

Report of the Scrutiny Group to the LHC RRBs

On behalf of the LHC Scrutiny Group

Heidi Sandaker (chair), University of Oslo

RRB, CERN, October 2021



**UNIVERSITY
OF OSLO**

2021 Scrutiny Cycle - Membership of the Group

CAMPBELL, Michael

DANIELSSON, Hans

DANNHEIM, Dominik

FATEMI, Renee

FREY, Ariane

GOLDSTEIN, Joel

LUBRANO, Pasquale

MAZZUCATO, Edoardo

POESCHL, Roman

PRODON, Sylvie

SANDAKER, Heidi

SCHMIDT, Burkhard

SCHWANDA, Christoph

YECK, James

CERN, EP Department

CERN, EP Department

CERN, EP Department

Univ. of Kentucky, US

Gottingen, DE

Bristol, UK

Univ. Perugia and INFN, IT

CEA/IRFU, FR

IN2P3, FR

CERN, FAP Department, Service Contracts

University of Oslo, NO, Chair

CERN, EP Department , Secretary

Institute of High Energy Physics, Vienna, AT

Brookhaven National Lab., US

Composition :

New members:

2019 - 21%

2020 - 14 %

2021 - 0%

2022 - 35%

36% from CERN

29% women

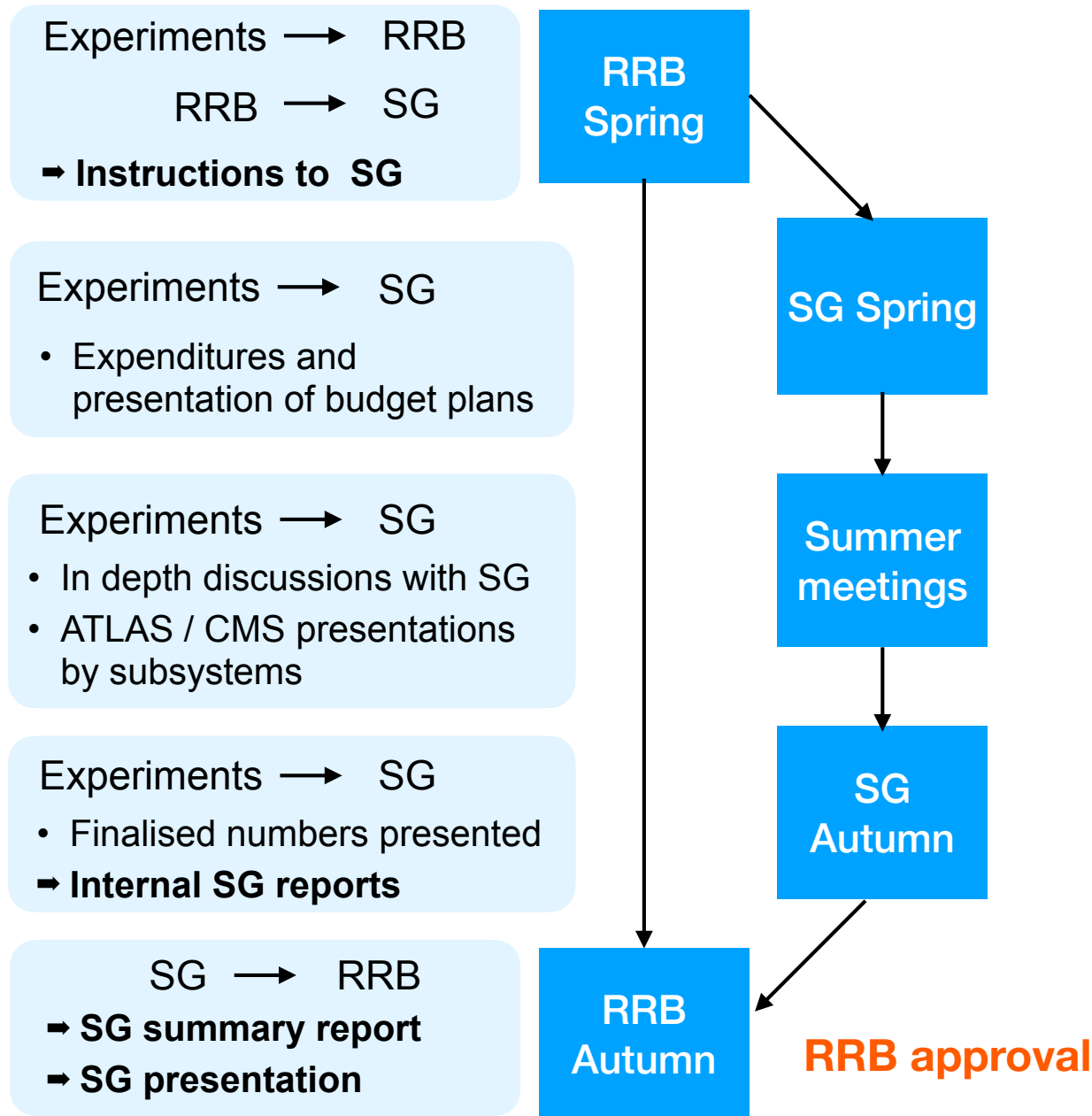
*** Outgoing members: Many thanks to for all the excellent work over many years !**

