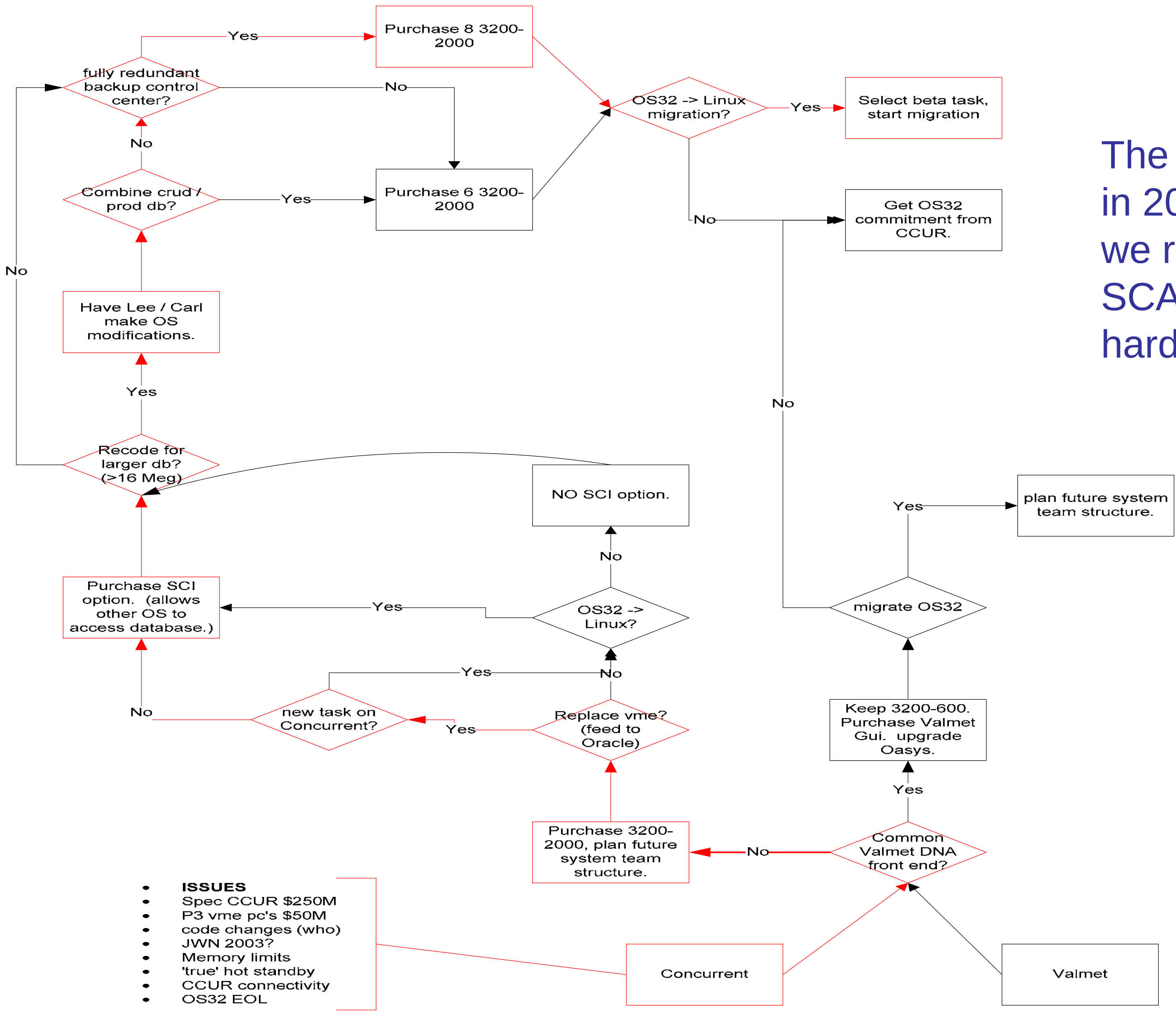
BP SCADA HMI Replacement

April 10, 2008

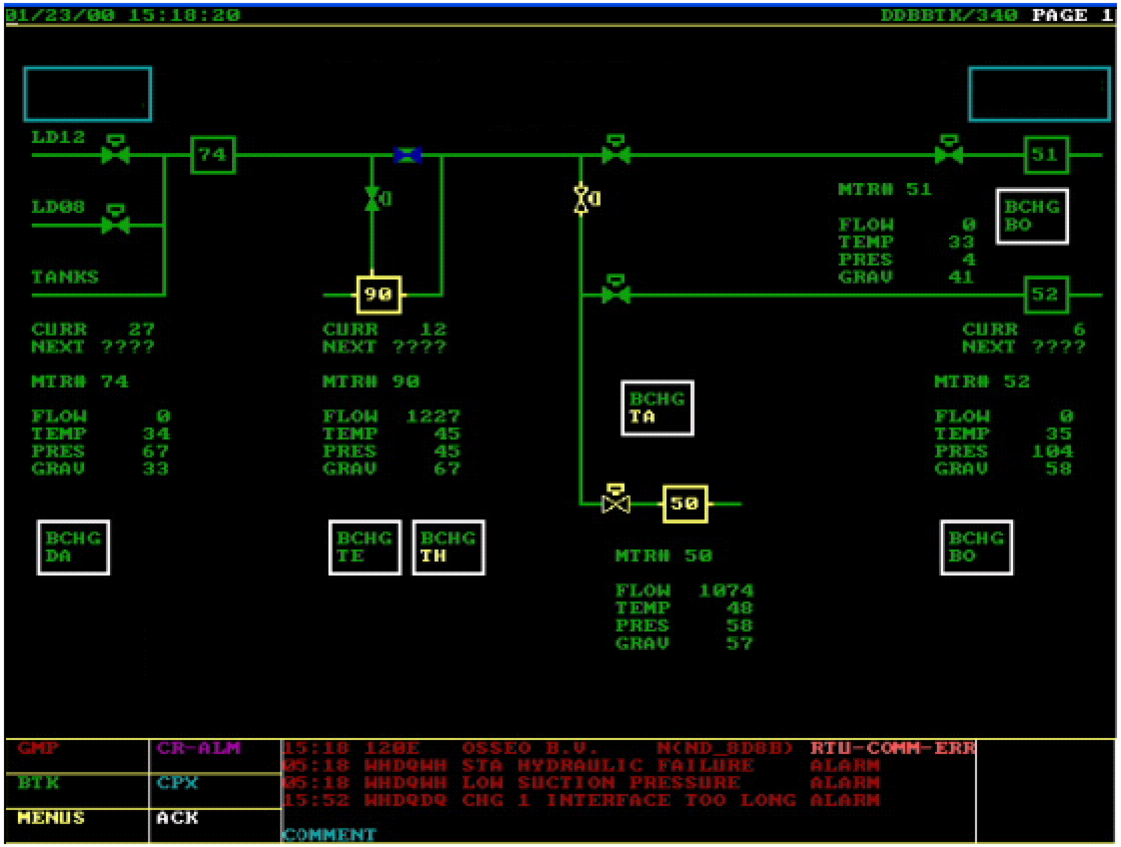


The story starts in 2002 when we replace our SCADA hardware.

•"NetColt" HMI

- Character based graphics
- "DOS" application (INT calls)
- Network driver desupported
- Support only 32 HMI devices
- Very limited security
- No redundancy

