

How To Successfully Renovate A Controls System?

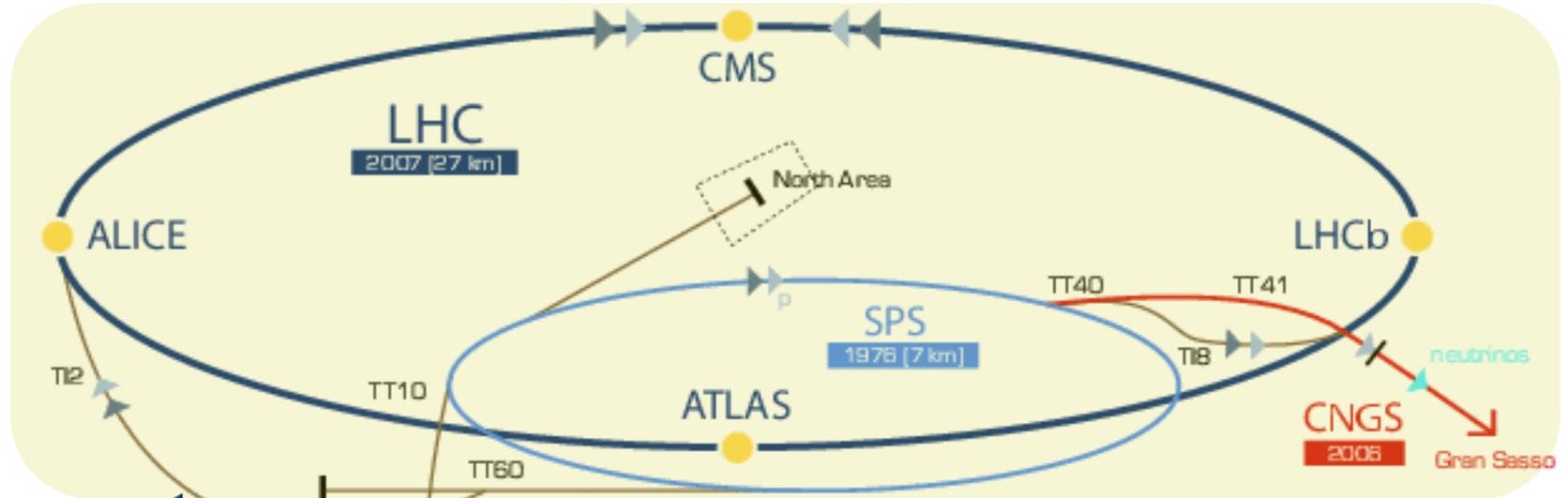
Lessons Learned From The Renovation of The CERN Injectors' Controls Software

