

LARGE-SCALE UPGRADE CAMPAIGNS OF SCADA SYSTEMS AT CERN – ORGANISATION, TOOLS AND LESSONS LEARNED

R. Kulaga, J. Arroyo Garcia, E. Genuardi, P. Golonka, M. Gonzalez Berges, J-C. Tournier, F. Varela, CERN, Geneva, Switzerland

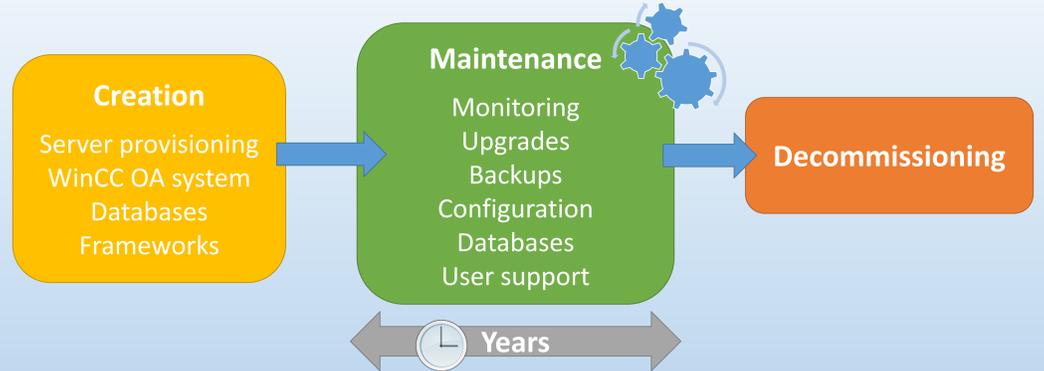
M. Boccioli, Paul Scherrer Institute, Villigen, Switzerland

THPHA021

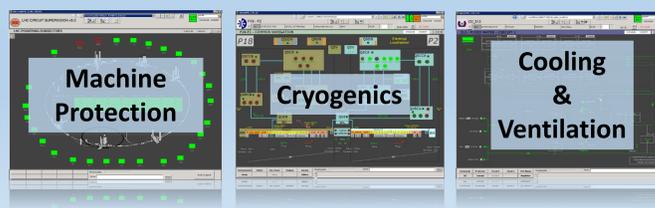
Introduction

- ❖ Upgrades of SCADA systems are crucial to ensure their reliability and compatibility with the evolving environment at CERN.
- ❖ WinCC OA is the de facto standard for development of SCADA applications at CERN. Two frameworks – JCOP and UNICOS – were developed on top of it in order to provide a reusable layer that helps to avoid duplication of efforts between different teams.
- ❖ SCADA Applications Service (SAS) is offered by the Industrial Controls and Safety Group and provides comprehensive handling of full lifetime of WinCC OA-based applications for many equipment groups at CERN. It allows control and software engineers to focus on configuration and development of the applications.
- ❖ In order to keep up with the increasing number of maintained applications (from 30 in 2009 to 230 in 2017), all aspects of the upgrades need to be automated as much as possible.