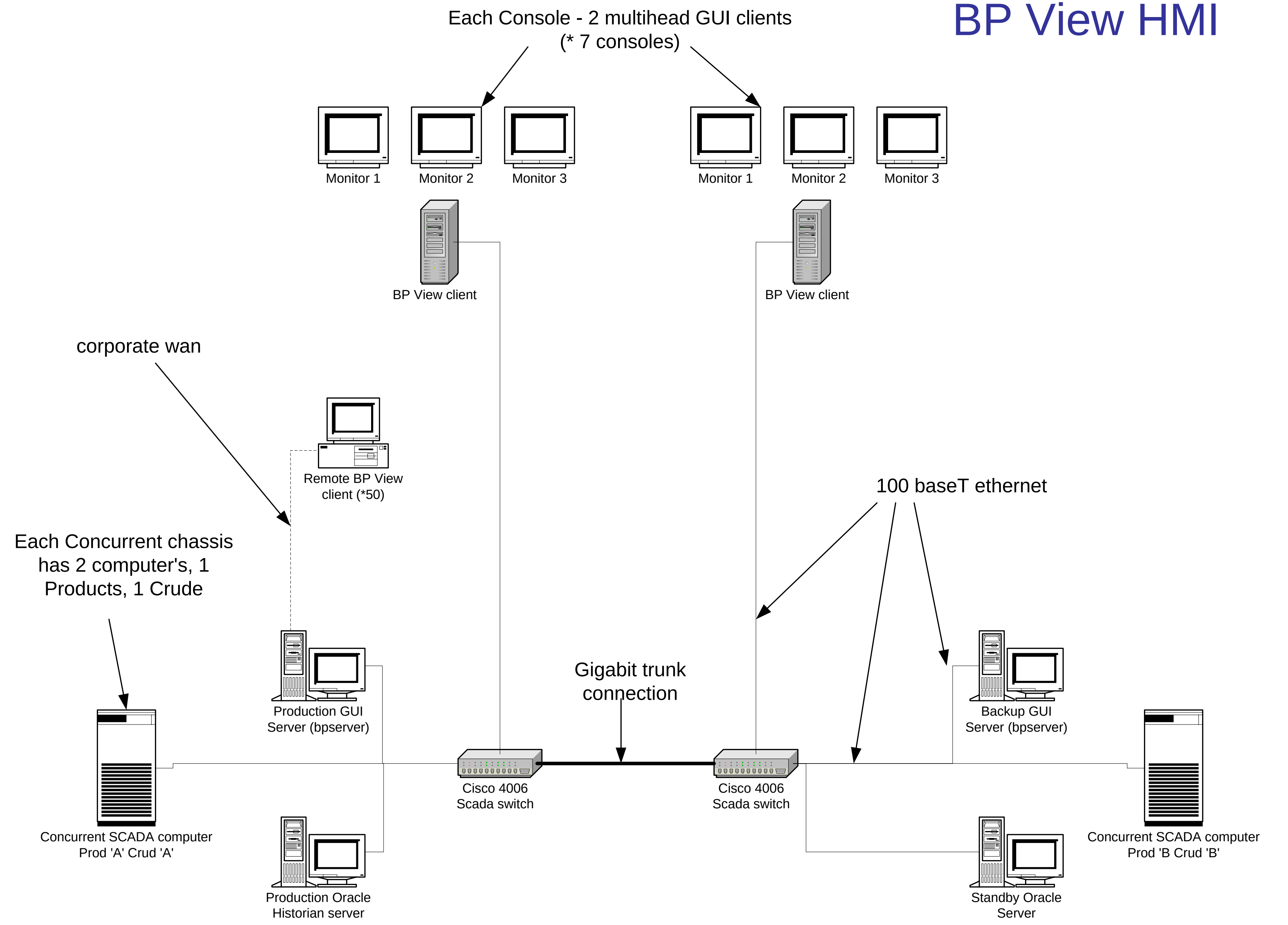
- Inability to 'mask' restricted data
- Limited DOS VGA support in XP
- Newer pc's having hardware issues
- Limited to 1 SCADA connection
- Non intuitive look and feel