Grzegorz Kruk on behalf of the InCA team

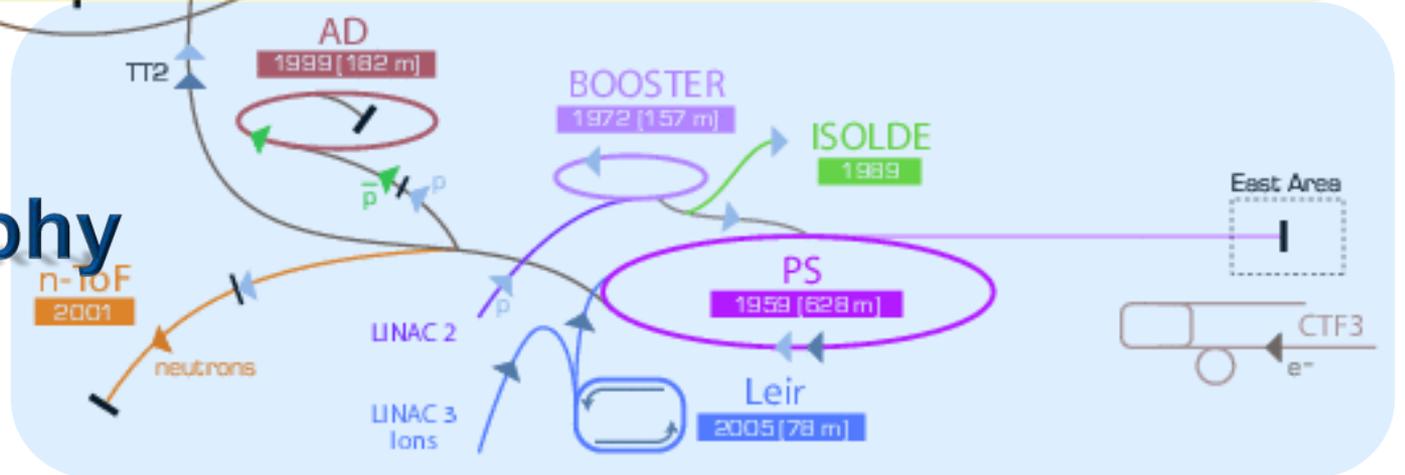
CERN, Beams Department, Controls Group



Different Worlds

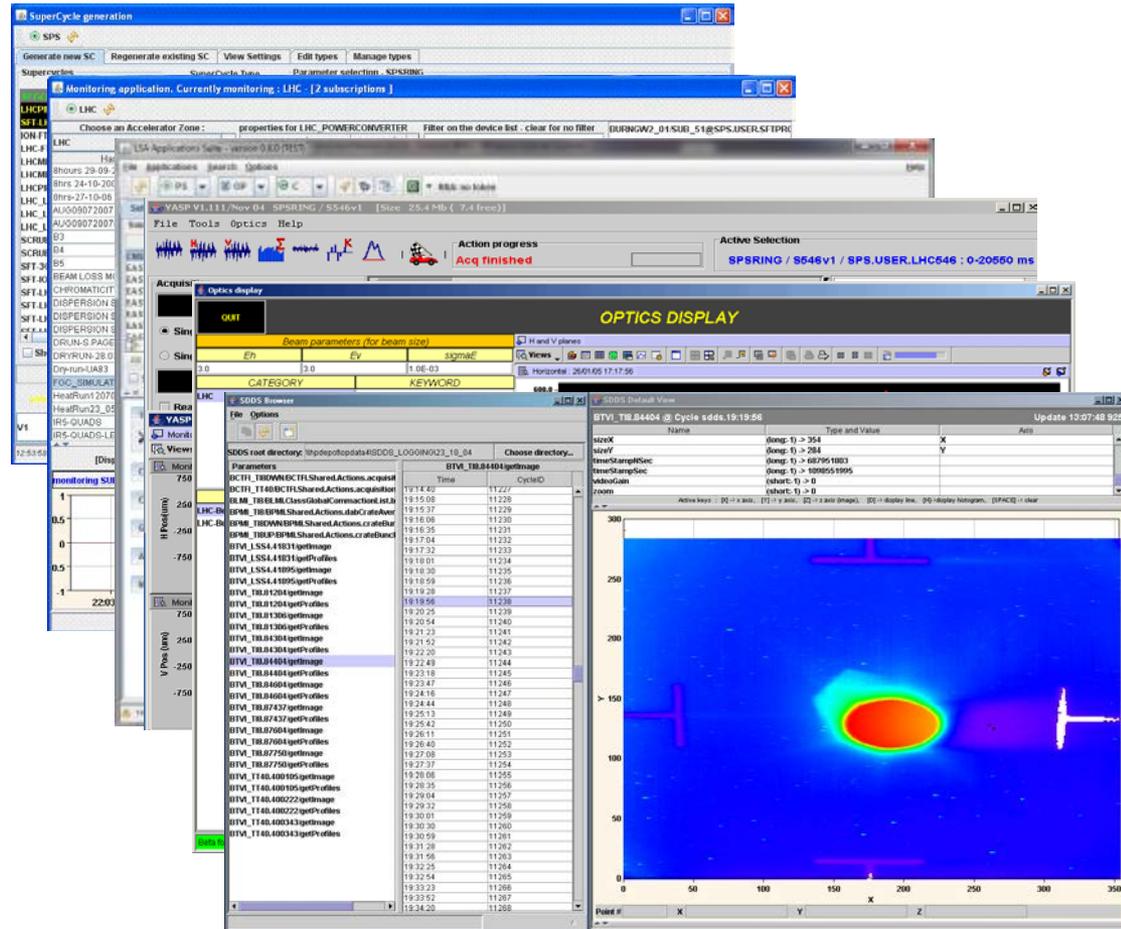


Different:
- Epochs
- Philosophy
- People



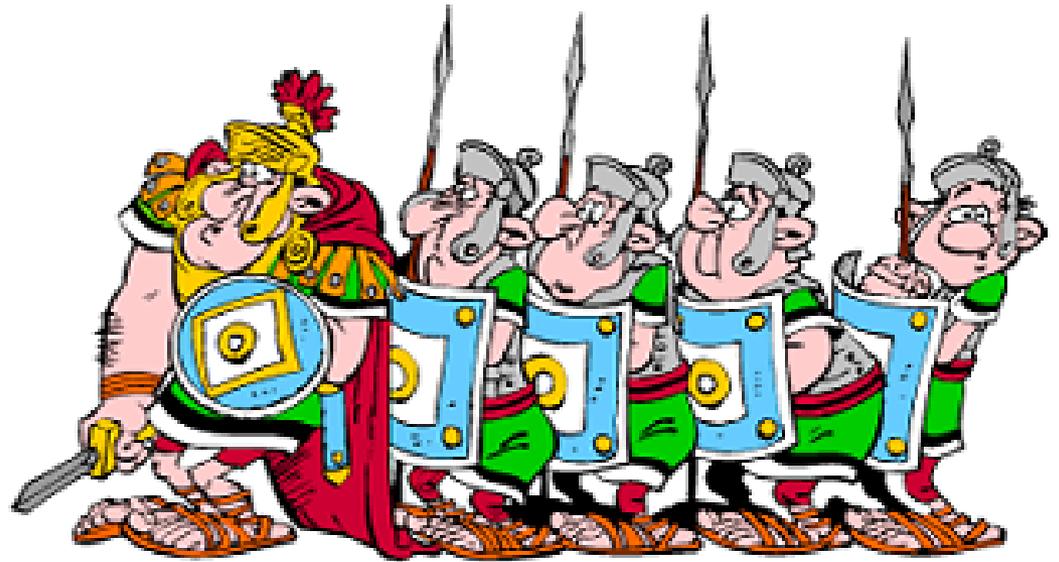
LHC Software Architecture

- Development shared between Controls and Operations
- All functionality needed to control SPS and LHC



Renovation: Apply successful model to other accelerators

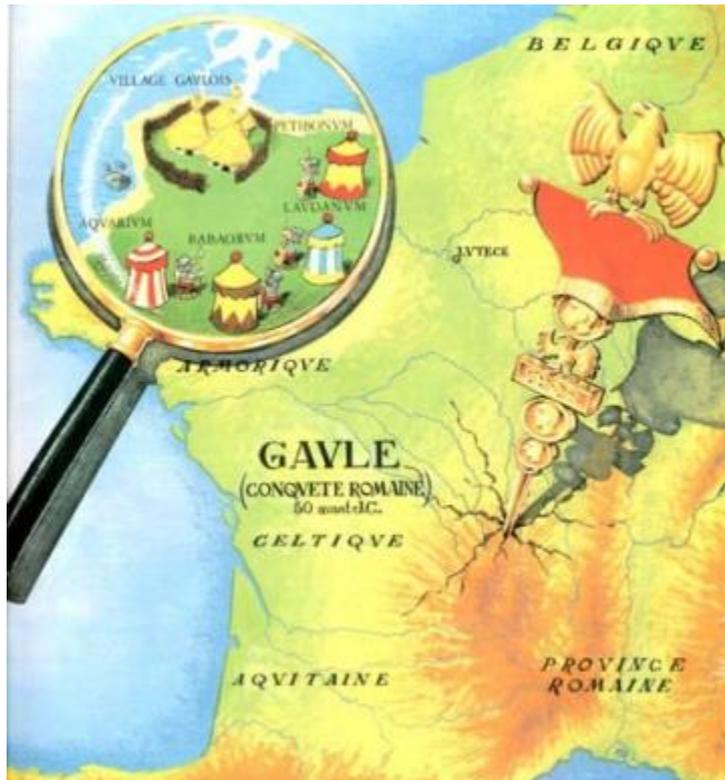
Renovation: Apply successful model to other accelerators



