Implementation and impacts of DM scope options.

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2018-10-07

1   Introduction

DM has been asked how we can save 10% of its remaining cost ($\approx$ \$7M). The official scope options which one might invoke are listed in LPM-72, but we have also identified some further possibilities which are described in this document. This note also discusses the practical aspects of invoking these options.

We have identified three viable cost saving options in 2018, of which two are not in the currently baselined version of LPM-72:

- Eliminate portal aspect of science platform (DM-10; refer to Section 2).

- Reduce quality of data facility services provided to the construction project (DM15; refer to Section 3).

- Move staff from institutions to AURA posts (DM16; refer to Section 4).

In addition there are other tasks which may be delayed, thus keeping them available as options which may be invoked later. These are:

- Delay base center operation in Chile (keeps DM13 available, and saves money on operational costs).

- Delay development of the mini broker.

- Return some budget from DAX.

All of this will be rolled up in one or more LCRs in the not too distant future.

2   DM10: Science Platform Portal

A detailed run through specific requirements for the portal is given in Appendix C.

Concretely we would reduce the effort expenditure on the Portal and Firefly from IPAC to about 0.2 FTE over a period of four to five months. We would continue the IPAC support for DM Architecture and the Science Platform Scientist.

If we follow DM10 to the letter, we would eliminate the Portal and this would mean a reduction in support of the broad science community, especially less capable and casual users. Hence we would rather keep the portal we have, pause development, and restart closer to the initial need date for a portal (DR1). At this point, we would take the opportunity to evaluate the then-available technology for the Portal.

The LSST EPO subsystem also needs a portal and has already decided that Firefly is not a suitable technology. A consideration of possible alternatives is already underway. Within the AURA family, STScI and NOAO have portals. We have concerns about their capabilities and usability, but perhaps those could be addressed with appropriate directives from AURA and synergy with LSST.

The existing system is adequate for the analysis of commissioning data. We would therefore target the availability of DR1 for the launch of an updated portal. The other area of potential concern is the front end for the alert subscription in the mini broker. This should be thin veneer on the mini broker API and is also not needed until start of operations.

Given the above we would keep $1M for the later development of an updated portal for DR1 We would not go to zero immediately to allow IPAC to adjust accordingly. Plus we would keep some level of effort — say, 0.2 FTE — for bug fixes on the existing portal. An LCR will provided detailed costings, but intitial estimates are that this will save at least $2M. We believe the final impact on science is minimal.

3   DM15: Reduce institutional overheads

If we could identify perhaps ten individuals who would move to AURA posts thus eliminating institutional overheads we could save potentially $100k per individual or $1M per year. It will

take months to put this in place of course so we would not get three years of savings. The institutes may complain but we expect this to be minimal not. This is a scientifically and functionally painless way to trim the budget, but may cause some disruption for the individuals concerned.

Potential saving of $2M or more to end of construction.

4 DM16: Reduce LDF service level

NCSA has been asked to do an impact analysis of a reduction in budget by 20%. This can only be achieved by reducing the staffing level from 20 FTE to 16. This may result in a lower service level for DM development it probably has no impact on science except in the realm of reliability. Note that we continue to find it difficult to track effort and deliverables from NCSA; this urgently needs to improve.

Adopting a "cloud computing" based approach may yield further savings. We are currently prototyping cloud-based deployments of DM systems in conjunction with Google. Assessing the actual cost of this relative to physical hardware at NCSA is difficult; see DMTN-072 for a rough comparison.

A 20% reduction in NCSA costs for the remaining four years of construction is worth about $3.5M.

A References

[1] **[LDM-554]**, Dubois-Felsmann, G., Ciardi, D., Mueller, F., Economou, F., 2018, *Science Platform Requirements*, LDM-554, URL https://ls.st/LDM-554

[2] **[DMTR-52]**, Dubois-Felsmann, G.P., 2018, *LDM-503-01 (WISE Data Loaded in PDAC) Test Report*, DMTR-52, URL https://ls.st/DMTR-52

[3] **[LPM-72]**, Krabbendam, V., 2015, *Scope Options*, LPM-72, URL https://ls.st/LPM-72

[4] **[DMTN-072]**, O'Mullane, W., Swinbank, J., 2018, *Cloud technical assesment*, DMTN-072, URL `https://dmtn-072.lsst.io`, LSST Data Management Technical Note

B   Acronyms

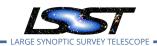The following is a complete list of acronyms used in this document.

Acronym	Description
AURA	Association of Universities for Research in Astronomy
DAX	Data access services
DM	Data Management
DMTN	DM Technical Note
LPM	LSST Project Management (Document Handle)
TN	Technical Note

C   Overview of requirements affected by DM-10

LDM-554 enumerates Science Platform requirements. The labels used here are from that document and are the requirements affected by the scope option. DMTR-52 is a test report on the Science Platform.

Note: There are no SUI/Firefly needs for commissioning.

- DMS-LSP-REQ-0008, DMS-PRTL-REQ-0004 Semantic linkage - logical links between data shown in portal (ok)

    – Have an implementation this but it is going to have to evolve with the data
    – More work for science users if we do not expend further effort on it

- DMS-LSP-REQ-0010 Transfer between portal and notebook (ok)

- User Storage - implication of UI for DMS-LSP-REQ-0011 to 18 - some of this is done.

- Portal aspect

- DMS-PRTL-REQ-0001 Browser access (ok)

- DMS-PRTL-REQ-0002 Discovery (ok)

- DMS-PRTL-REQ-0005,6 Calibration and Coadd and Single Epoch access (ok)

- DMS-PRTL-REQ-0007 access to other VO services (On the list of things to do in ramp down)

• Query support

- DMS-PRTL-REQ-0009 to 38, Async Queries, Spatial, Id etc.

  * Mainly backend work (i.e. will be addressed by effort in 02C.06) but need some need for supporting interfaces; some of these are available

  * Other possibilities than bespoke development exist

  * EPO will have to do many of these as well

- DMS-PRTL-REQ-0040 to 46 - visualize based in images meta data (ok)

• Alert and tabular data

- DMS-PRTL-REQ-0048 to 54 - showing alerts and tabular data

  * Mostly done

  * Other tools exist to address these requirements (e.g. Topcat)

- DMS-PRTL-REQ-0055 to 74 - Graphing, scatter plots, histograms, uncertainties etc ..

  * Arguably we should *not* provide this in the Portal: notebooks and other tools are more appropriate for this.

  * We should look more critically at requirements like this.

- DMS-PRTL-REQ-0075 to 77 - image overlay and color adjustment (ok)

  * Need in Portal questionable; most scientists will use their own tools.

  * There are other tools that do this like Visiomatic.

- All Sky DMS-PRTL-REQ-0078 to 88 (ok)

  * There are also other tools (Aladin lite) - may not be as nicely integrated

• Exploration and Analysis DMS-PRTL-REQ-0089 to 108

- Many nice to have things like table filtering, selection from plots, linked plots

- Again questionable whther we *need* this in the Portal and there are other tools.

• Control and Management DMS-PRTL-REQ-0115 to 118 (some of this is implemented)

– Preferences, API, quotas...

- Alert support DMS-PRTL-REQ-0119 to 21,27

    – This is not done - mainly since the alert mini broker is not done

    – Worst case the simple interface coming with the mini broker is used and not well integrated.

- Documentation DMS-PRTL-REQ-0122 to 24

    – Can claim this with `www.lsst.io`

    – This may not perhaps be as tightly integrated as may be liked.