Management of full application lifetime in the SAS



The three biggest application domains in the SAS

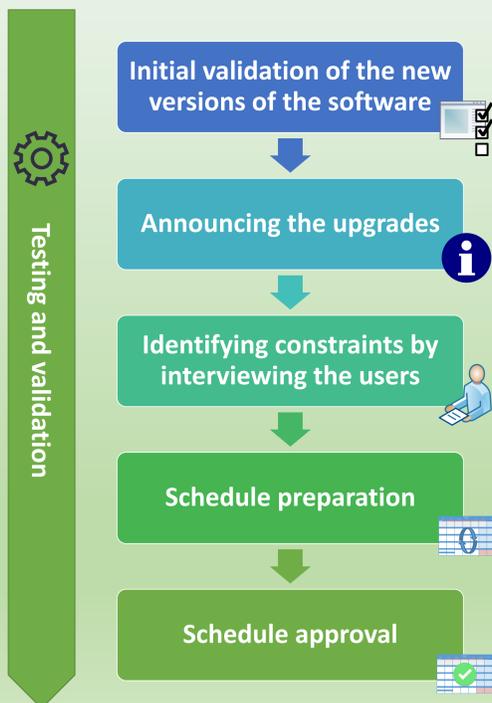


SAS in numbers

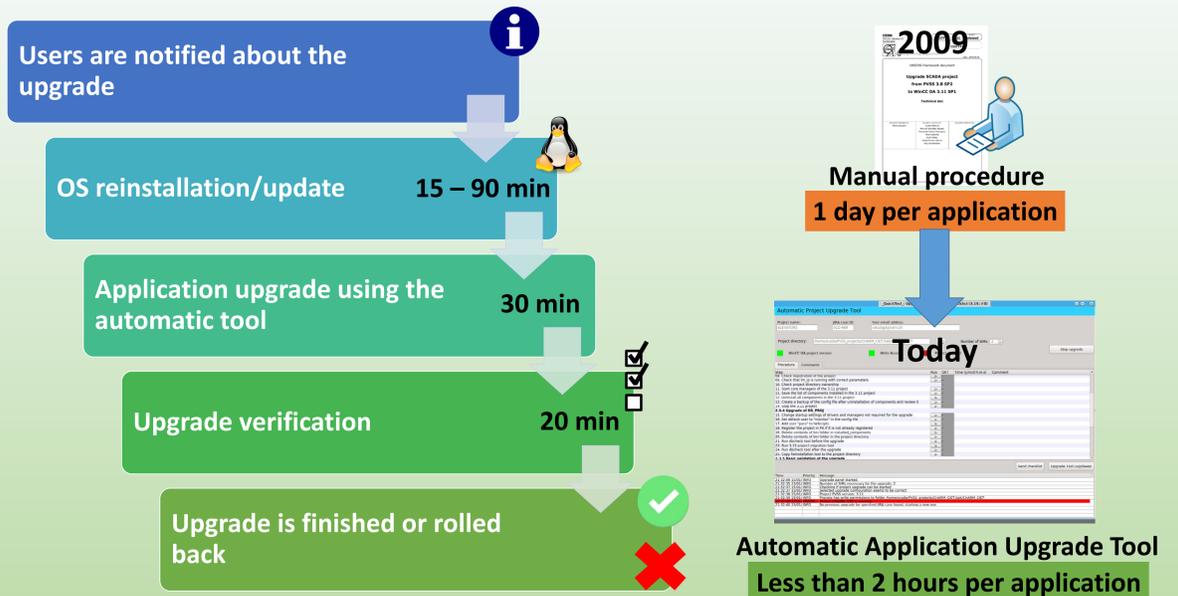
Application domains	27
Servers	120
Applications	230

Planning upgrade campaigns

- ❖ Due to the size of the service, number of users and various constraints to take into account, upgrade campaigns are planned a few months in advance.



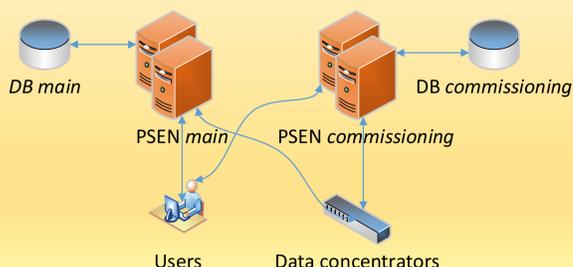
Execution of an application upgrade



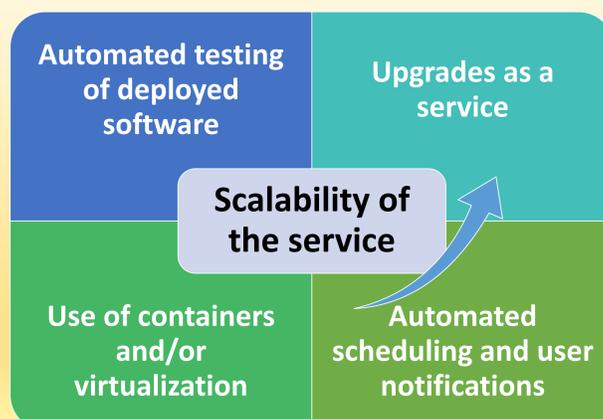
- ❖ Steady increase of the number of applications triggered development of the automatic upgrade tools.
- ❖ Progress of each upgrade is automatically recorded in Jira cases generated from the campaign schedule.
- ❖ To shorten the OS installation step to less than 30 minutes, it can be performed in advance on a spare server, then hard disks can be swapped.

Handling of critical systems

- ❖ Example: CERN Electrical Network SCADA (PSEN) upgrade – *commissioning* instance set up for validation and use during the upgrade of the main system.



Future work



Conclusions

- ❖ Currently used methodology of performing upgrades is the result of almost 10 years of evolution to keep up with the growing number of applications in the SAS.
- ❖ It enabled a few big campaigns to be performed successfully and within constraints specified by the users.
- ❖ Further automation of all aspects of upgrades is required to keep up with the continuing growth of the service and to further reduce the downtime.