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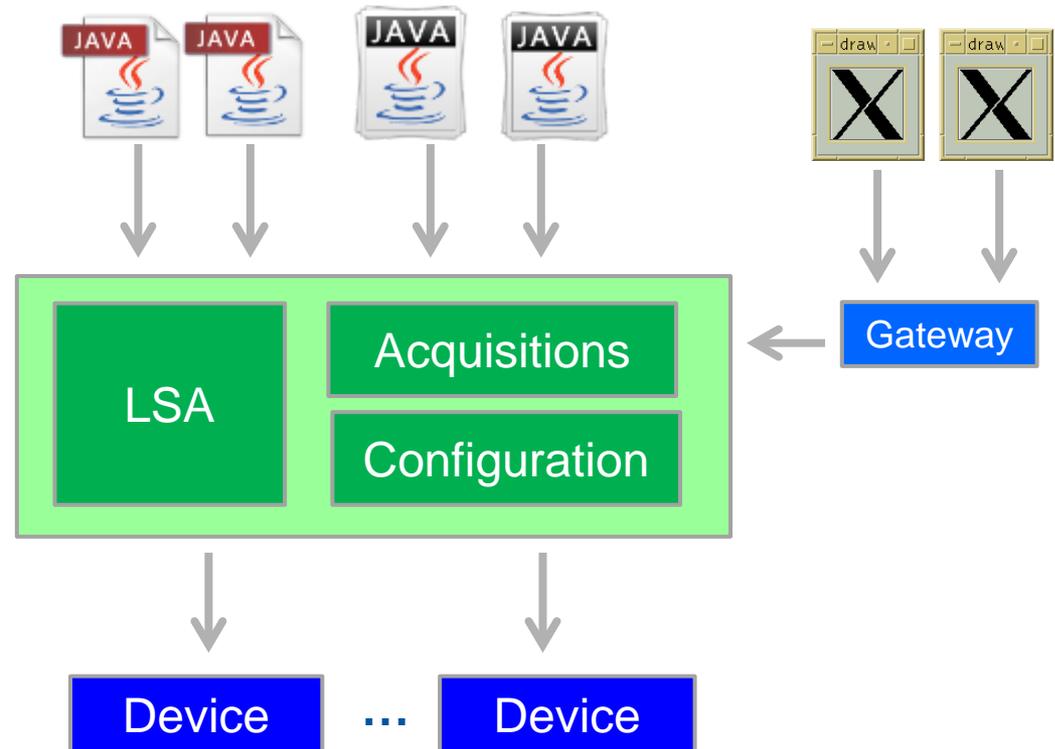


Renovation: Apply successful model to other accelerators

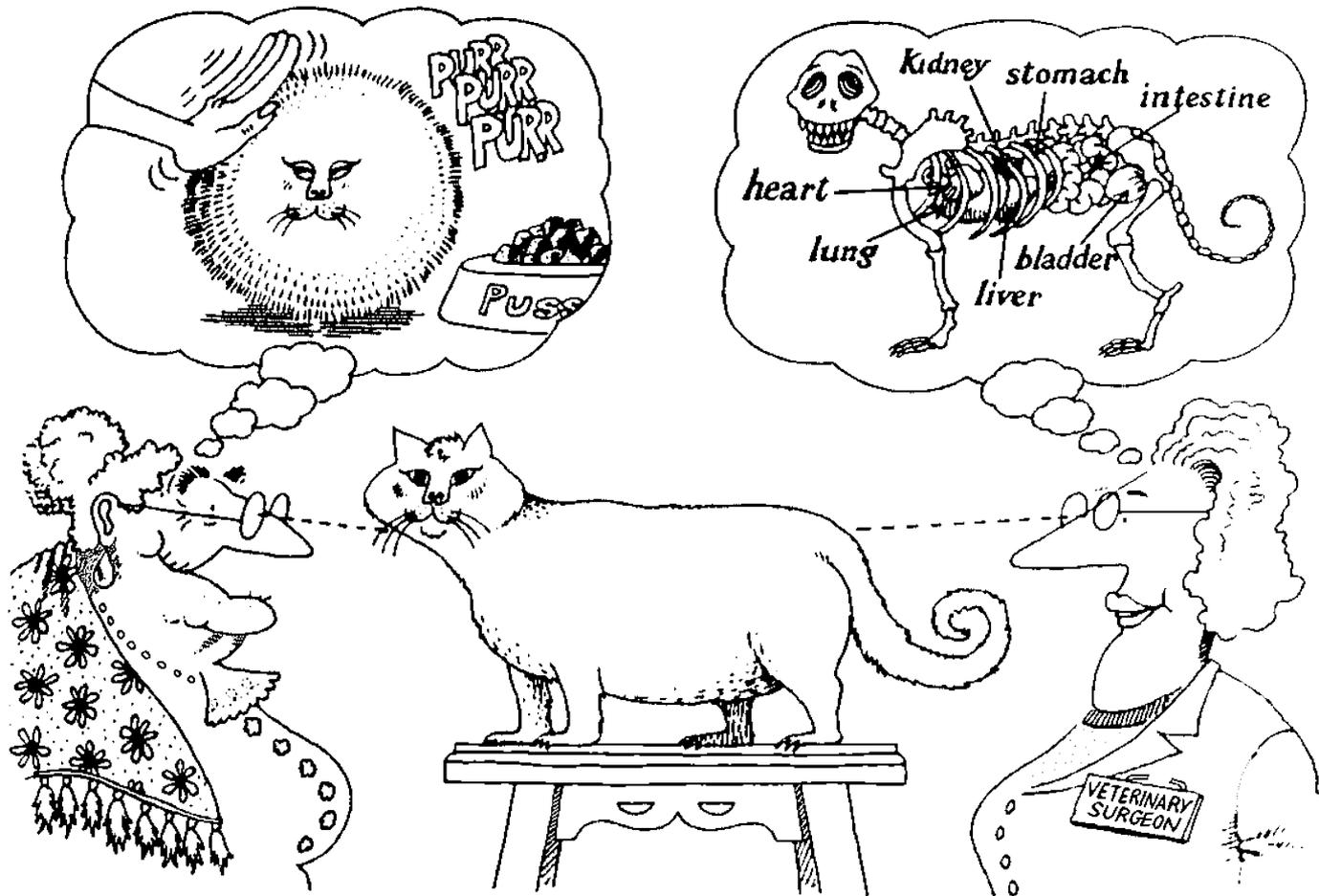


We thought it's just technical...

- ? **Integration**
- ? **Configuration**
- ? **Performance**
- ? **Scalability**
- ? ...



But users have a bit different view...



So when we came with the new system...

