



# The Software Developments and Related Support

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TE-MPE LS1 Review, 02/06/2015

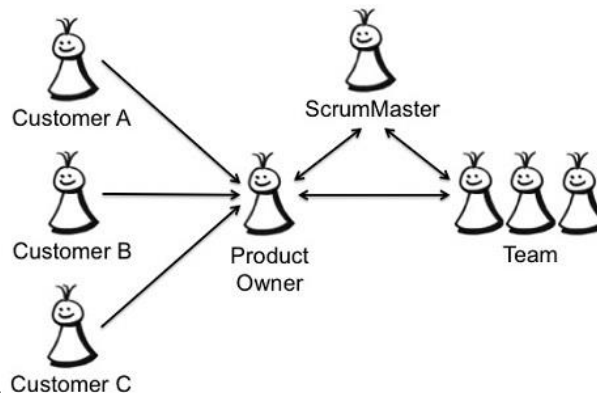
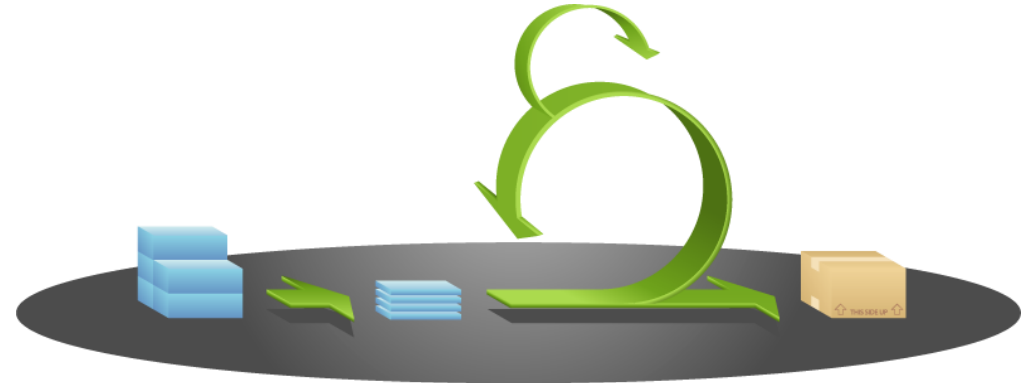
**On behalf of the TE-MPE-MS Software Team**

# Scope

- Provide supervision tools for Machine Protection Systems (BIS, SMP, FMCM, QPS) targeting the System Experts, the Operation Crews and the Piquet Services
- Provide tools to ensure exhaustive and accurate understanding of the LHC systems during its commissioning and operations: AccTesting, Analysis Service, System Management Service, Post Mortem Storage and Analysis Modules
- Provide support to all MPE members for the integration of their system into the Accelerator Controls Environment (DIAMON, Logging, OS, etc.)

# Work process

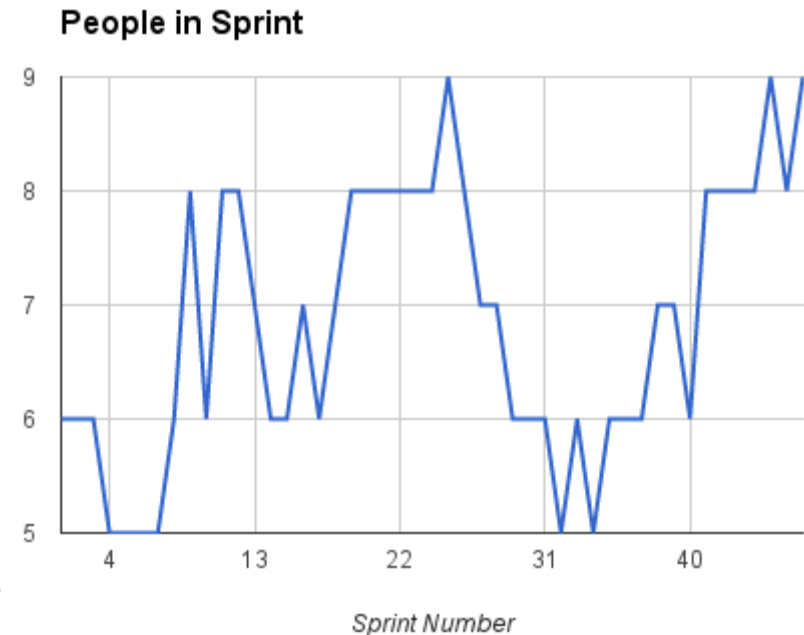
- Product Owners: Markus and JC
- Scrum Master: role rotation, typically 1 person for 6-8 sprints
- Team: everybody including SM and PO
- Reactive to change



