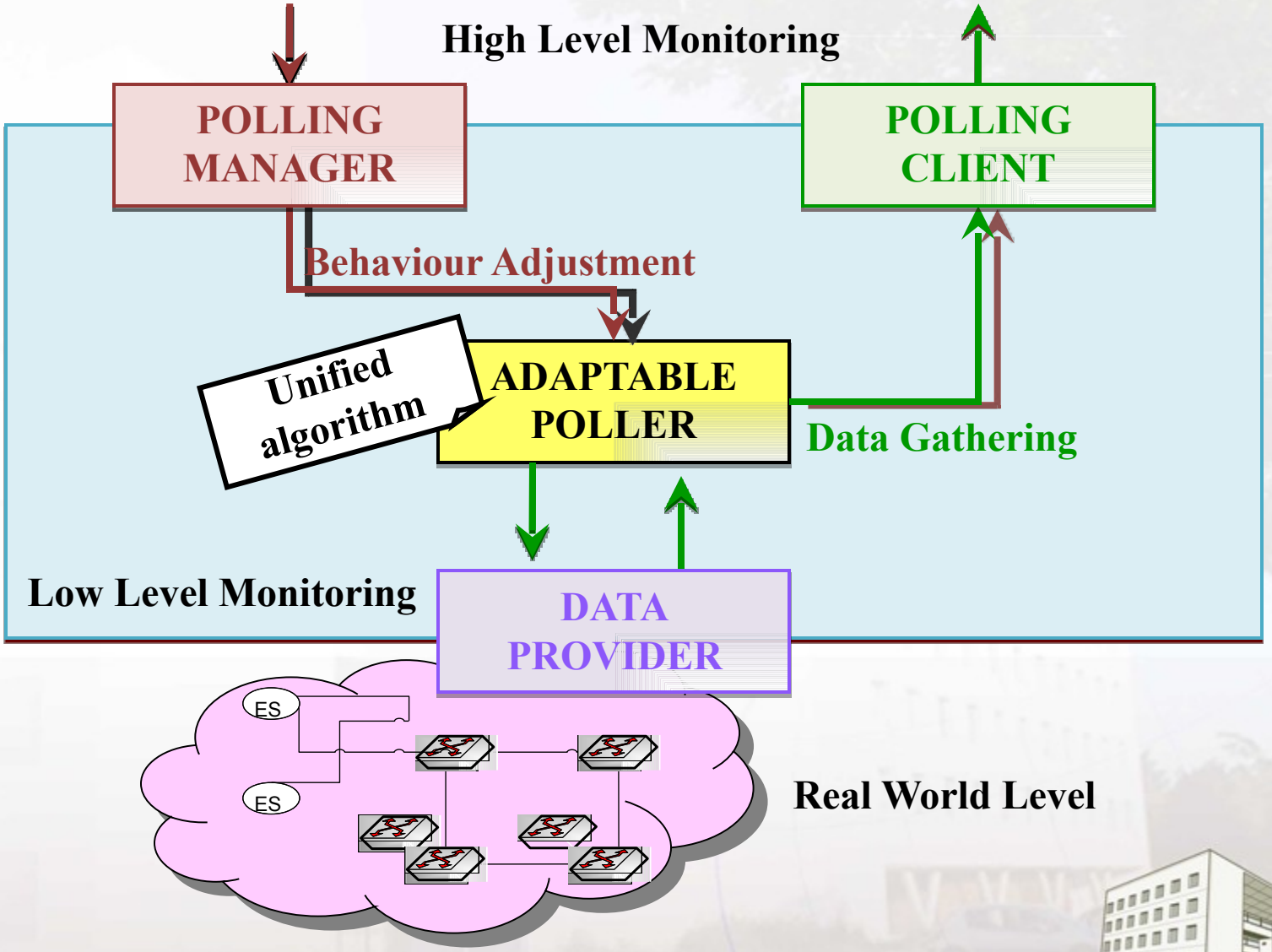
$$S = (M_T, C_f) = \{\langle P_{t_1}, C_{f_1}\rangle, \langle P_{t_2}, C_{f_2}\rangle, ..., \langle P_{t_n}, C_{f_n}\rangle\}$$