CVP Process

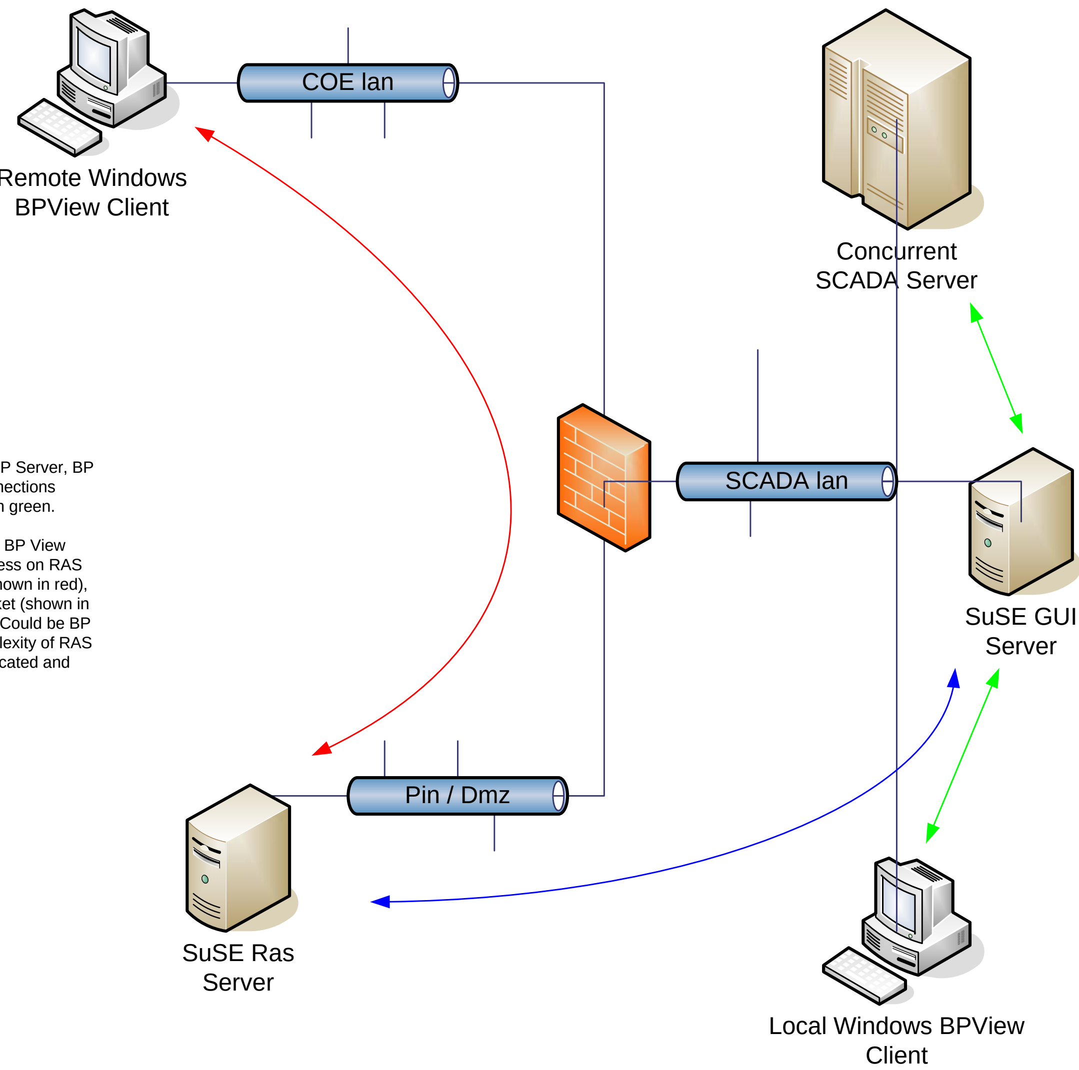
- Appraise – Decide if this the right project at the right time in the right place.
- Define – Define the scope of the work. Develop a project specification document. (Spend more time than needed here!)
- Select – Select a subset of vendors, distribute the RFP, determine the successful bidder.
- Execute – “Meat” of the project. Programming changes to existing SCADA, create “BPserver”, “BPview”, and “BPrasserver”
  - Phase tests 1-7, FAT, SAT, OLAT
- Operate – Put project in operation. Resolve “out of scope” issues. (Example – larger monitor replacement.)