# Work Process - Resources

Contract	2012	Today	Forecast
Staff	1	1	2
Fellow	3	2	2
Technical Students	1	3	2
VIA	0	2	1
PhD	0	1	1
PJAS	0	1	1

- Highest number of Consecutive Sprints
  - With same team: 5 sprints
  - With same product: 3 sprints

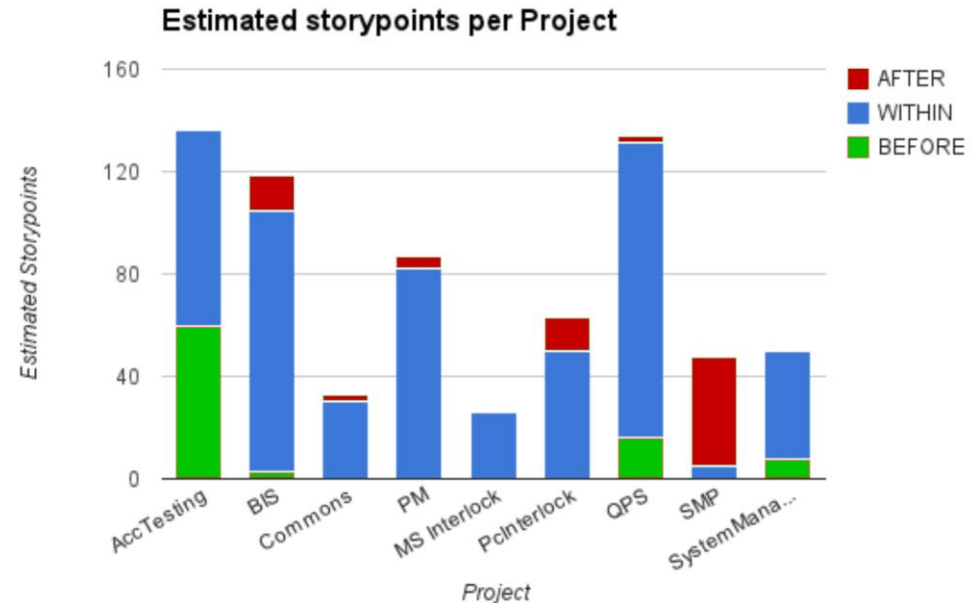


# Work process outline

- Keep Agile process 😊
- Team stability must be improved 😞
  - We suffer from on-boarding new members, training newcomers decreases focus factor
  - Losing members, we lose long term vision. As a consequence, we still lose re-usage of components
  - Recommendations:
    - TSC are a good opportunity to meet new talented developers and train them to keep them thereafter as FELL or PJAS
- Project stability must be improved 😞
  - Split team to work on multiple projects rather than single team on multiple projects
    - Done when working on Post Mortem migration, added a lot more context switching for Product Owner/lead developers
    - Will build this with experienced team members
  - Anticipate deadlines and more precise needs for better cross-project planning

# Planning

- Estimation of known epic features in Story Points
  - Unit relative to previous experience of feature complexity
  - Estimated EPIC raw features, details estimated when tackling the task
  - Presented in MPE LS1 workshop on 23/11/12