POLLING ADAPTABILITY



TI = Time Interval IB = Iteratively Bounded
PP = Polling Period TB = Temporally Bounded

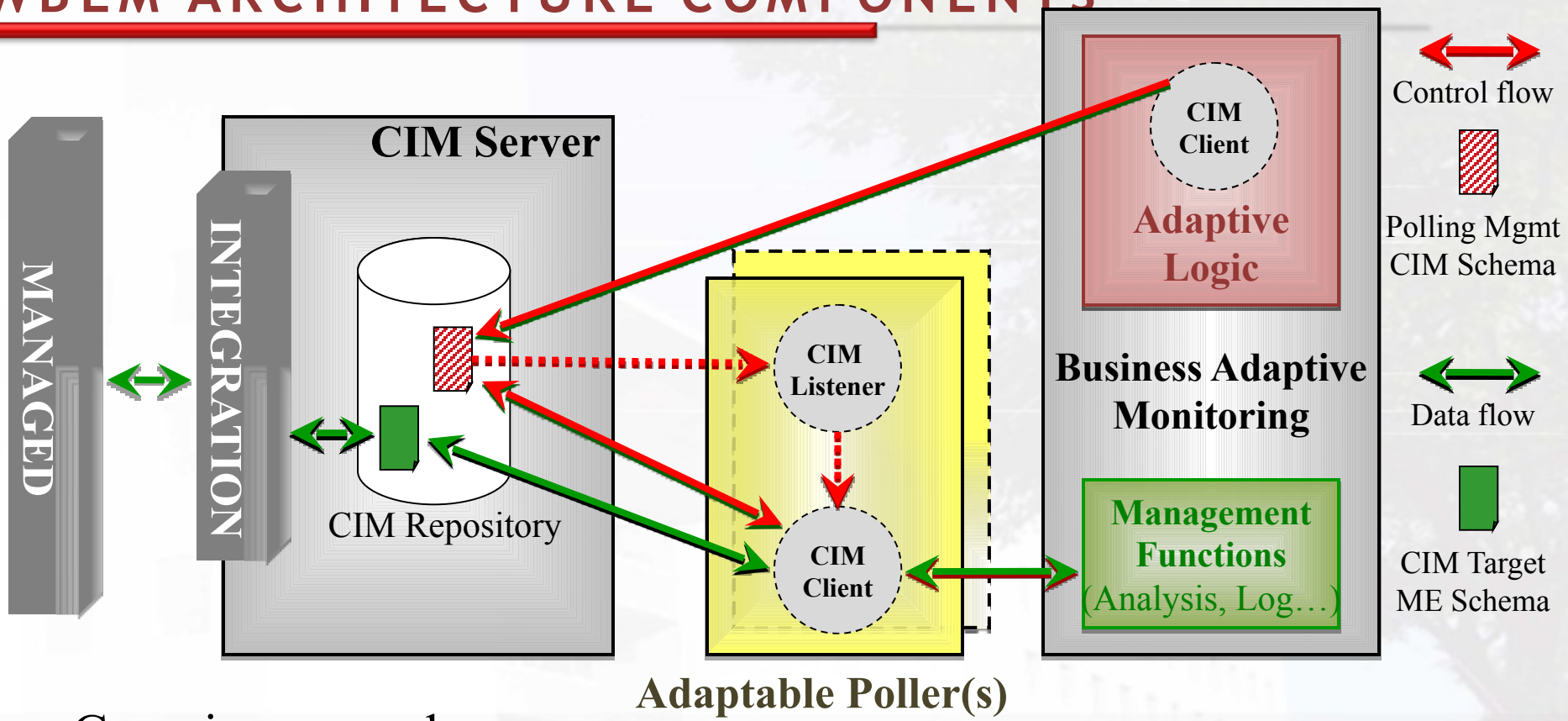
THE ROLES


High Level Monitoring
POLLING MANAGER
POLLING CLIENT
Behaviour Adjustment
Unified algorithm
ADAPTABLE POLLER
Data Gathering
Low Level Monitoring
DATA PROVIDER
ES
ES
Real World Level

