



# How To Successfully Renovate A Controls System?

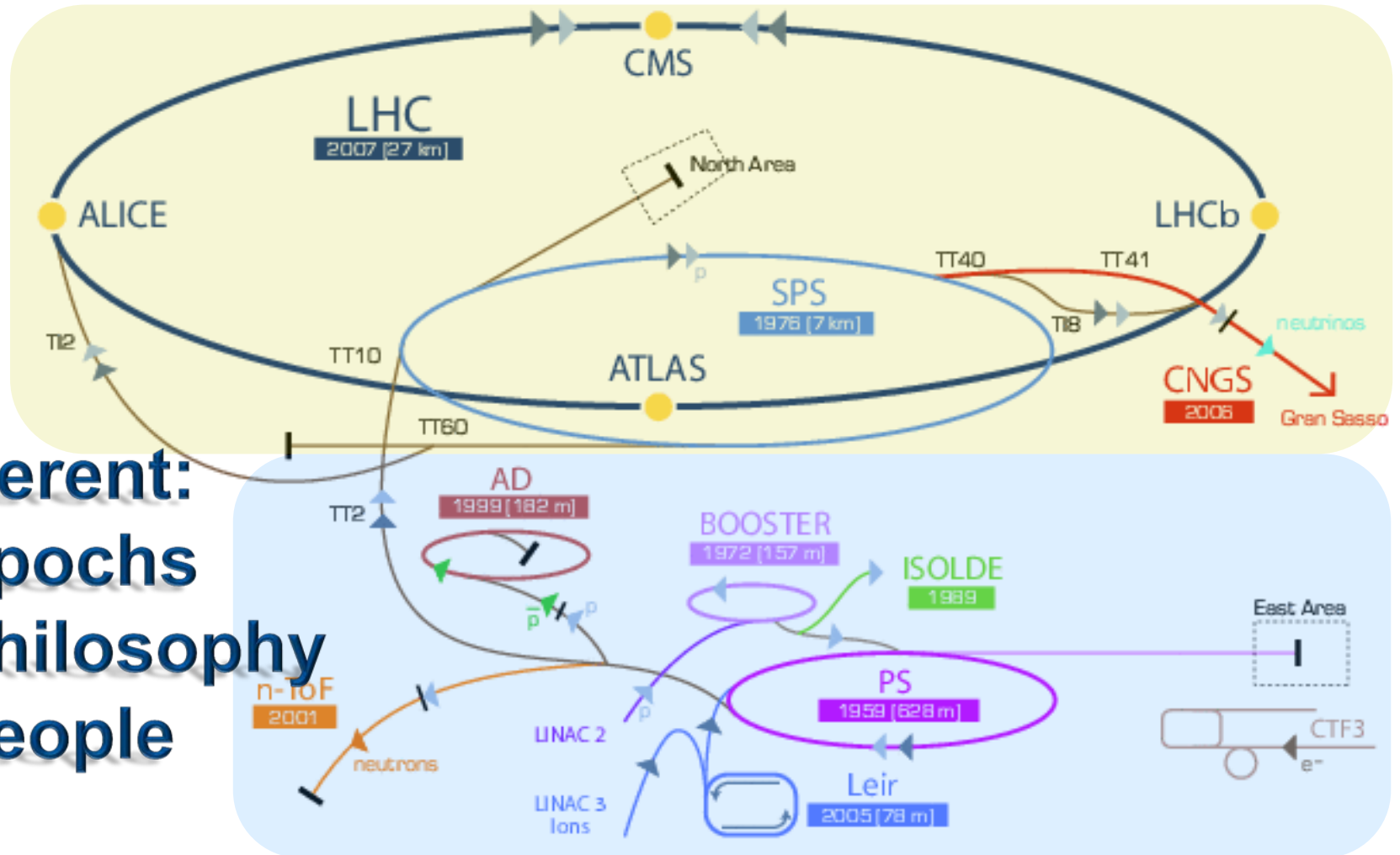
## Lessons Learned From The Renovation of The CERN Injectors' Controls Software