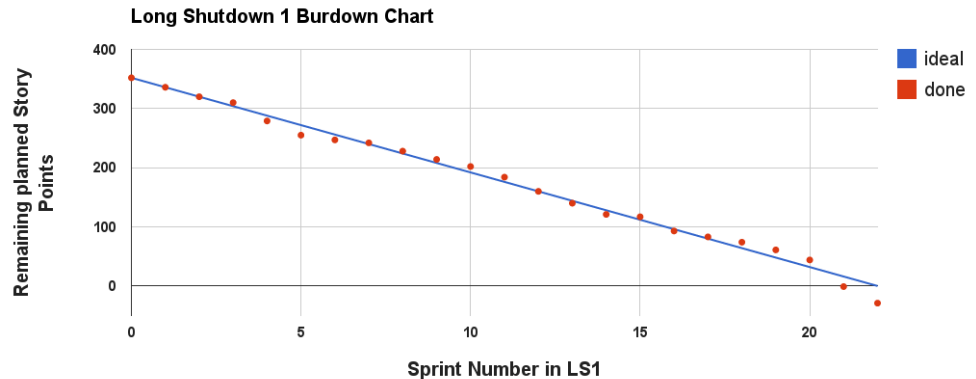
*The Measure of All Things: The Seven-Year Odyssey and Hidden Error That Transformed the World.*

# Planning

- Know our capacity
  - Velocity = story point/time = 16 points per 12 day sprint for original team
  - In term of time
    - 6 sprints before LS1 start (e.g. CSCM end of March 2013)
    - 16 sprints before end of LS1 (April 2014 for injector restart)
  - Foreseen that velocity would not increase, as Scrum expects, due to
    - Team changes
    - Context switches
    - Growing support needs

# Planning vs schedule

- We consumed all the points we could, and much more
  - Original team capacity was 352 points for 22 sprints
- We didn't do everything that was required
  - Clear over commitment: estimated 527 Story Points
- We did things that we did not plan to do
  - Unforeseen feature requests
  - Last minute solutions to be designed in high level software
  - Forgotten or late follow-ups



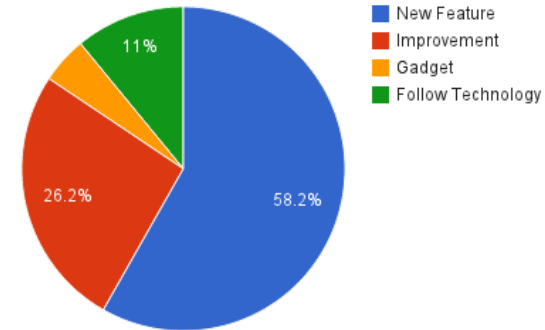
*For quantifications I invite you to consult our product backlog*



# Planning outline

- Keep Agile planning and estimating 😊
- Improve with better estimation error and PERT
  - Not spending too much time on this
- Must keep even closer contact with collaborators 😐
  - Some priorities were lost during LS1 (for BIS, for AccTesting)
  - Some priorities were not defined before LS1
- Focused on providing new features rather than addressing original technical debt and following technology deprecation 😐
  - At some point we will have no choice
  - Running FESA2 on LynxOS and SLC5.
    - End of Support of OS is near -> security issues won't be fix after April 2017

BIS Activities



# Software Collaborations

## ➤ Main partners:

- TE-MPE-EP
- TE-MPE-PE
- MP3
- BE-OP
- BE-CO (IN, DO, DA, DS)
- EN-ICE
- IT-DB
- BE-BI
- TE-ABT, VSC, etc.