Alignment with DMTF Standards

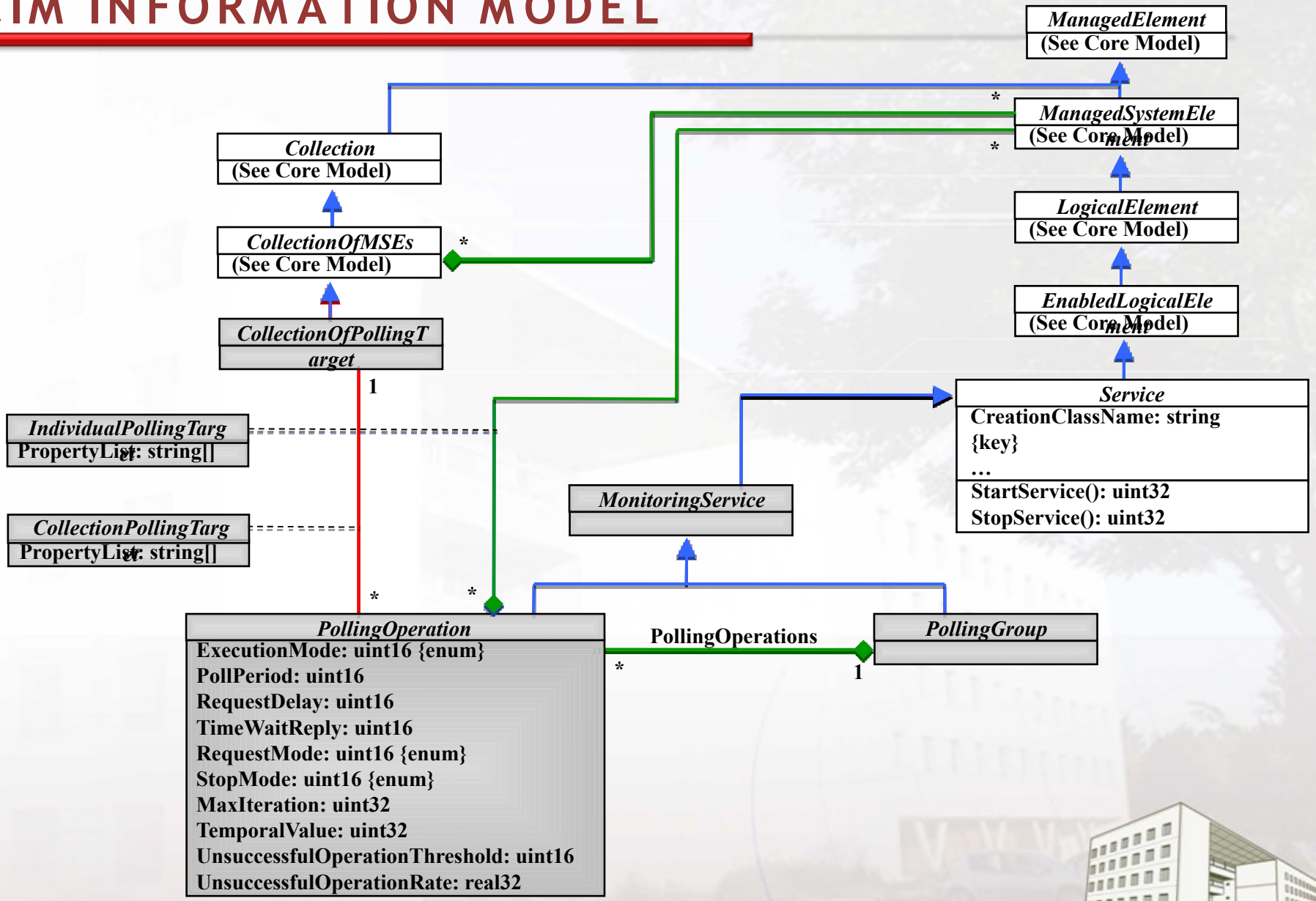
- *WBEM Architecture Components*
- *CIM Information Model*