Proposed new members for 2022, to be endorsed by the RRB:

TROSKA, Jan (CERN, EP), SPENCER, Catherine (CERN, FAP), Monica Pepe (Perugia, IT), US representative tba



The Scrutiny Cycle



Continuous work to improve the scrutiny :

- Optimisation of the meetings of the SG review (2019)
- Discussion of the mandate started to improve continuity between years (2019 - 2021)
- Optimisation of the writing of the summary report (2020, 2021)
- Plan to adjust the overall Schedule of the SG (2022)
 - ➔ Early internal reports available after Summer SG
 - ➔ Draft summary report available before Autumn SG

2021 Scrutiny Cycle - summary

General Topics :

- *Following up on the cash balance reconciliation* between CERN Finance reports and the experiment's M&O A budgets.
 - ➡ Quite a few discrepancies this year, however when understood we find excellent agreement maintained for all experiments
- *Long-term projections for the special online computing replacement accounts*, which should not accumulate excessive reserves, and are allowed to go negative.
 - ➡ All experiments presented their plans and projections, see separate slide
- *M&O B carry over*. In RRB-2017-070 it was agreed that carry-over on sub-detector M&O B accounts should aim to stay below approximately 30% of the yearly budget.
 - ➡ All experiments are below this limit or execute down-spending according to their plans
- *Tracking of entry fees*. These fees are not subject to the same level of scrutiny as M&O expenditures, and remain at the discretion of the collaboration management.
 - ➡ No issues found



2021 Scrutiny Cycle - summary

Specific Topics of 2021 :

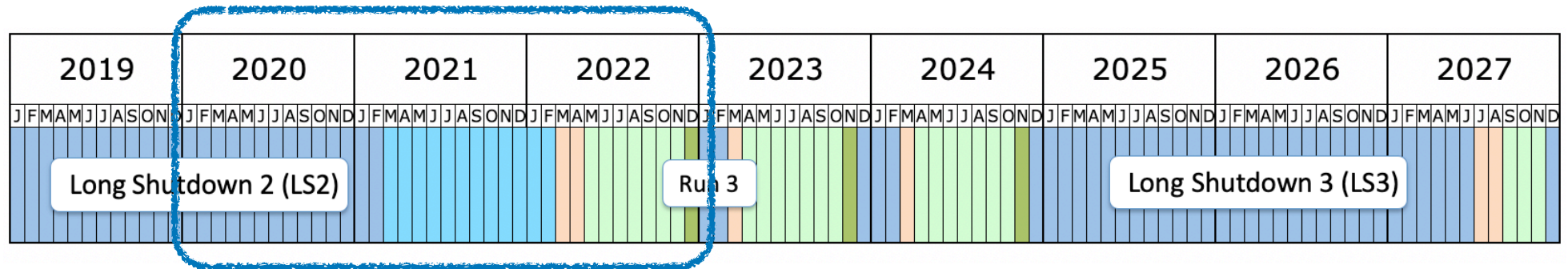
- *Covid-19 and its impact on the experiments*
 - ➔ Situation appears to be under control this second Covid year. Congratulations to all experiments for their extraordinary effort and for keeping the spending as close to normal as possible.
- *LS2 work and the inclusion of new detectors*
 - ➔ All experiments presented plans for the transition to the new detectors and the corresponding modification this makes to the future budgets.
 - ➔ Overall increased costs to be studied in more detail where applicable.
- *Is the collection of common funds proceeding according to plan?*
 - ➔ Overall yes.

Issues raised during the cycle:

- Experiments continues to express concerns about the level of subsistence for users which may be effectively reduced by the different application of the existing French tax laws.
- Trend with delayed contributions as observed in 2020 continues in 2021
- SG would like to review the relation between upgrade and operation in 2022



Scrutiny Cycle - Context



2019-2021: Long Shutdown 2 (LS2). Extensive work has been completed:

- upgrade and maintain existing detectors and their computing systems
- install and commission new detectors
- improve the infrastructure and services for a stable and safe operation of the detectors and to achieve an optimal working environment for staff and students.

2022: Long Shutdown 2 (LS2) ends, commissioning and operation year.