So when we came with the new system...



So when we came with the new system...



So when we came with the new system...



```
▲▲▲▲▲▲▲▲▲▲  
Delay      37000  
▼▼▼▼▼▼▼▼▼▼
```

So when we came with the new system...



▲▲▲ ▲
784.0 KV
▼▼▼ ▼

▲▲▲▲▲▲▲▲
Delay 37000
▼▼▼▼▼

So when we came with the new system...



1960s → Hardware



So when we came with the new system...



1960s → Hardware



1980s → X/Motif



So when we came with the new system...



1960s → Hardware



1980s → X/Motif



2000s → Java

So when we came with the new system...



1960s → Hardware



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“We didn’t ask for this, we want it as it was before!”

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But why?

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- Not just habits → accelerators are different, really
 - Fast vs. slow, model, impact, ...
- The renovation was in Controls' interest, not really in Operations'
- Insufficient commitment

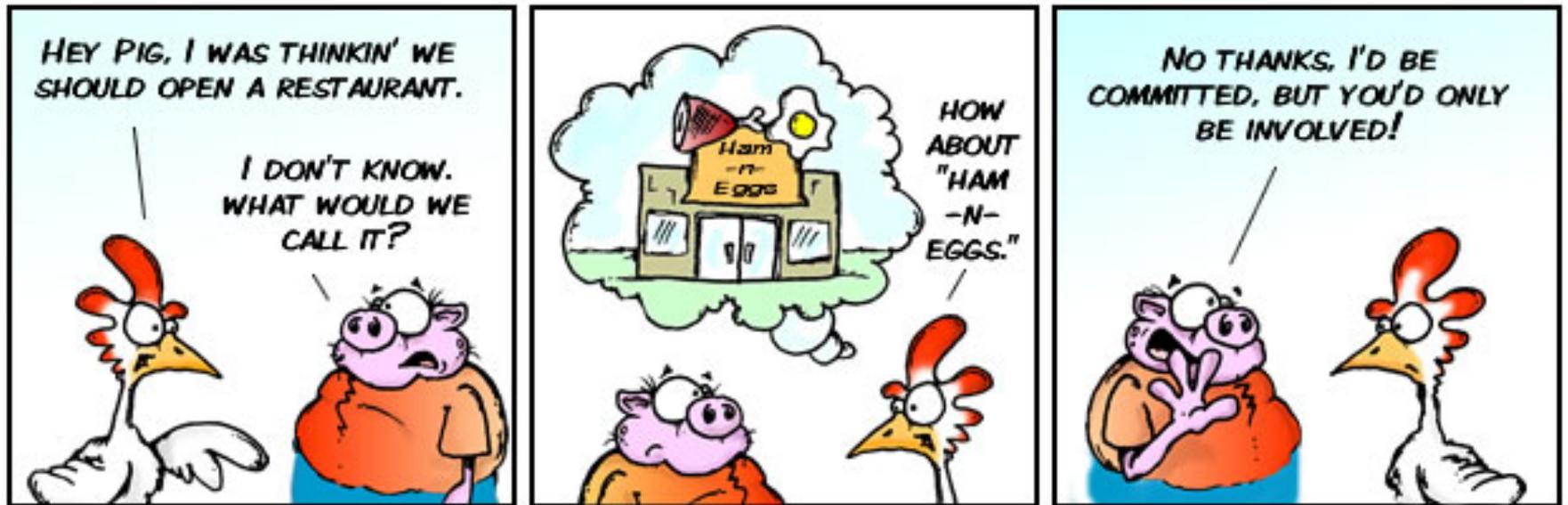
But why?

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We focused on technical problems and underestimated human aspects.

Involvement and Commitment

Involvement and Commitment

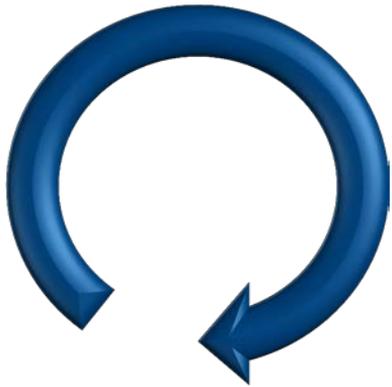


By Clark & Vizdos

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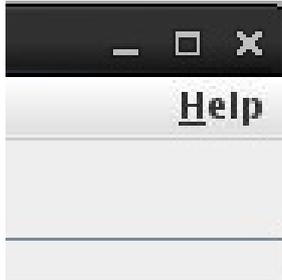
How did we address it?

- Increase **mutual understanding**
 - Spend time in the control room
 - Observe, Listen, Discuss
 - Help resolving problems
 - Engage Operations in the development and testing
- Promote the **new ideas** while **respecting** their **habits**
 - Go for compromises
- **Iterative Improvement**

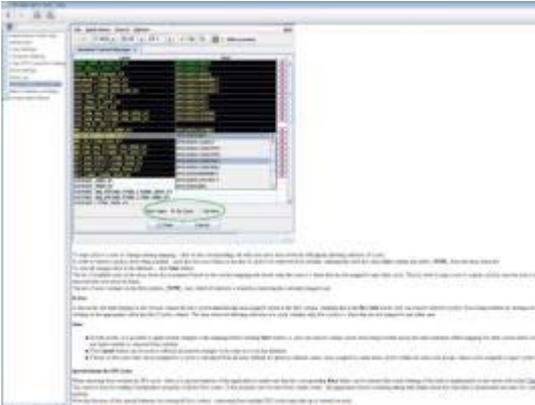
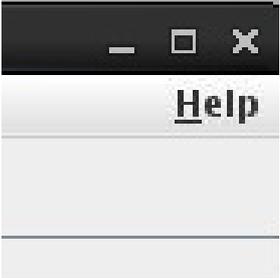