**Grzegorz Kruk** on behalf of the InCA team

**CERN, Beams Department, Controls Group**



# Different Worlds

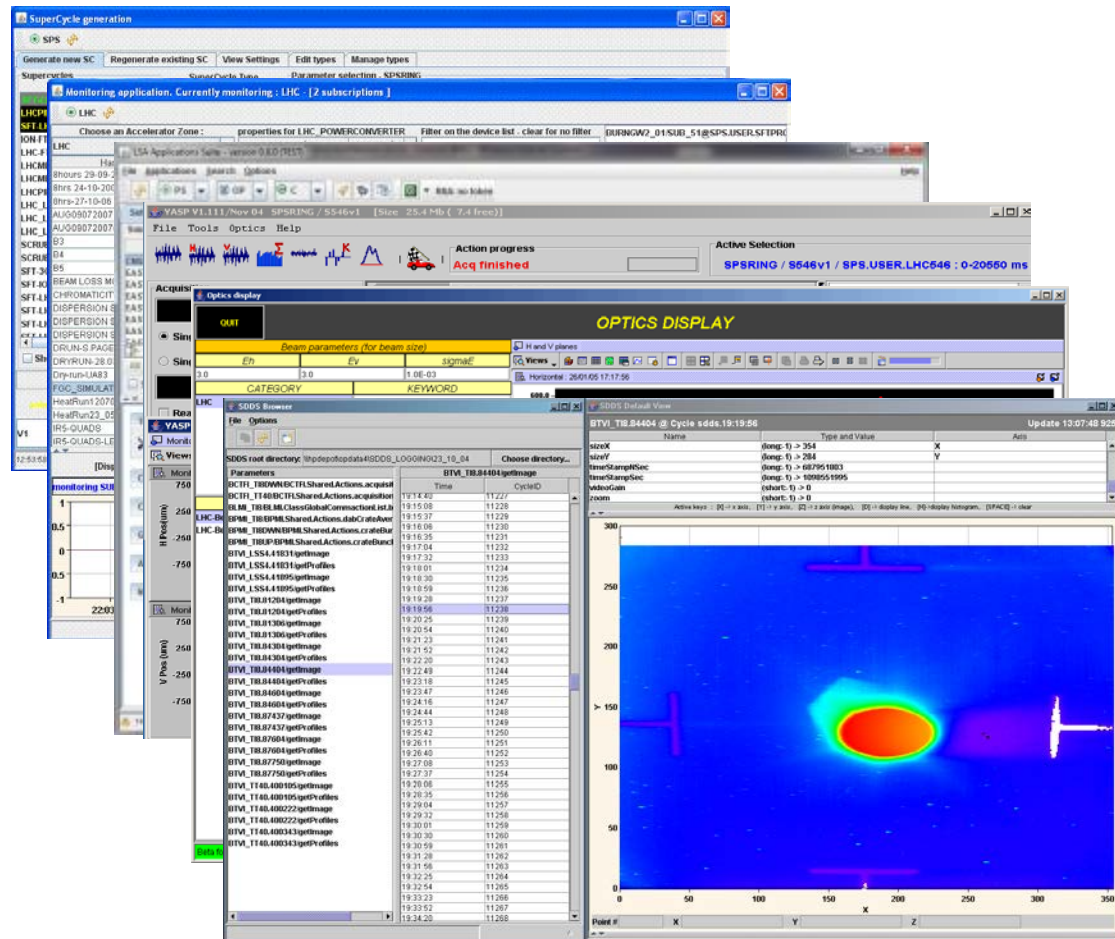


**Different:**

- Epochs
- Philosophy
- People

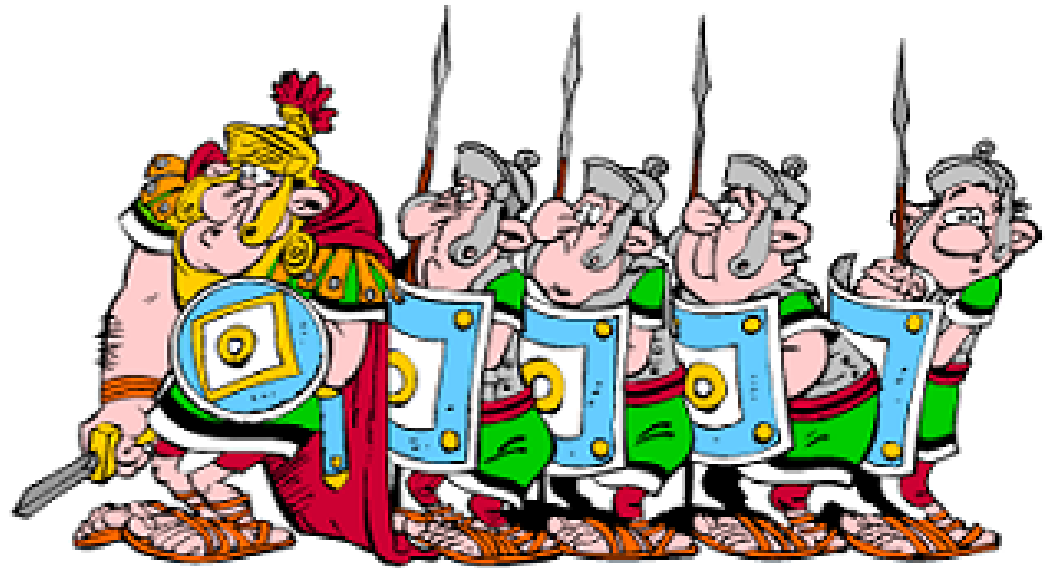
# LHC Software Architecture

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



# Renovation: Apply successful model to other accelerators

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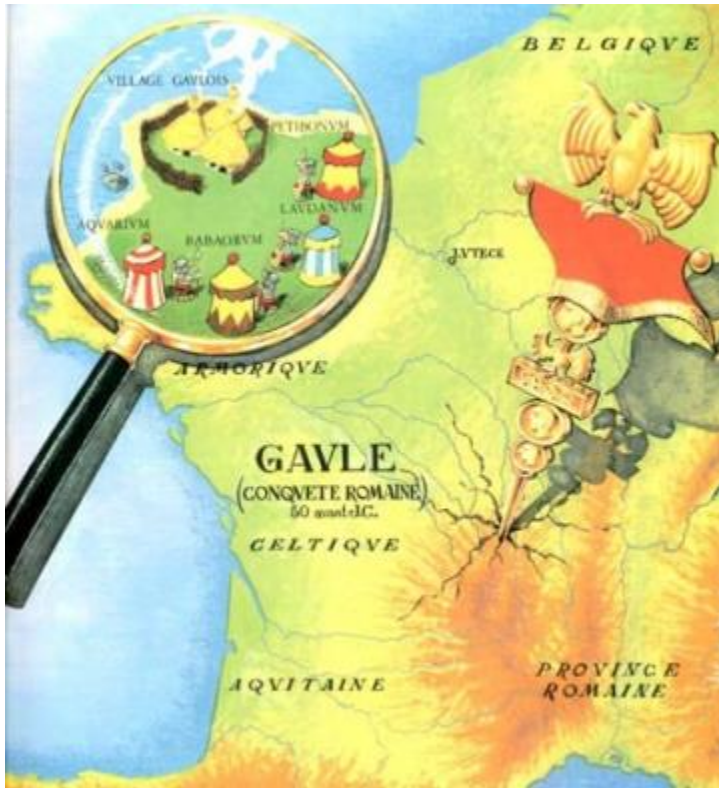