- commissioning of old and new detectors
- installation and commissioning of computing
- start of operation

Global sum M&O A without power	MCHF
2021	49.3
2020	49.0
2019	49.6
2018	47.0
2017	47.2
2016	46.9
2015	47.5



ALICE M&O A - overview and evolution

Closing report 2020 M&O A :

- Budget w/o power: **4,887 kCHF**
- Actual costs w/o power: **4,596 kCHF**
- End of year open commitments: **267 kCHF**
- NMS power costs: **11 kCHF**

Comments

- 2020 M&O A : With the open commitments there is a small surplus of **24 kCHF**. Late contributions continues.
- 2020 M&O B : Budget was **970 kCHF**, actual spending was **1,012 kCHF**, overspending of about 4% to reduce accumulated reserves
- 2022 M&O A : Budget request of **4,983 kCHF**, main changes are due to the SLA change (80 kCHF) and expenses due to Covid-19.
- 2022 M&O B : Budget request is **1,418 kCHF**, at the level of an operation year and taking into account the operation of the new detectors.

Budget request 2022 and future projections

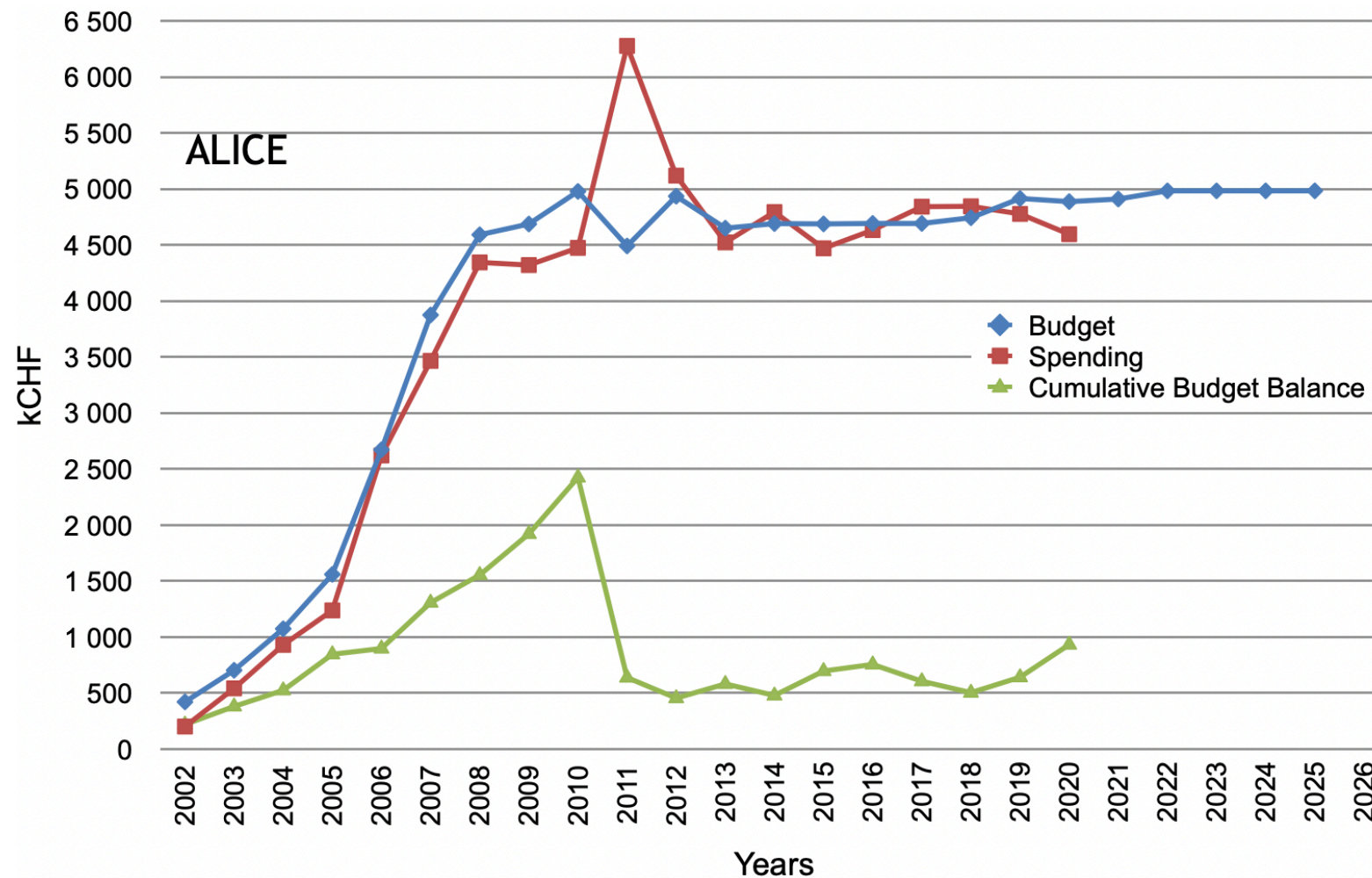
M&O A (kCHF)	2021	2022	2023	2024	2025
TOTAL without power	4,910	4,983	4,983	4,983	4,983
Grand Total	5,627	7,529	7,485	7,485	5,576