A few practical GUI recommendations

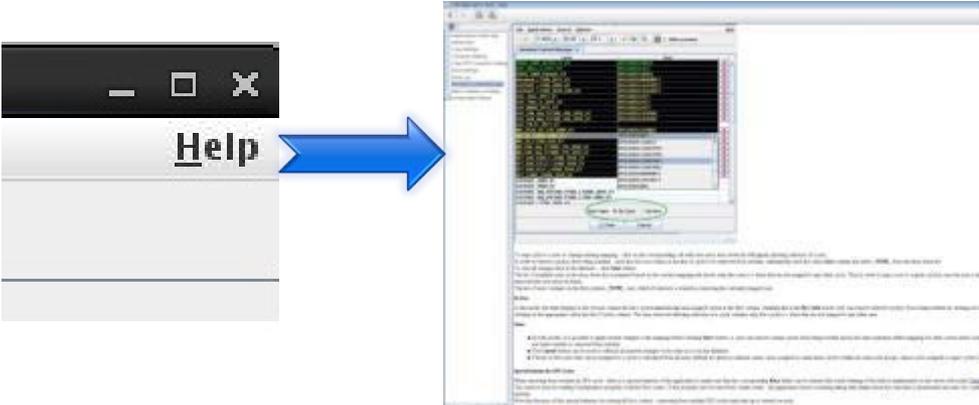
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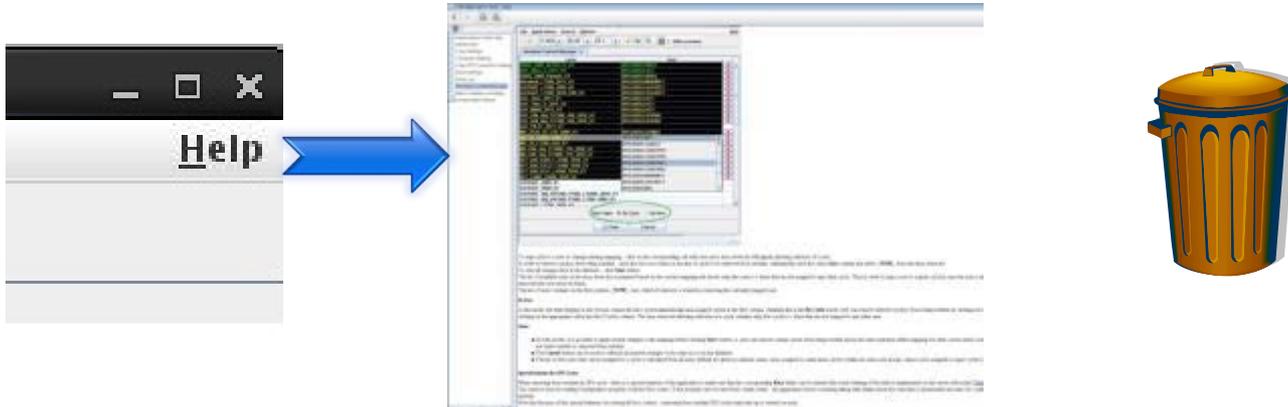
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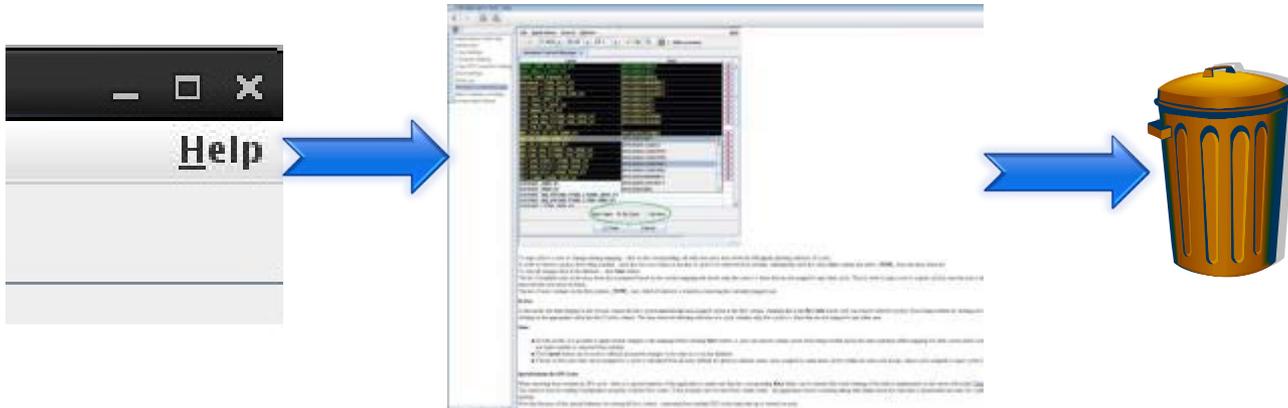
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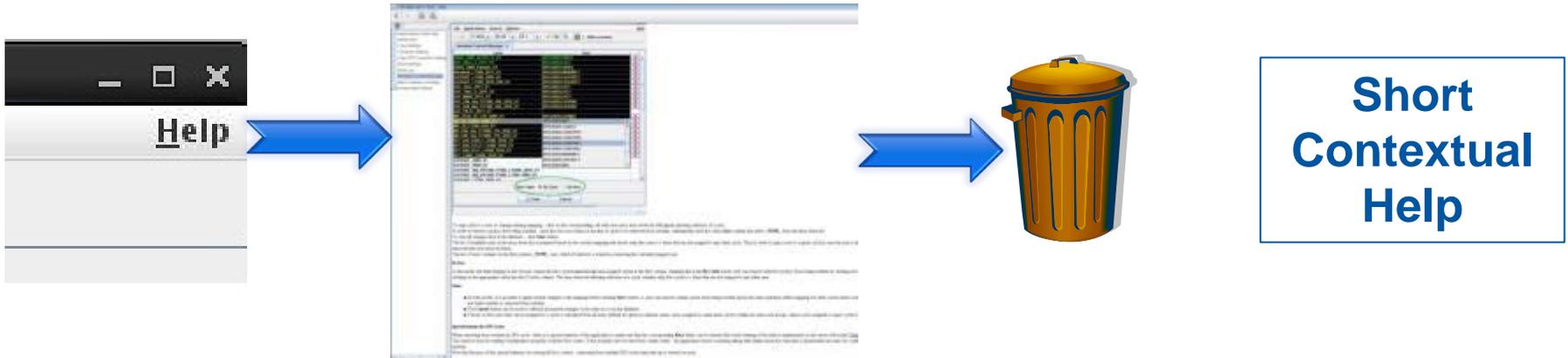
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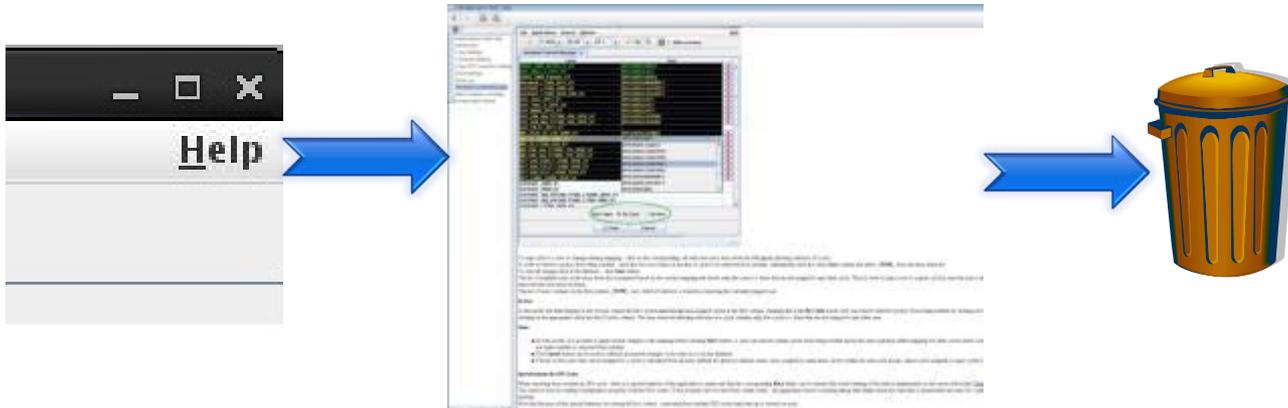
- Hardware
- Front-End Process
- Middleware
- Java Server
- GUI Bug