# Renovation: Apply successful model to other accelerators



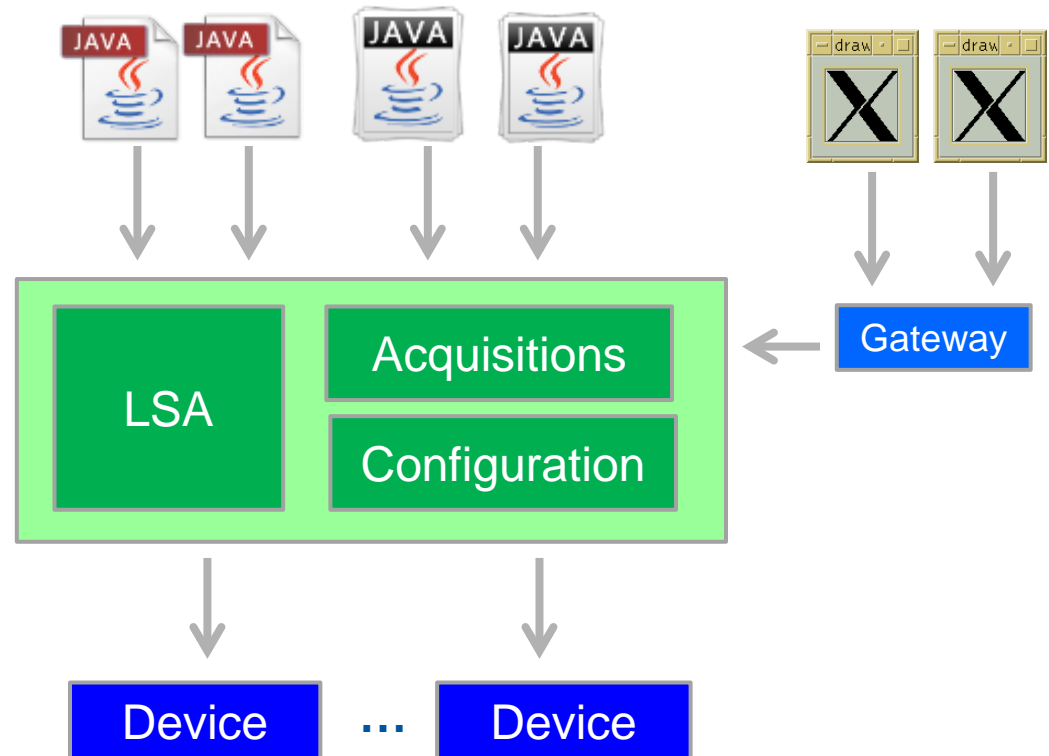


# Renovation: Apply successful model to other accelerators

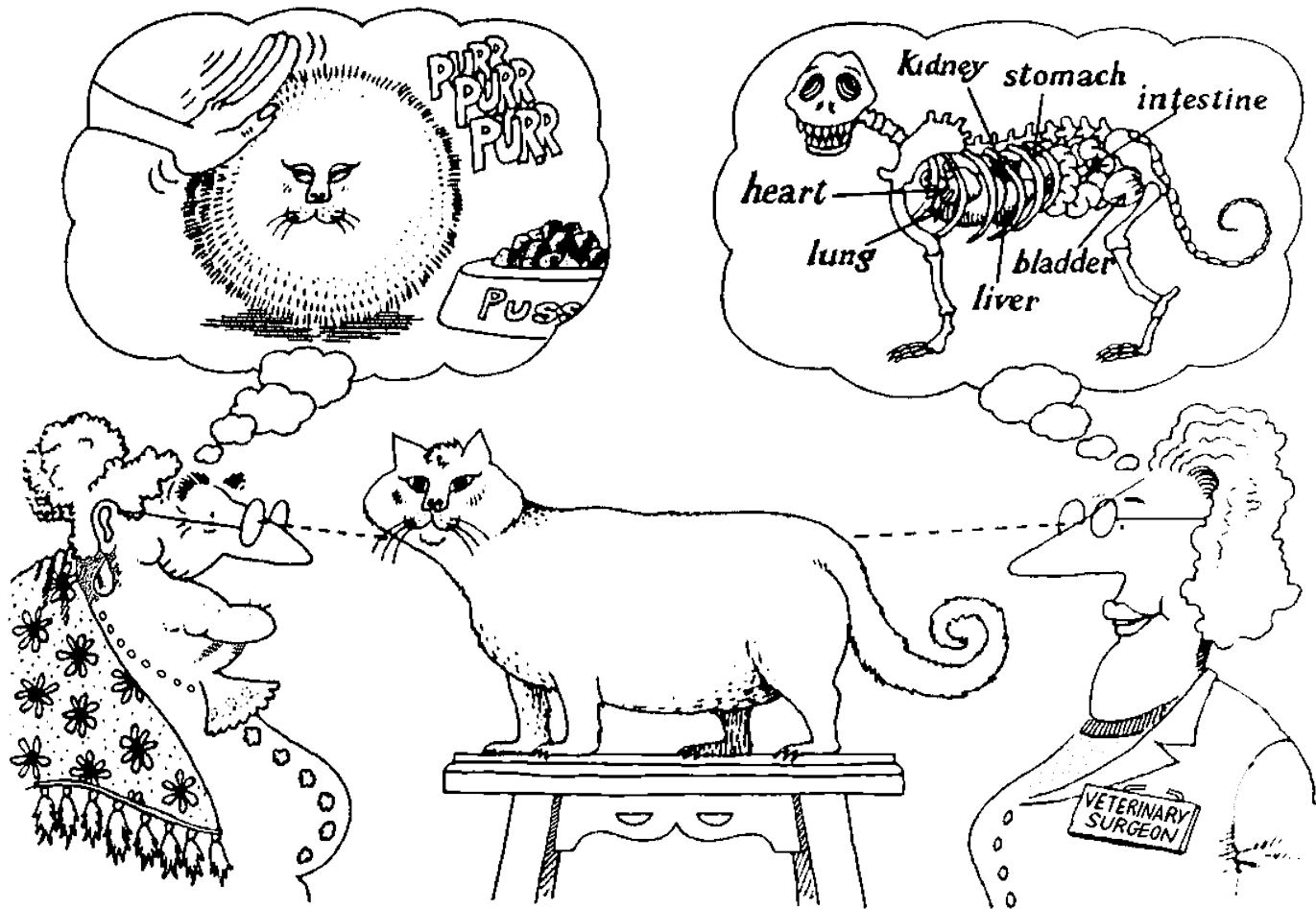


# We thought it's just technical...

- ? **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

▲▲▲▲  
784.0 KV  
▼▼▼▼

Delay 37000  
▲▲▲▲▲▲▲▲  
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# So when we came with the new system...