M&O B	2021	2022	2023	2024	2025
Grand Total (kCHF)	1430	1418	1410	1422	1483
Technical Manpower (FTE)	234	221	213	213	223



ALICE M&O A evolution

Graph does not include open commitments



The SG recommends approval of the ALICE M&O A and M&O B closing reports for 2020, and the budget requests for 2022



Closing report 2020 M&O A :

- Budget w/o power: **13,525 kCHF**
- Actual costs w/o power: **12,349 kCHF**
- End of year open commitments: **782 kCHF**
- NMS power costs: **718 kCHF**

Comments

- 2020 M&O A : An underspending of **1,176 kCHF**, mainly due to the reduced use of gas due to the extended LS2.
- 2020 M&O B : Budget was **5,795 kCHF**, actual spending was **5,420 kCHF**, the carry-over slightly below the target limit of 30% of the annual budget.
- 2022 M&O A : Budget request of **13,982 kCHF** is similar to previous projections, reduced slightly from what was presented last year.
- 2022 M&O B : Budget request is **5,258 kCHF**, increased slightly due to the additional support for the forward detectors ARP, LUCID and ZDC.

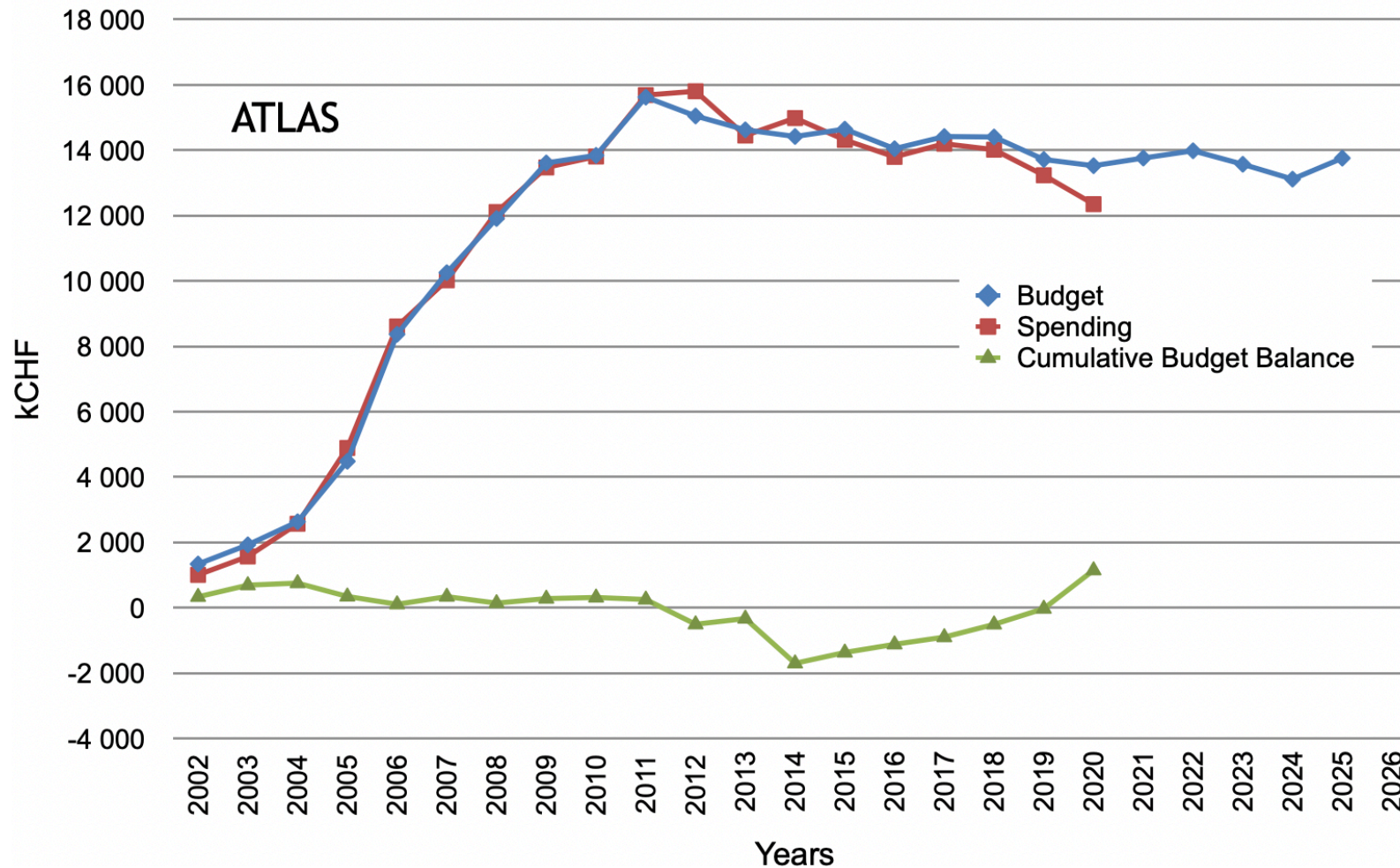
Budget request 2022 and future projections