BP View HMI



Each Console - 2 multihead GUI clients
(* 7 consoles)
Monitor 1
Monitor 2
Monitor 3
Monitor 1
Monitor 2
Monitor 3
BP View client
BP View client
corporate wan
Remote BP View
client (*50)
100 baseT ethernet
Each Concurrent chassis
has 2 computer's, 1
Products, 1 Crude
Production GUI
Server (bpserver)
Gigabit trunk
connection
Backup GUI
Server (bpserver)
Cisco 4006
Scada switch
Cisco 4006
Scada switch
Concurrent SCADA computer
Prod 'A' Crud 'A'
Concurrent SCADA computer
Prod 'B Crud 'B'
Production Oracle
Historian server
Standby Oracle
Server

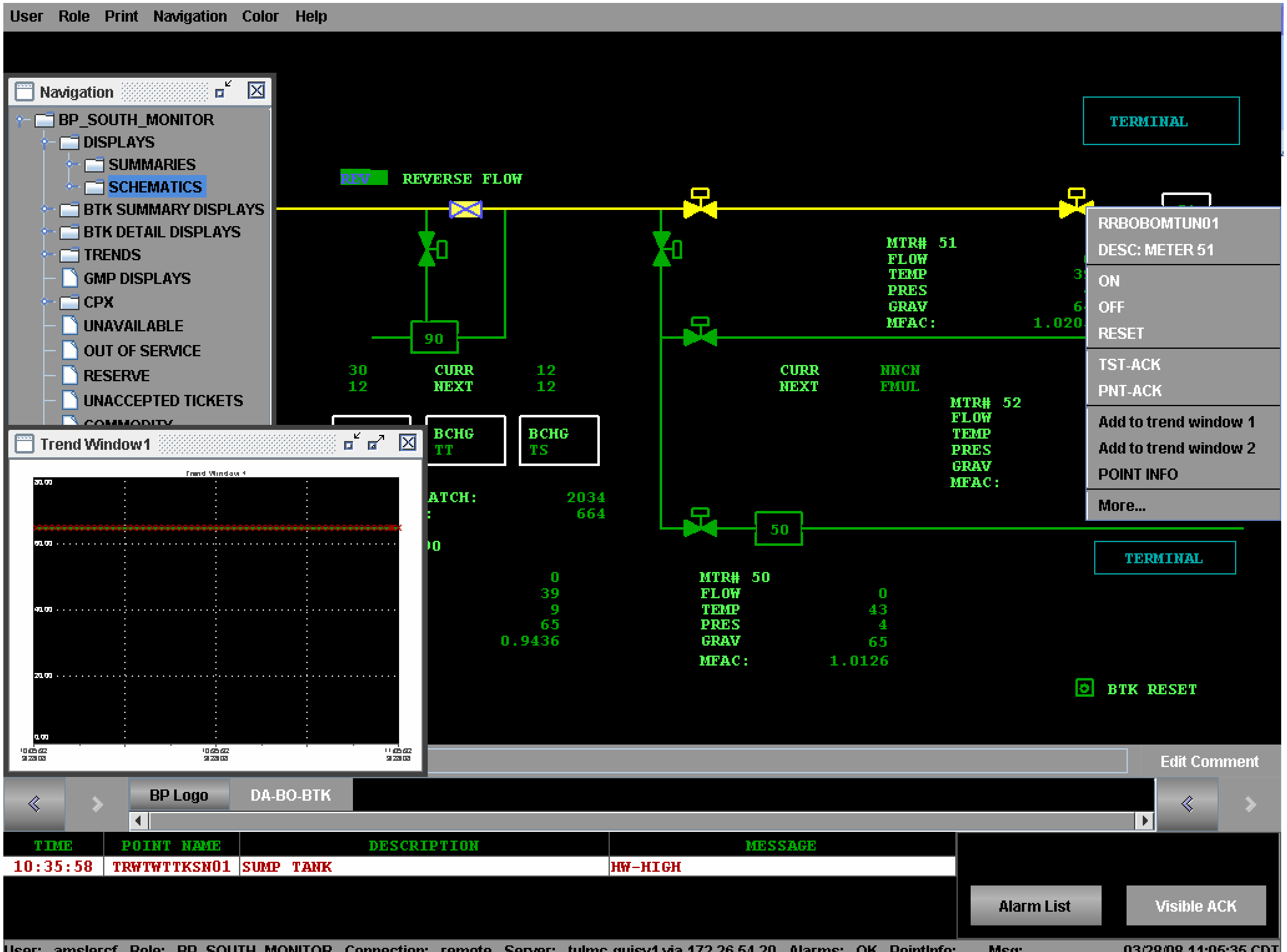
Digital Security changes the scope!