WBEM ARCHITECTURE COMPONENTS



- Generic approach
  - ⇒ All possible polling configuration
  - ⇒ Independence of all management protocols
- Uniformity of both the modeling and the formalization through the CIM Schema

CIM INFORMATION MODEL

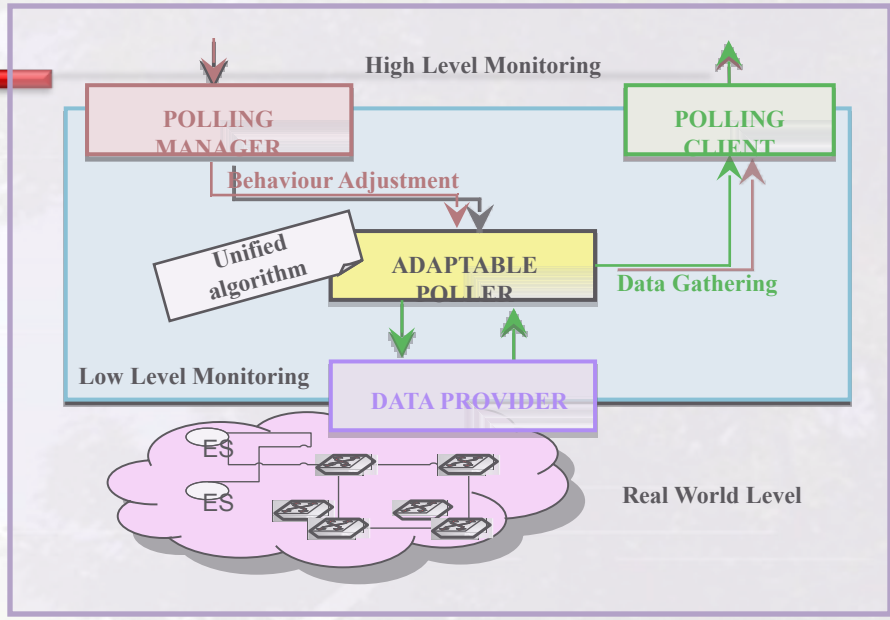


Experimentation with Open Pegasus

- *Scenario*
- *UML Interaction Diagram*

SCENARIO

More Freshness and Accuracy in order to **DETECT PRECISELY THE FAILURE**



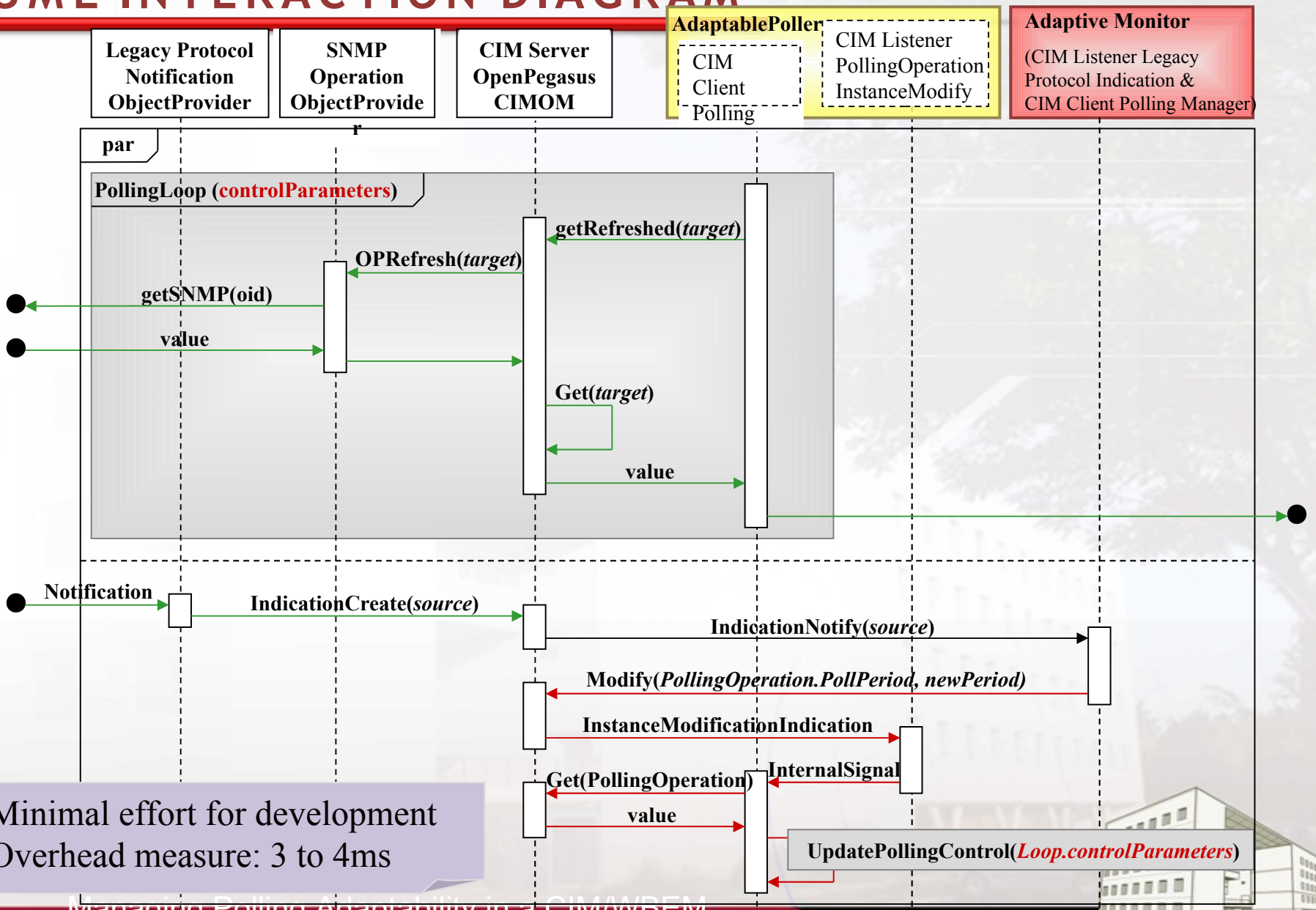
ADAPTABLE POLLER

Polling Period ← 60 sec
Rely on refreshed data (SNMP agent)

Subscription in order to receive **FAULT INDICATIONS** (private protocol)

if event = FAULT INDICATION **then**
Reduce the *Polling Period*
end if

UML INTERACTION DIAGRAM



Minimal effort for development
Overhead measure: 3 to 4ms

Synthesis and Future Work

- *Synthesis*
- *Future Work*

SYNTHESIS AND FUTURE WORK

- Synthesis
  - ⇒ Services oriented vision of the **monitoring** concept
  - ⇒ Formalization of the **polling configurability** and **adaptability**
  - ⇒ **CIM** information model and **WBEM** architecture components
  - ⇒ **Experimentation** with Open Pegasus

- Future Work
  - ⇒ Extend the **control capability** of polling services
  - ⇒ Refine the **formal representation of the polling mechanism**
  - ⇒ Enlarge control capability to the **event reporting mechanism**
  - ⇒ Finally, a study is in progress to **define a language** for the control capability with the use of **business monitoring strategies**

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