M&O A (kCHF)	2021	2022	2023	2024	2025
TOTAL without power	13,759	13,982	13,569	13,114	13,756
Grand Total	15,959	16,182	15,769	15,314	15,956

M&O B	2021	2022	2023	2024	2025
Grand Total (kCHF)	5,501	5,258	5,631	6,086	5,444
Technical Manpower (FTE)	260	242	239	239	241
Core Computing (FTE)	152	152	152	152	

ATLAS M&O A evolution

Graph does not include open commitments



The SG recommends approval of the ATLAS M&O A and M&O B closing reports for 2020, and the budget requests for 2022



CMS M&O A - overview and evolution

Closing report 2020 M&O A :

- Budget w/o power: **13,955 kCHF**
- Actual costs w/o power: **13,584 kCHF**
- End of year open commitments: **584 kCHF**
- NMS power costs: **718 kCHF**

Comments

- 2020 M&O A : An underspending of **371 kCHF** mainly due to the an accounting error of the gas supplier, 100 kCHF will be invoiced in 2021 and detector related costs.
- 2020 M&O B : Budget was **5,953 kCHF**, spending in accordance with this, accumulated funds continues to decrease according to plan.
- 2022 M&O A : Budget request of **13,366 kCHF** is increased with 130 kCHF from last year mainly due to the new shift crew training scheme. Funds from Online account will be used for the new Control room (1 MCHF).
- 2022 M&O B : Budget request is **6,089 kCHF**, it continues to increase, up 374 kCHF from the 2021 budget. Costs related to the phase 2 upgrades are included.

Budget request 2020 and future projections

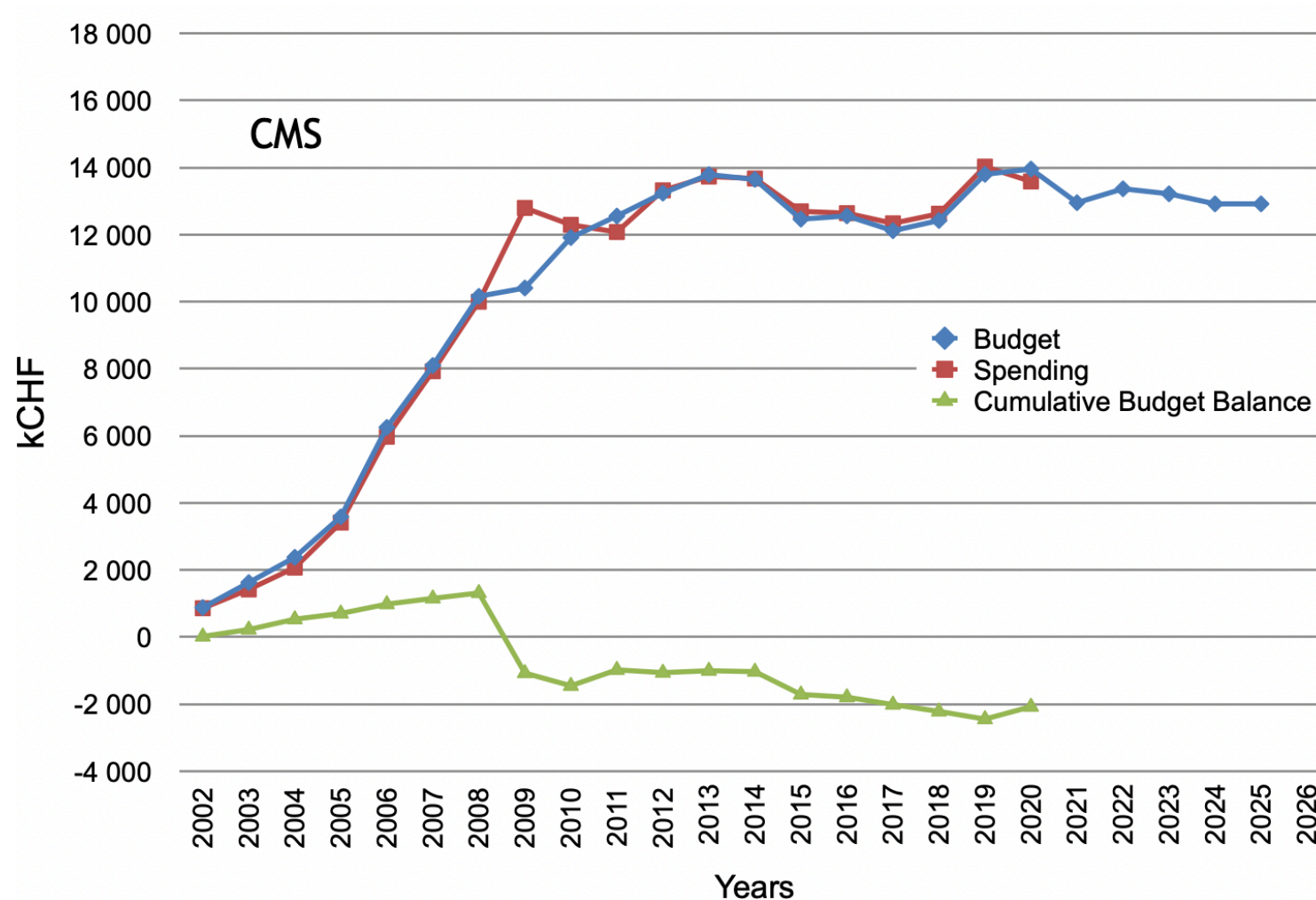
M&O A (kCHF)	2021	2022	2023	2024	2025
TOTAL without power	12,951	13,366	13,216	12,916	12,916
Grand Total	14,651	15,066	14,916	14,616	14,616