1960s → Hardware



1980s → X/Motif



# So when we came with the new system...



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2000s → Java

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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



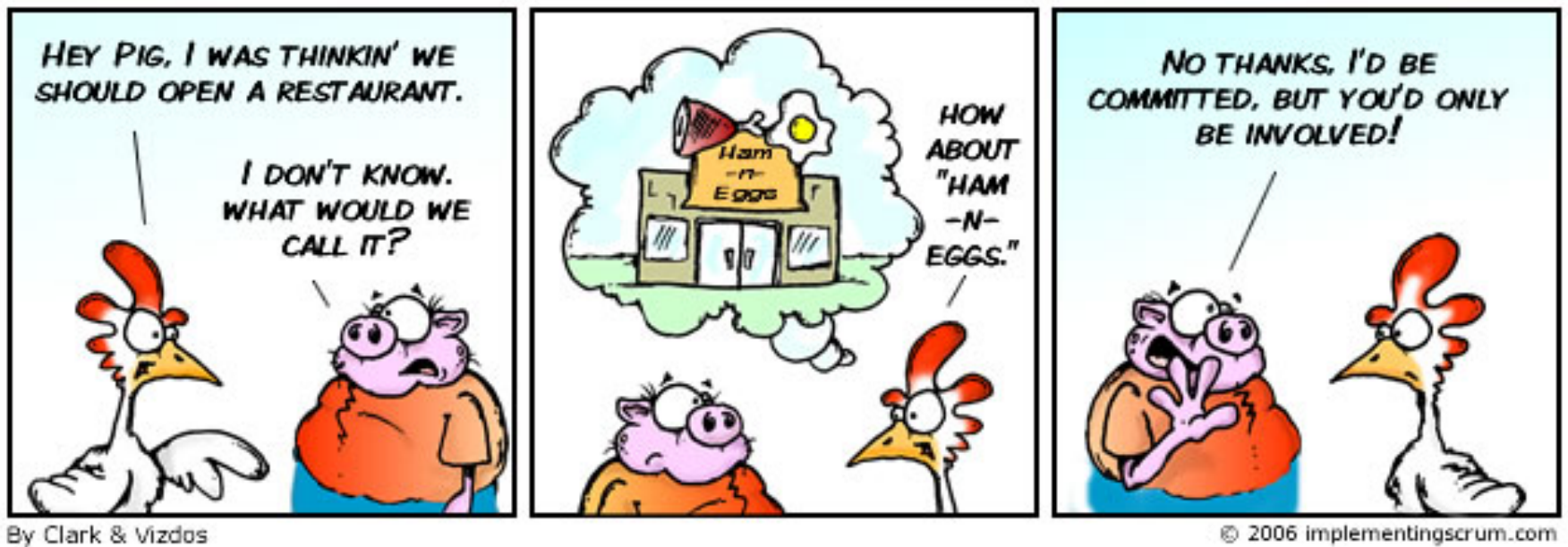
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**We focused on technical problems and underestimated human aspects.**