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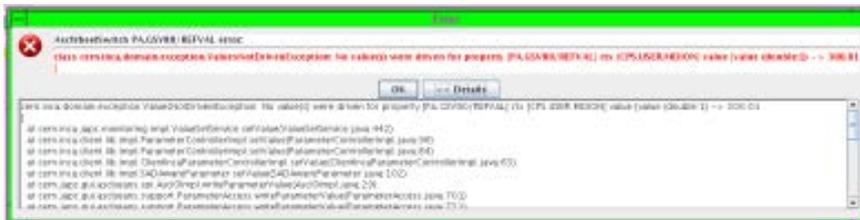


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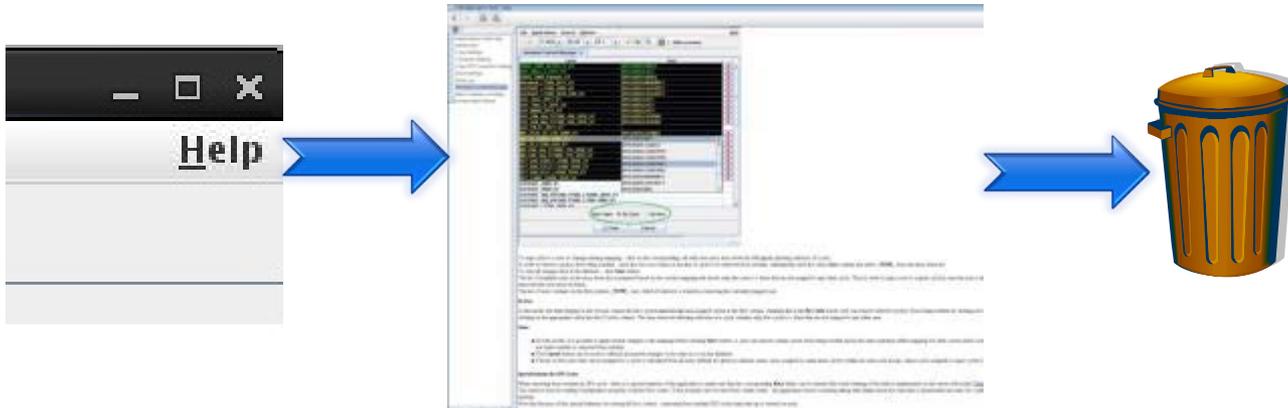
**Short
Contextual
Help**



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**Clear
Error
Reporting**

A few practical GUI recommendations



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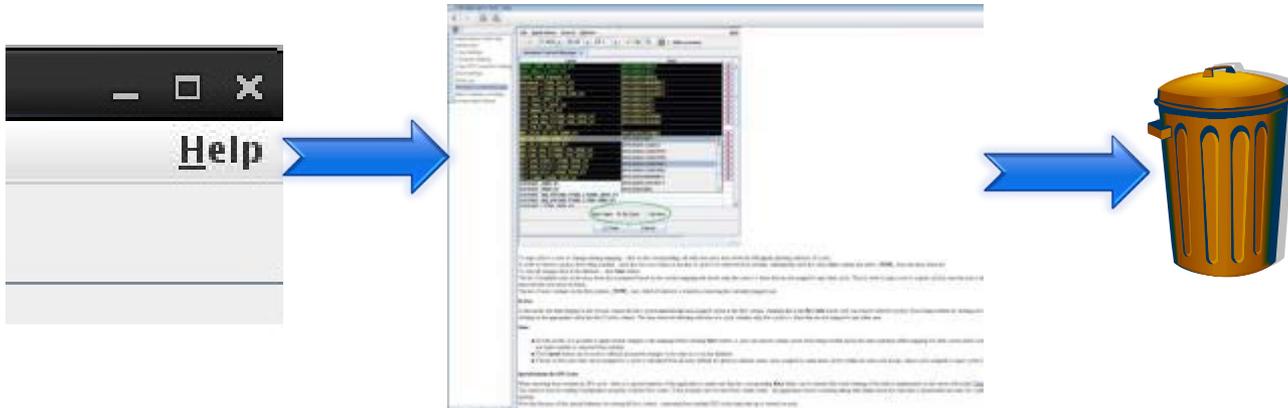