M&O B	2021	2022	2023	2024	2025
Grand Total (kCHF)	5,715	6,089	6,725	6,982	7,586
Core Computing (FTE)	8	8	8	8	8



CMS M&O A evolution

Graph does not include open commitments



The SG recommends approval of the CMS M&O A and M&O B closing reports for 2020, and the budget requests for 2022



LHCb M&O A - overview and evolution

Closing report 2020 M&O A :

- Budget w/o power: **2,930 kCHF**
- Actual costs w/o power: **2,806 kCHF**
- End of year open commitments: **63 kCHF**
- NMS power costs: **58 kCHF**

Comments

- 2020 M&O A : A small underspending of 124 kCHF mainly due to reduced activities from Covid-19. The scheme to reduce the surplus (170 kCHF) was not followed.
- 2020 M&O B : Budget was **1000 kCHF**, spending in accordance within 10%. The expected increase due to the adding of new sub-detectors have started.
- 2022 M&O A : Budget request of **3,070 kCHF** is unchanged. The costs of the Service Level Agreements is a concern for LHCb.
- 2022 M&O B : Budget request is **1,270 kCHF**, increased with **190 kCHF** from the 2021 budget due to the new sub-systems and in particular the new RTA project.

Budget request 2022 and future projections

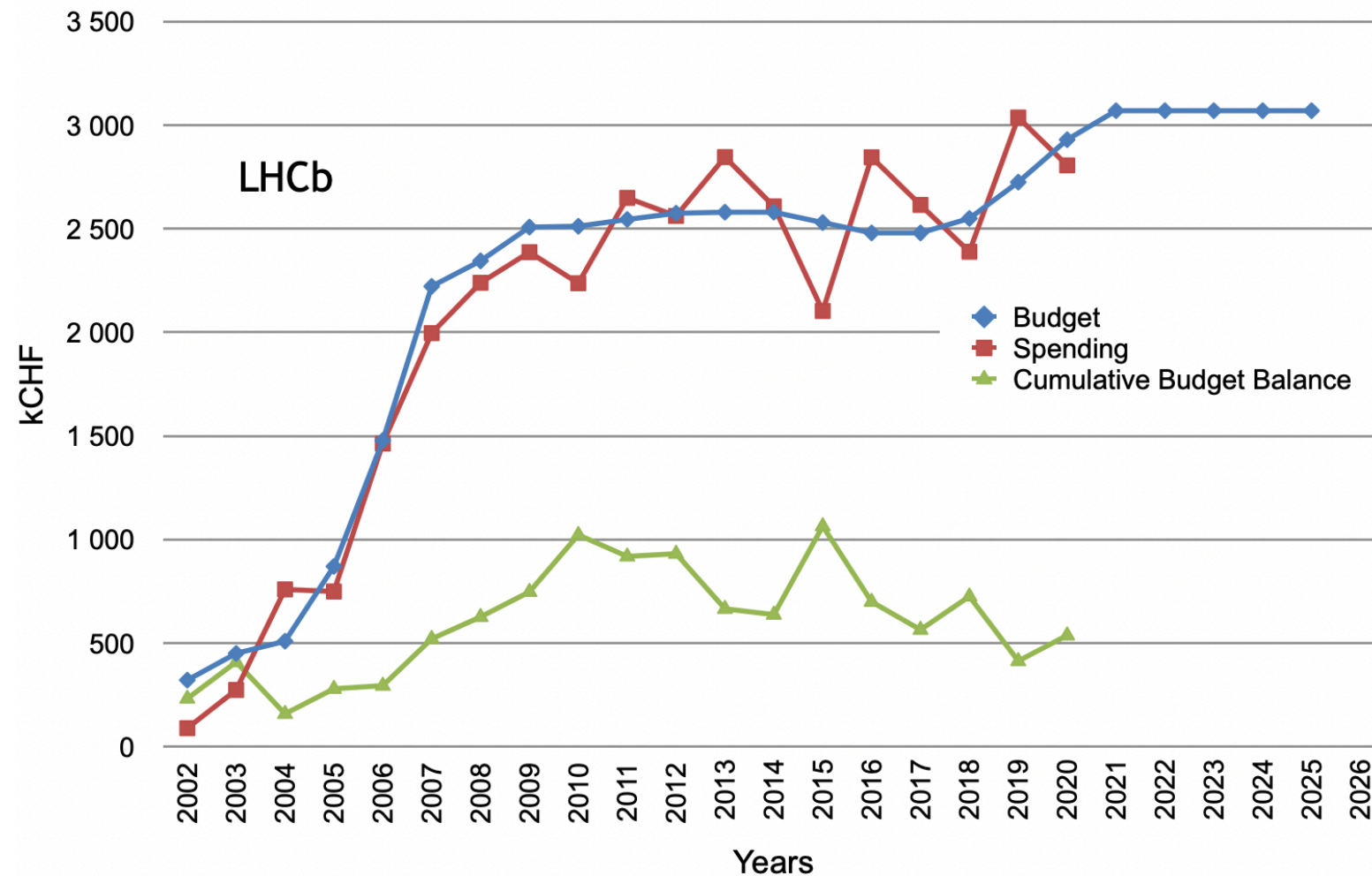
M&O A (kCHF)	2021	2022	2023	2024	2025
TOTAL without power	3,070	3,070	3,070	3,070	3,070
Grand Total	3,370	3,370	3,970	3,970	3,970

M&O B	2021	2022	2023	2024	2024
Grand Total (kCHF)	1,080	1,270	1,270	1,270	1,270



LHCb M&O A evolution

Graph does not include open commitments



The SG recommends approval of the LHCb M&O A and M&O B closing reports for 2020, and the budget requests for 2022



2020 Scrutiny Cycle - Totem

Reminder: TOTEM will be completed in 2021 and after this part of CMS.
Transition period from 2018 - 2021 defined in MoU (CERN-MoU-2018-003)

Closing report 2020 M&O A :

- Budget w/o power: **426 kCHF**
- Actual costs w/o power: **281 kCHF**

Comments

- 2020 M&O A : An underspending of **145 kCHF**, is part of a strategy to accumulate funds for the operation which now will happen in 2023.
- 2020 M&O B : Spending was **128 kCHF**, exactly on budget.