# Involvement and Commitment

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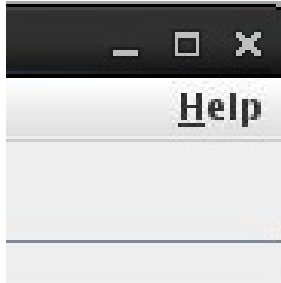
# How did we address it?

- 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**

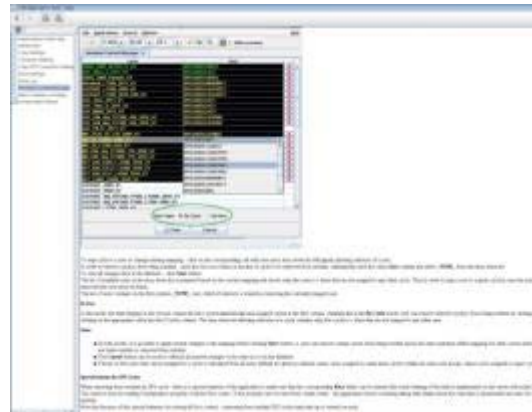
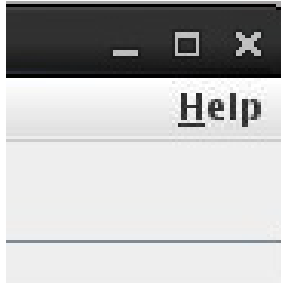


# A few practical GUI recommendations

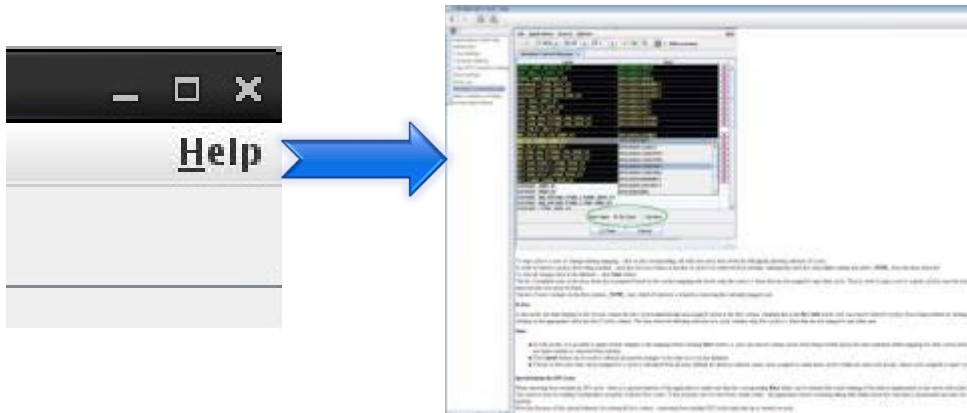
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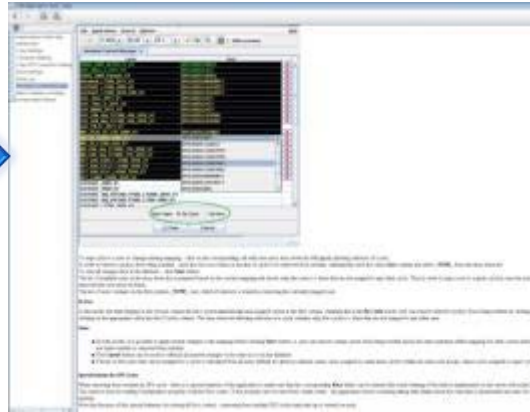
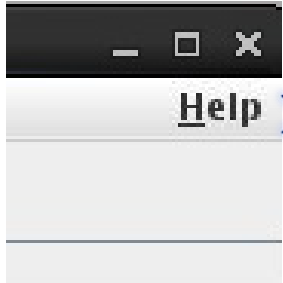