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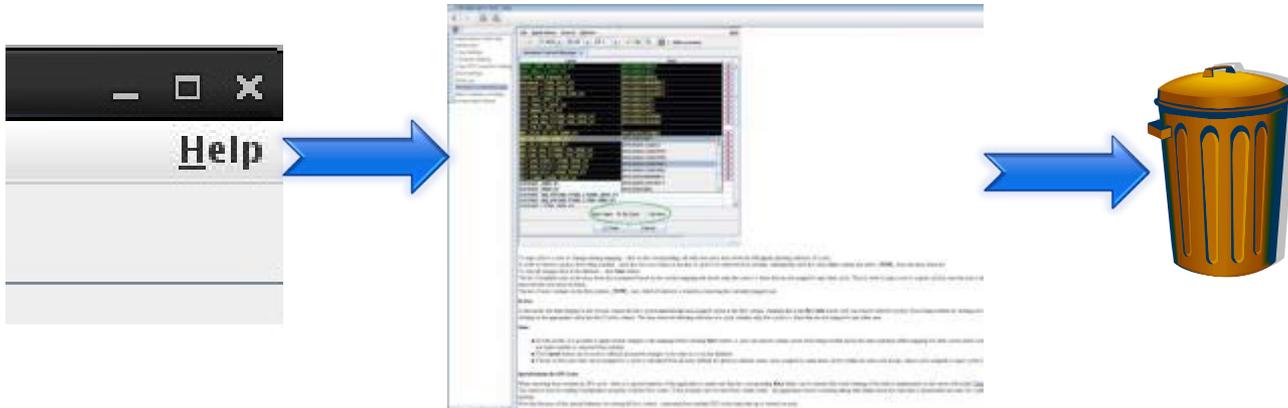


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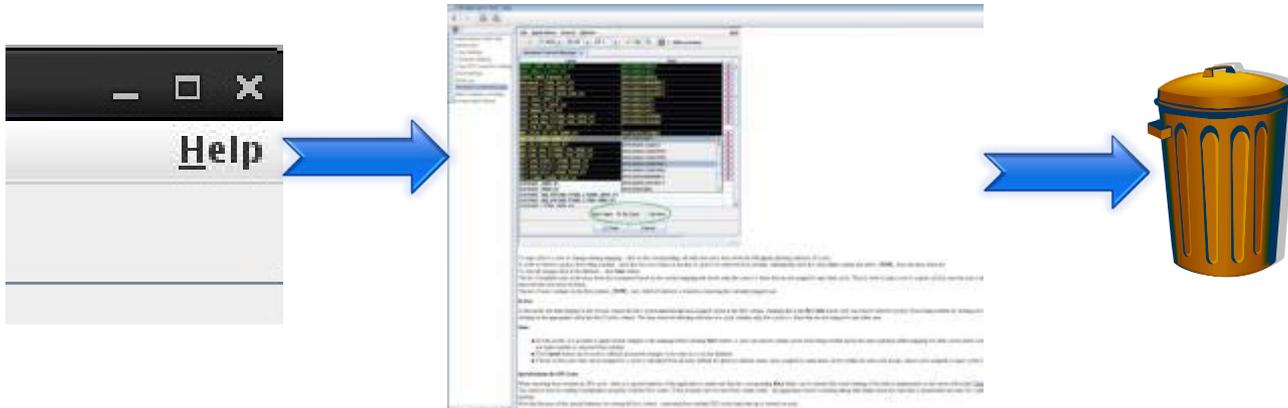


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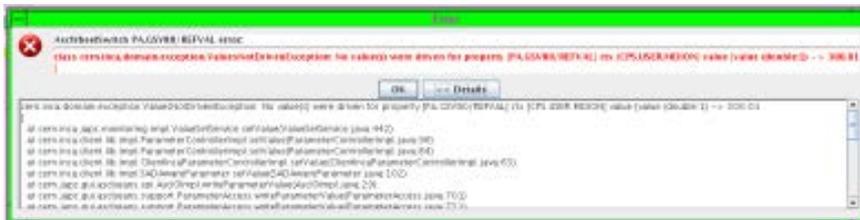
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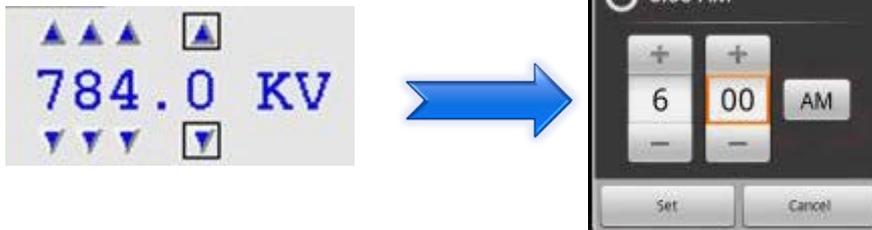


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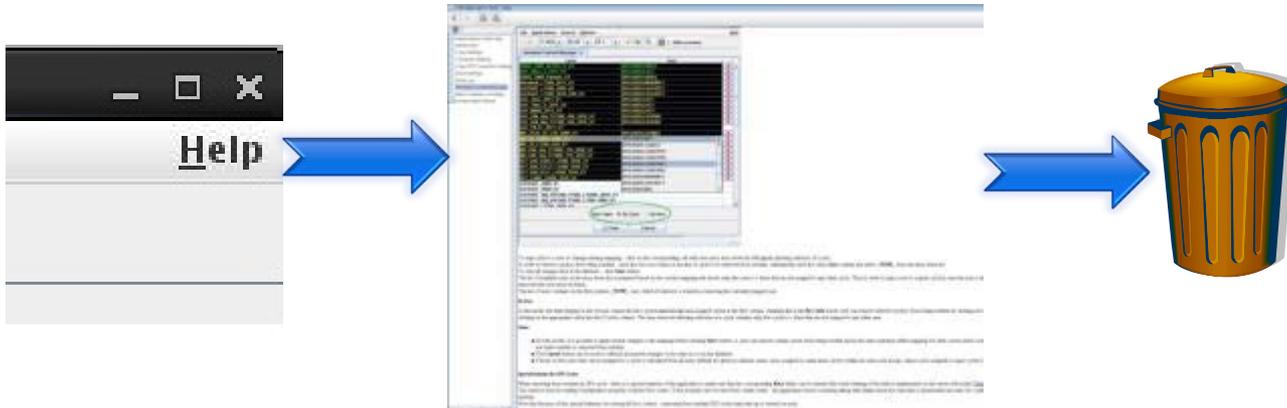
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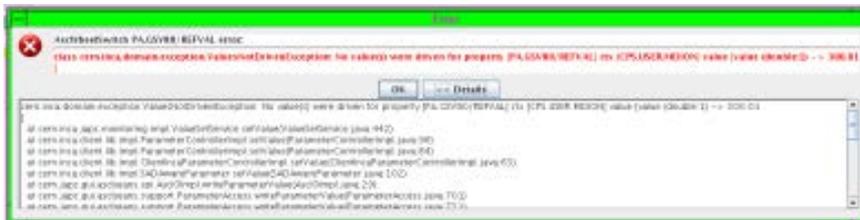