The SG recommends approval of the TOTEM M&O A and M&O B closing reports for 2020

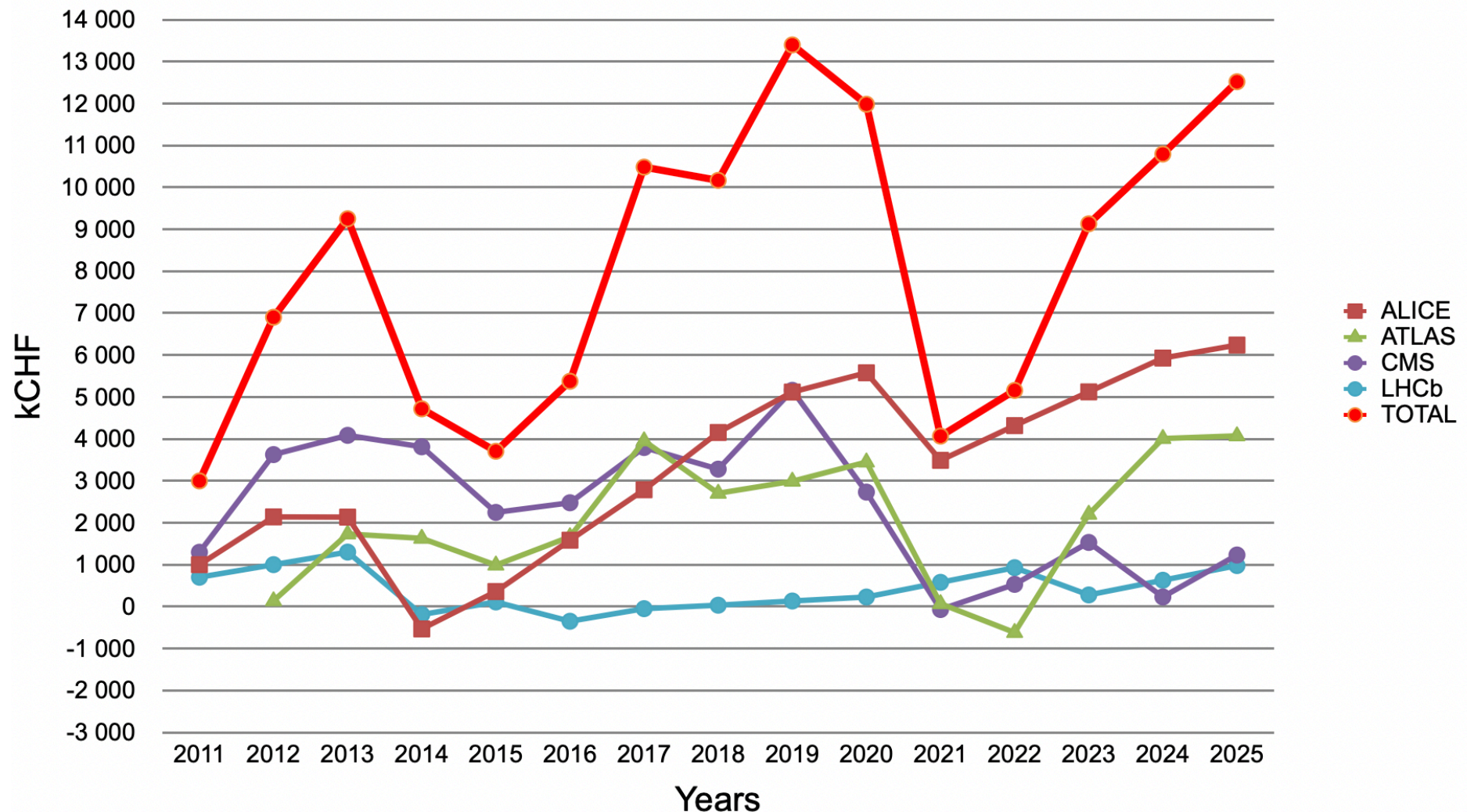
The Scrutiny Group would like to thank TOTEM especially for the excellent collaboration with the Scrutiny Group over many years. We congratulate TOTEM with the great physics results and wish all of TOTEM an excellent future as part of CMS.



2021 Scrutiny Cycle - Special Online Replacement Account

Observation of the development of the Online Replacement Account

- Experiments presented updates to their plans for the use of the account, most shifted by 1 year due to LS2
- All experiments plan for periods of (close to) negative balance, with different approaches. The account for ALICE is planned to go negative in 2027, ATLAS in 2022, CMS in 2021 and LHCb in 2023.



2021 Scrutiny Cycle - Upgrade Common Fund

- ALICE** *Phase-1 Upgrade CF* budget 5,8 MCHF, by September 2021 5,7 MCHF was collected from the FA (98%). 5,4 MCHF has been spent or committed by the end of 2020. Due to the change in schedule the plan is to spend the remainder of the funds into early 2022.
- ATLAS** *Phase-1 Upgrade CF* Phase-1 Core is 33,5 MCHF of which 4,2 MCHF was realised in 2020 (13%). Extra costs for the NSW (362 kCHF) is funded also by the remainder of the Construction common fund (3,270 kCHF).