## ➤ Covered topics

- Operational software
- Commissioning software
- System Integration

## ➤ Missing topics

- Testbeds
- Simulations
- **Project design**

# OP Collaboration

- MPE-SW Piquet started during HWC, good visibility in CCC and good responsivity 
  - Continued for the operations
  - Best effort
  
- Control of the MPE LHC equipment currently exposes internal logic to OP 
  - LHC Sequences are not the most well maintained pieces of code
  - Another set of BIS applications is originally maintained by OP
  - Numerous external dependencies, difficult to track
  
- Involved Andrea Moscatelli (SPS-OP staff) in team for BIS application development
  - And other projects in practice ;)
  - Limited support capability due to shift work
  - To do again, can be valuable

# MP3 collaboration

- Many ideas coming during the campaign
  - We're agile to handle this ;)
  - We foresaw it and reduced our commitment level during the powering campaign
  
- Many requirements to be prioritized for the future
  - Analysis, tracking and communication, persistence, supervision, etc.
  - Automation Working Group being only MPE-MS and Odd's team
  - Will organize clarification sessions for each requirements, estimation sessions and then prioritization
    - Better integration of tools is clear priority

# EN-ICE collaboration


## ➤ Powering tests and Post Mortem Analysis

➤ Loose collaboration for powering tests that was recovered right on time

➤ Keep it closer from now on, with AWG framework

## ➤ QPS



➤ Collaboration to be started for QPS status summary displays?

➤ Evolution of gateway management, FESA class, RBAC rules? 

# BE-CO collaboration

- Common software (aka accsoft-commons) 😊
  - BE-CO developers did not necessarily have the time to review or integrate our solutions
- Post Mortem Analysis and Sequencer 😊
  - Mainly 1 privileged collaborator with good reactivity : Roman
- Modern Software Engineering 😊
  - Quality monitoring with SONAR (success)
  - Continuous Delivery with Atlassian Bamboo and CBNG (more difficult)
  - Keep it going
- Sprint with Roman and Adam on Analysis Framework 😊
  - And introducing them to Scrum
- New collaboration starting, to explore how to use CALS data more easily 😊
  - With IT-DB as well

# BE-CO collaboration

- How to develop new critical software with non-mature tools? 
  - CMW-RDA3 library first release on June 2013. First use in PM in November 2013, and in AccTesting in February 2014.
    - API and ABI modified in non backward compatible way and still not completely stable
    - Add this to continuous development of features in AccTesting (signature changes, new tests, new analysis, etc.), brought quite some troubles in communication with EN-ICE's PMEA
  - FESA3 tentative migrations summer 2012 and summer 2013, unsuccessful, gave up then until it became more stable
- Failed tentative on common source of systems 
  - ACET connections viewer vs System Management Service
  - Not aborted

# Miscellaneous collaborations

- TE-ABT 😊
  - Got 1 student for 6 months to push lot of nice features for integration of AccTesting on maintenance commissioning
- Expertise of PM users from various groups is good to collect numerous requirements



# MPE project collaborations

- Reliable and integrated software application development takes time, for long term maintenance
  - Where the Proof of Concept stops to let the Operational Software development take over?
    - Common vision across equipment and software teams (especially within MPE)
    - Dedicate part of the software team for this
  
- Stand-alone expert applications ending up in operation
  - Unforeseen side-effects during standard environment upgrades
    - QHDA missing 3<sup>rd</sup> party library
  - Knowledge of the application relies on 1 person
  - Non-optimized data flow or system interactions
    - Overloading gateways to extract data common to other applications
    - Complex communication between powering test tools
  - Poor reusability and maintainability

# Outlook

- Operational tools are well developed and integrated in Controls' environment
- Lot of work to come for limited resources, prioritization within group required
  - Complete QPS Swiss Tool, configuration management and signal integrity checks
  - Next powering tests + all MP3 review requirements
    - To be clarified and prioritized with MP3 and Automation Working Group in the next weeks
  - Automation of most commissioning (MPS, after technical stops, after technical maintenance)
  - Complete BIS and SMP application suite to provide all needed decoded information to users
  - Post Mortem infrastructure and data collection upgrade
  - Move from outdated or outdating technologies to latest standards
    - Possible security issues staying on SLC5
    - Loss of support staying on LynxOS
    - Such migration will consume resources and are the opportunities to clean some legacy projects