The KISS Principle
Keep It Simple, Stupid

A few practical GUI recommendations



Short Contextual Help



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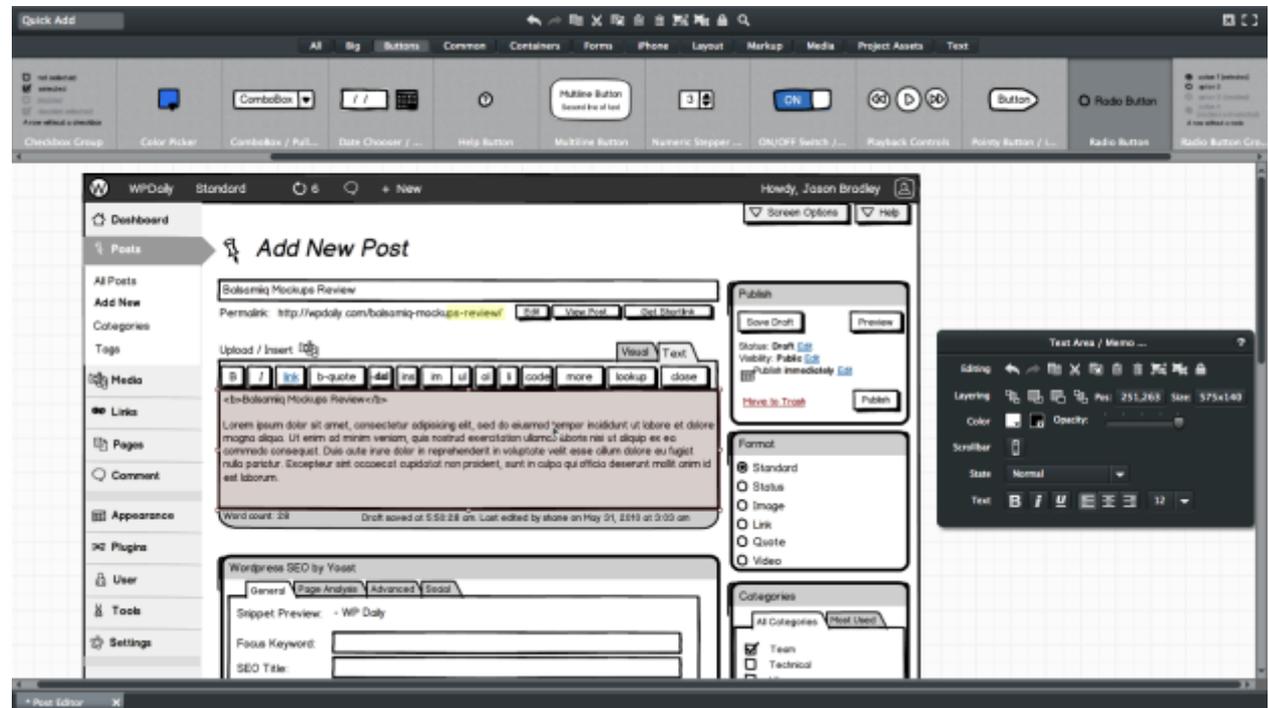
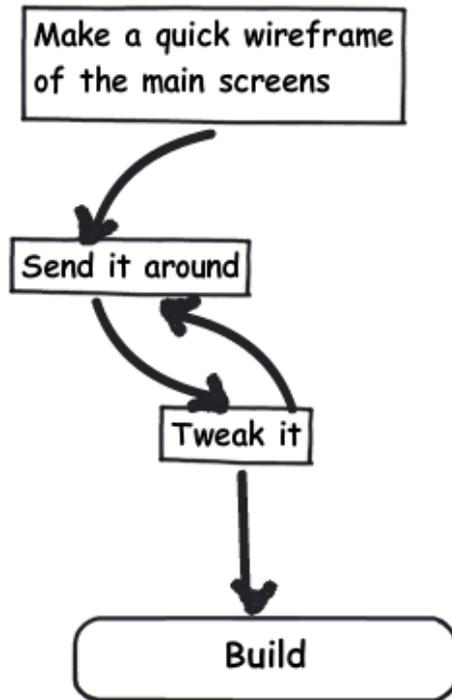
Clear Error Reporting



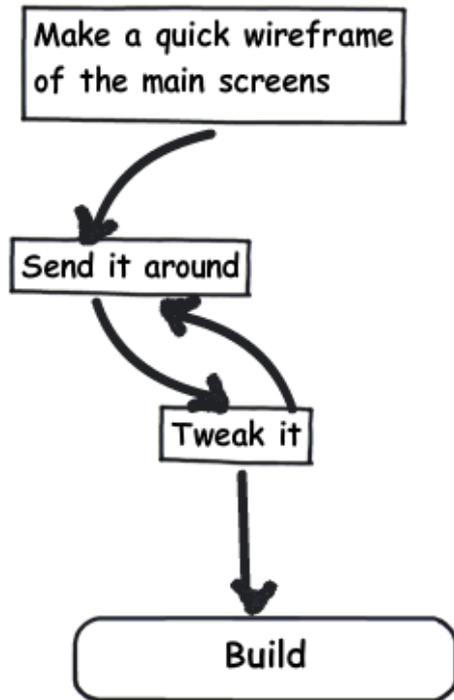
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Quick GUI sketches

Basamiq Mockups



Quick GUI sketches



Basamiq Mockups

WorkingSet Selector / Editor

OpConfig: CPSOP | Process: MAIN | WorkingSet: CPS.PFW-MPS

+ - | + - | + -

+ Add table | + Add Chart | - Remove selection

POW-V	Status	CCV	AQN	Units
PR.DHZ01	On	123.45	123.45	Amp.
PR.DHZ02	On	123.45	123.45	Amp.
PR.DHZ03	On	123.45	123.45	Amp.
PR.DHZ04	On	123.45	123.45	Amp.

Title

Annotations:

- Add new table, chart, etc after selected table or at the end of the WorkingSet if no table was selected yet.
- Remove selected table, chart, etc
- Change tables / charts order using the draggable anchors
- New empty tables added.

Lessons Learned

human aspects

It's the ~~technical issues~~, stupid!

- Don't underestimate **habits**
- **Stay close** with users
- Focus on **simplicity** – it's the key



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