- Phase-2 Upgrade CF* budget is of 24.4 MCHF to be collected over 9 years from 2018 to 2026 with a flat profile of 2.7 MCHF per year. In September 2021, contributions of the order of 9,108 kCHF (37%) have been received and 309 kCHF spent.
- CMS** *Phase-1 Upgrade CF* has been collected (all but one FA). Close to all savings are used. The plan is to close the Phase-1 Common Fund in 2022 as soon as a solution is found for the last contribution.
- Phase-2 Upgrade CF* contributions is 25 MCHF, to be collected over 9 years from 2018 to 2026 with a profile in agreements with the Funding agencies. At the end of 2020 8,6 MCHF has been collected and spending is 4,739 kCHF.
- LHCb** *Phase-1 Upgrade CF* budget is of 15,710 kCHF, with approximately 90% available or fully committed. Outstanding contributions amounts to 1,260 kCHF. By the end of 2020 9,943 kCHF have been spent. Most of the funds is to be spent on the farm with components being purchased in 2021-2022.



Acknowledgements

The Scrutiny Group thanks the Resource Coordinators and the collaborations as a whole for the excellent work, outstanding cooperation and the constructive spirit of the discussions of this years process.

We thank Patricia Mage-Granado and her team in EP-AGS-SCS for their excellent support.

And last but not least many thanks to the CERN management and the Funding Agencies

