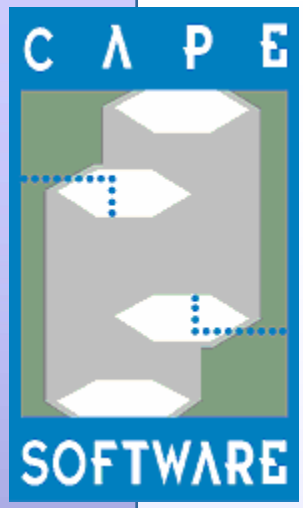
The Virtual Process Overview and Applications

Cape Software Inc.

Houston TX

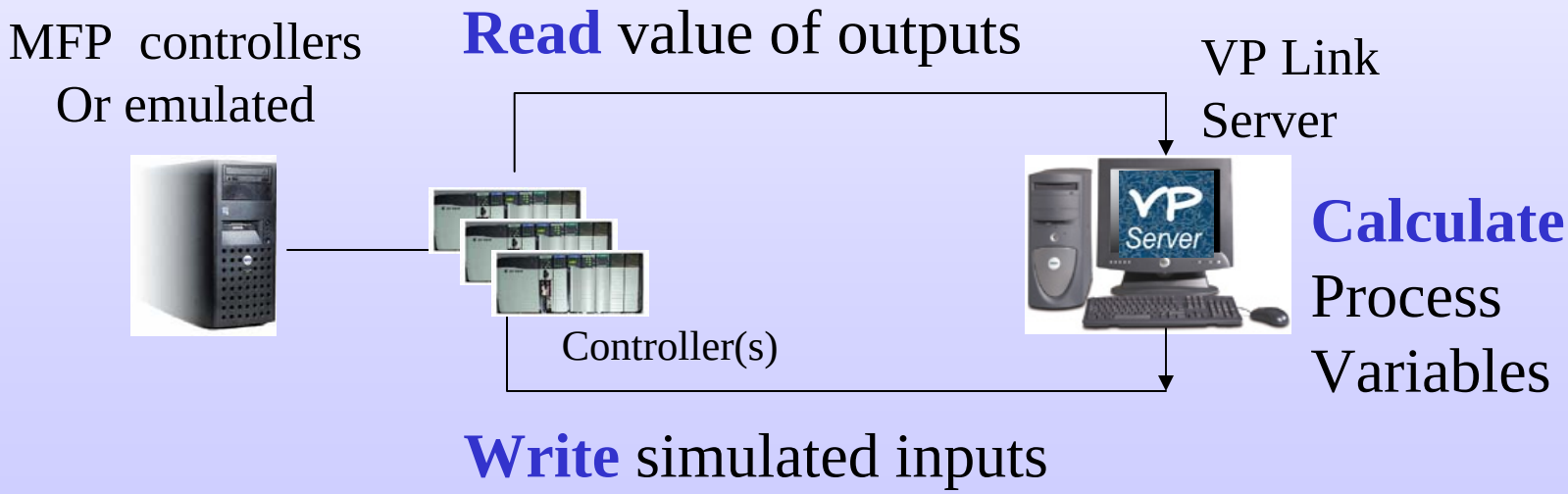


What is VP Link ?

A **dynamic** representation of a chemical process to an **offline** control system.

The Virtual Process Loop

- **Object Oriented** and Tag-based.
- **Direct Connect** bypasses hardware I/O boards
- **Interfaces** with real or emulated controllers