Normal data flow – BP View connects with BP Server, BP Server connects to Concurrent, all connections authenticated and encrypted. Shown in green.

Proposed Remote connectivity. Remote BP View connects to process on RAS Server. Process on RAS Server tears apart packet (for connection shown in red), determines action required, builds new packet (shown in blue), and forwards to appropriate server. [Could be BP Server or Concurrent depending upon complexity of RAS Server process] All connections authenticated and encrypted.

BP View HMI


User Role Print Navigation Color Help
Navigation
BP_SOUTH_MONITOR
DISPLAYS
SUMMARIES
SCHEMATICS
BTK SUMMARY DISPLAYS
BTK DETAIL DISPLAYS
TRENDS
GMP DISPLAYS
CPX
UNAVAILABLE
OUT OF SERVICE
RESERVE
UNACCEPTED TICKETS
Trend Window1
TERMINAL
REV
REVERSE FLOW
RRBOBOMTUN01
DESC: METER 51
ON
OFF
RESET
TST-ACK
PNT-ACK
Add to trend window 1
Add to trend window 2
POINT INFO
More...
MTR# 51
FLOW
TEMP
PRES
GRAV
MFAC:
1.020
90
30
12
CURR
NEXT
12
12
CURR
NEXT
NNCN
FMUL
MTR# 52
FLOW
TEMP
PRES
GRAV
MFAC:
BCHG
TT
BCHG
TS
ATCH:
2034
664
50
TERMINAL
0
39
9
65
0.9436
MTR# 50
FLOW
TEMP
PRES
GRAV
MFAC:
0
43
4
65
1.0126
BTK RESET
Edit Comment
BP Logo
DA-BO-BTK
TIME
POINT NAME
DESCRIPTION
MESSAGE
10:35:58
TRWTWTTKSN01
SUMP TANK
HW-HIGH
Alarm List
Visible ACK
User: amslercf Role: BP_SOUTH_MONITOR Connection: remote Server: tulmc-guisv1 via 172.26.54.20 Alarms: OK PointInfo: Msg: 03/28/08 11:05:35 CDT

THE GOOD, THE BAD, AND THE UGLY

- What went right
  - Creation of a very detailed specification
  - Having weekly status meetings with vendor and operations
    - (quickly flush out problems.)
  - Phase tests, FAT tests, SAT tests, OLAT acceptance test
  - Dedicating key players to the project
  - DLA (dynamic line analysis)
  - Limit project scope to achievable deliverables
    - (for example, we didn’t implement layers, panning, etc.)
  - Security Enhancements ~ No direct external access to SCADA
  - Flexibility ~ Ability to present data from multiple sources
  - Remained within budgetary constraints

- Lessons learned
  - Needed additional dedicated resources
    - Operations / Controllers
    - SCADA Maintenance (technicians)
    - Backfill for company project team members
  - Had to extend project timeline
  - OLAT needed a ‘suspend’ clause for non-vendor problems
  - Don’t be afraid to challenge controversial items
    - example ~ fixed navigation bar
  - Communication between groups
    - SCADA project team and pipeline operations
    - SCADA project team and SCADA support

- Handling out of scope issues (specification document)
  - – Change orders
  - – Define criticality (must have vs. enhancement) & funding
    - Must have example ~ proxy server for non operator access
    - Enhancement ~ smaller fonts created need for larger monitors
  - Obsolescence & project specified hardware and software
    - Hardware
      - Over life of project, Dell 2650 servers were superseded by 2950
      - BPView client video went from AGP & PCI to PCI-Express
    - Software
      - SuSE linux moved from sles 9 to sles 10 (multiple sles 9 patches)
      - Oracle moved from 9i to 10g (multiple 9i patches)
      - Java moved from 1.5 to 1.6 (multiple 1.5 patches)
      - Windows XP service packs and anti-virus updates