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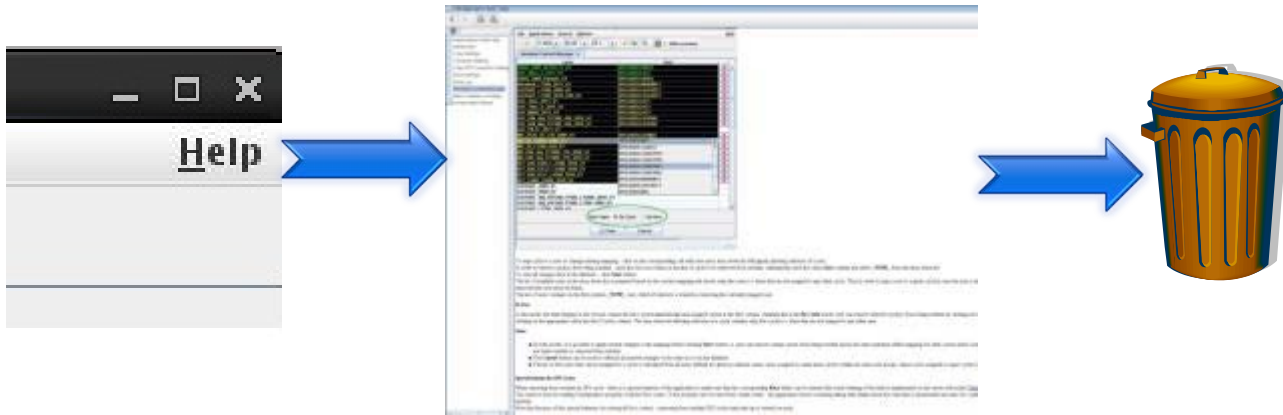




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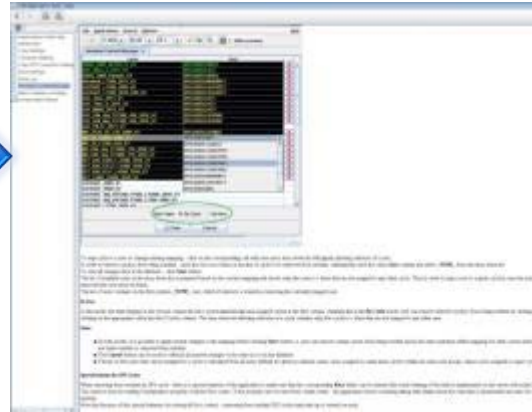
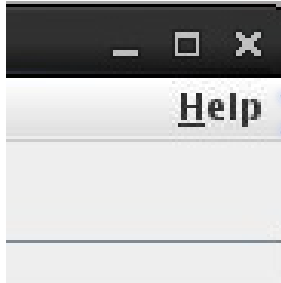


# A few practical GUI recommendations



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

## A few practical GUI recommendations

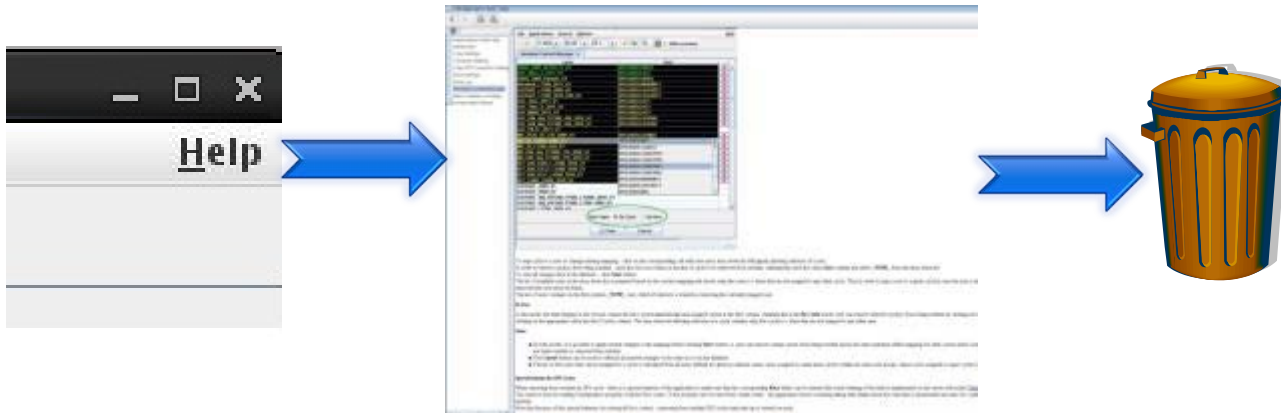


## Short Contextual Help



- Hardware
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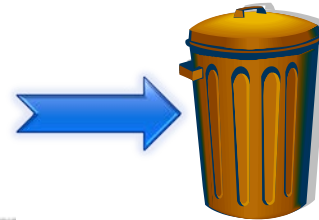
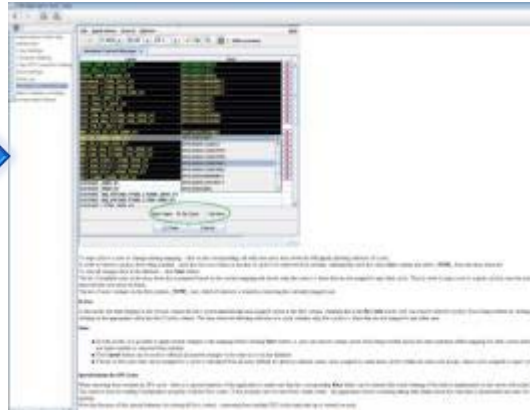
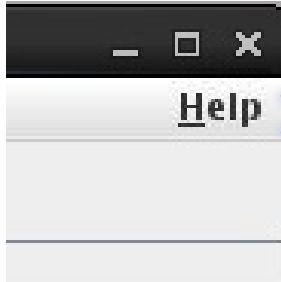
**Short  
Contextual  
Help**



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**Clear  
Error  
Reporting**

# A few practical GUI recommendations



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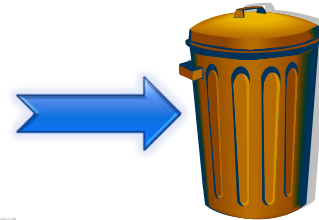
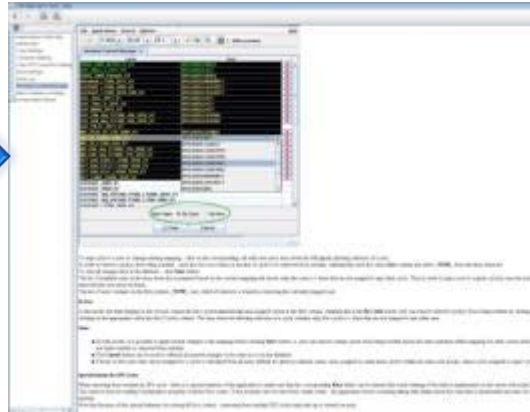
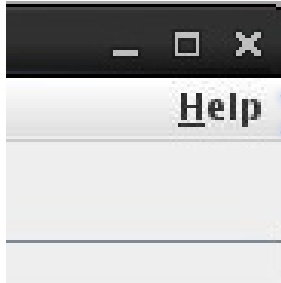


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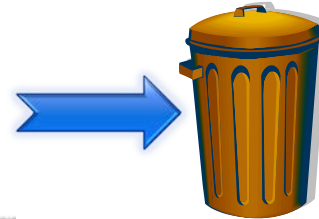
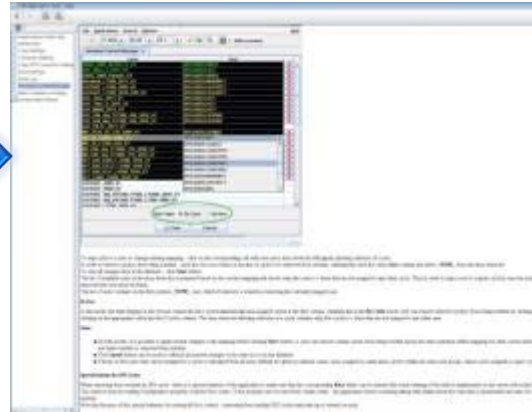
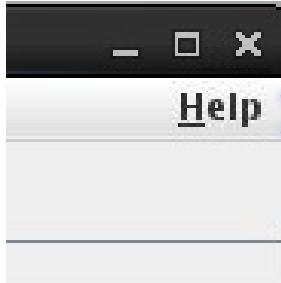


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**The KISS Principle**  
*Keep It Simple, Stupid*

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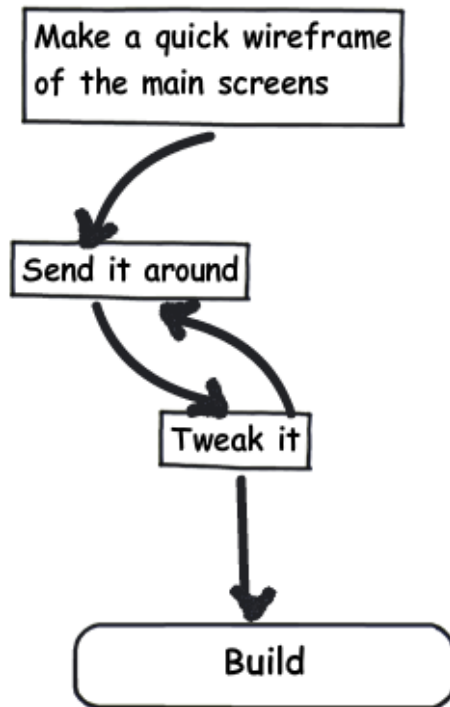
**Clear Error Reporting**



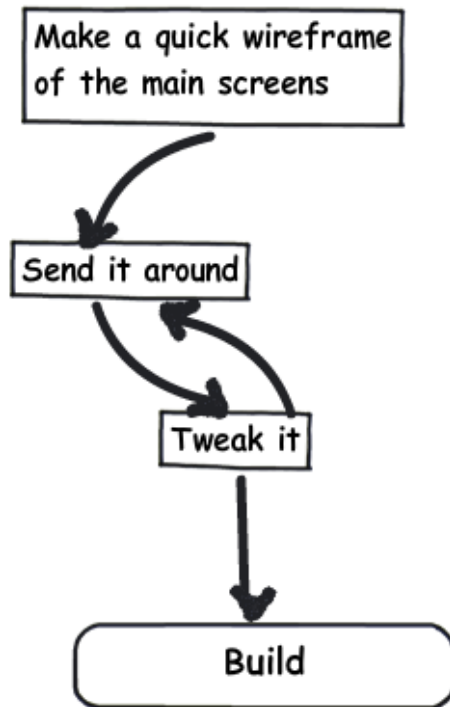
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# Quick GUI sketches

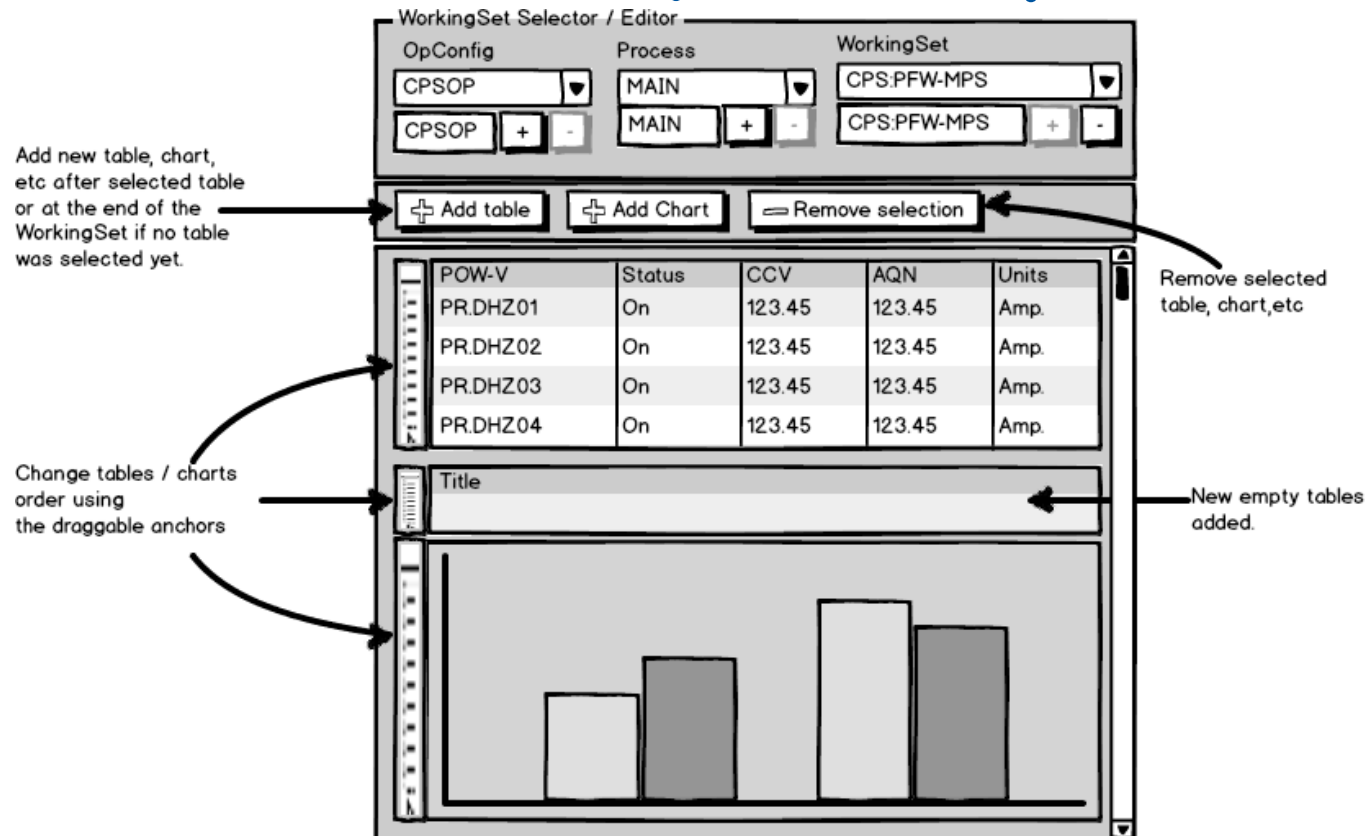
## Basamiq Mockups



# Quick GUI sketches



## Basamiq Mockups



# 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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