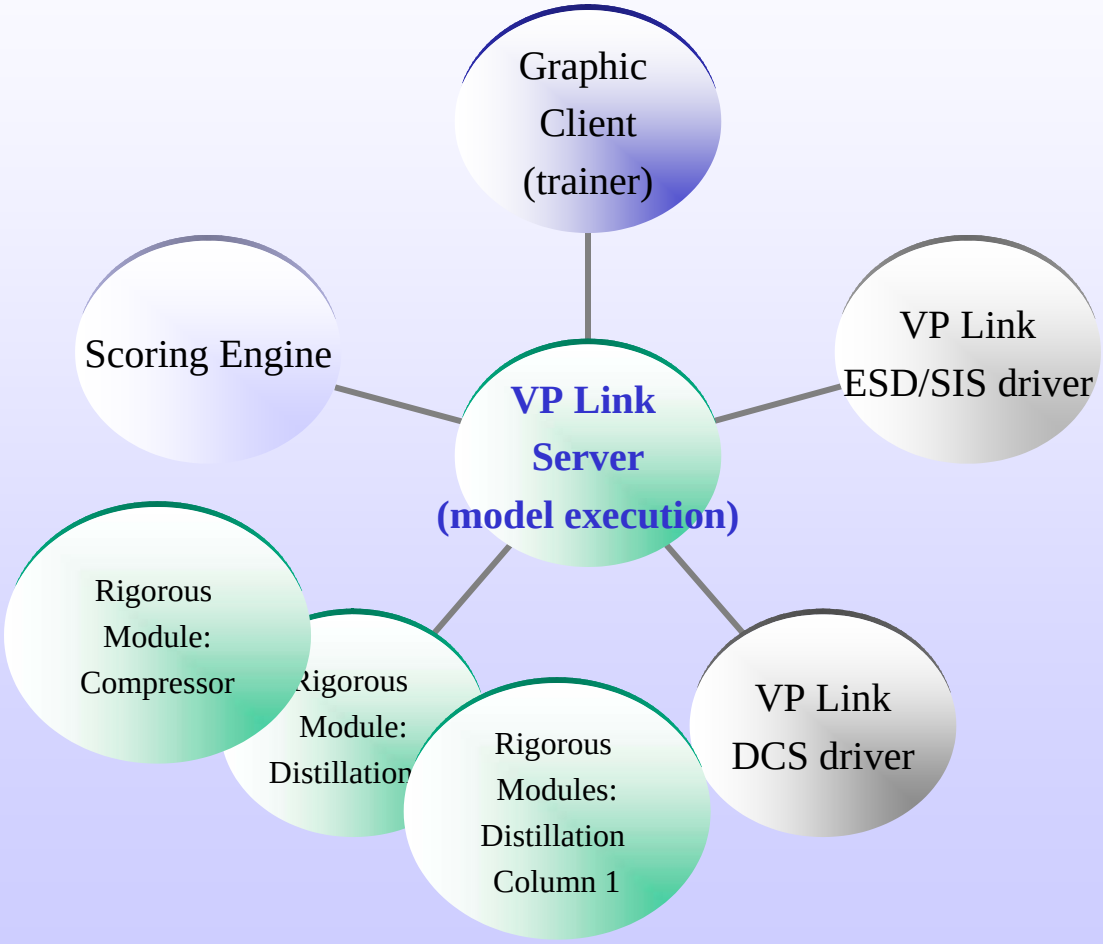


Some of our customers...

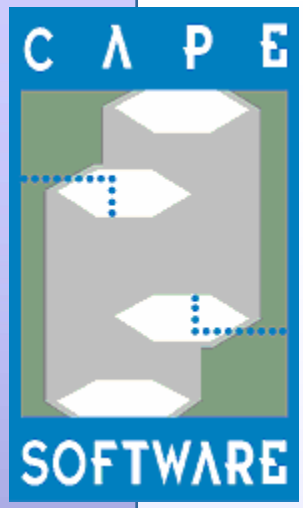
Supported Control Systems

- ABB Mod300, Advant, Bailey Infi 90
- Triconex:Tricon/Trident/Emulator
- Honeywell Experion PKS TDC,TPS , FSC
- Honeywell Plantscape / Rockwell ProcessLogix
- Foxboro I/A series, Archestra, A^2
- Honeywell Experion PKS ,TPS , Honeywell FSC
- Honeywell Plantscape / Rockwell ProcessLogix
- GE Fanuc series 90
- A-B PLC5/SLC500,CLX, Modicon,Siemens-Ti 505
- Siemens APACS, PCS7, S7
- Yokogawa ProSafeRS
- Yokogawa CS3000/R3
- Etc...

VP Link components in a client / server architecture

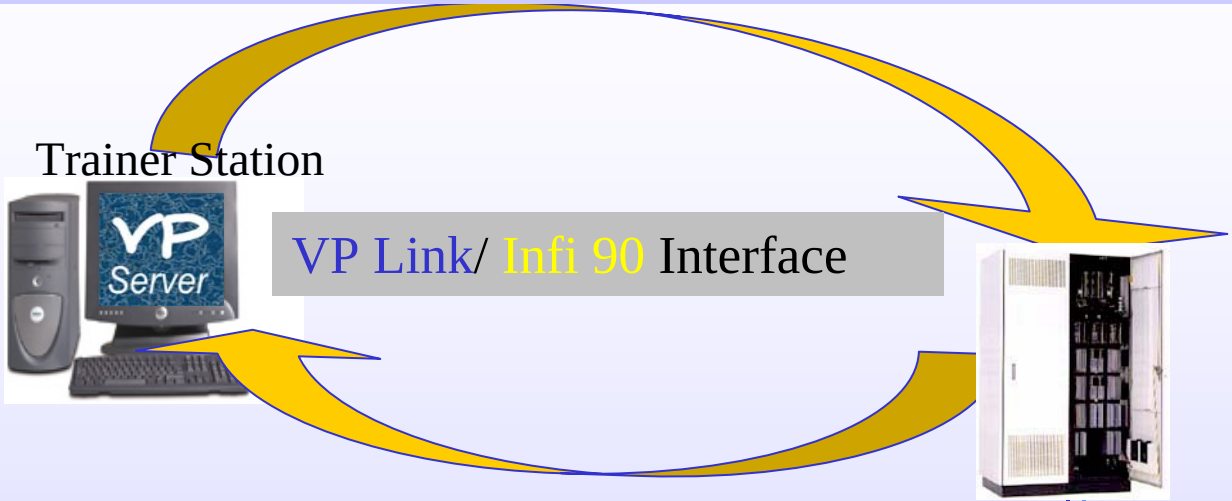


VP Link components run seamlessly across the network

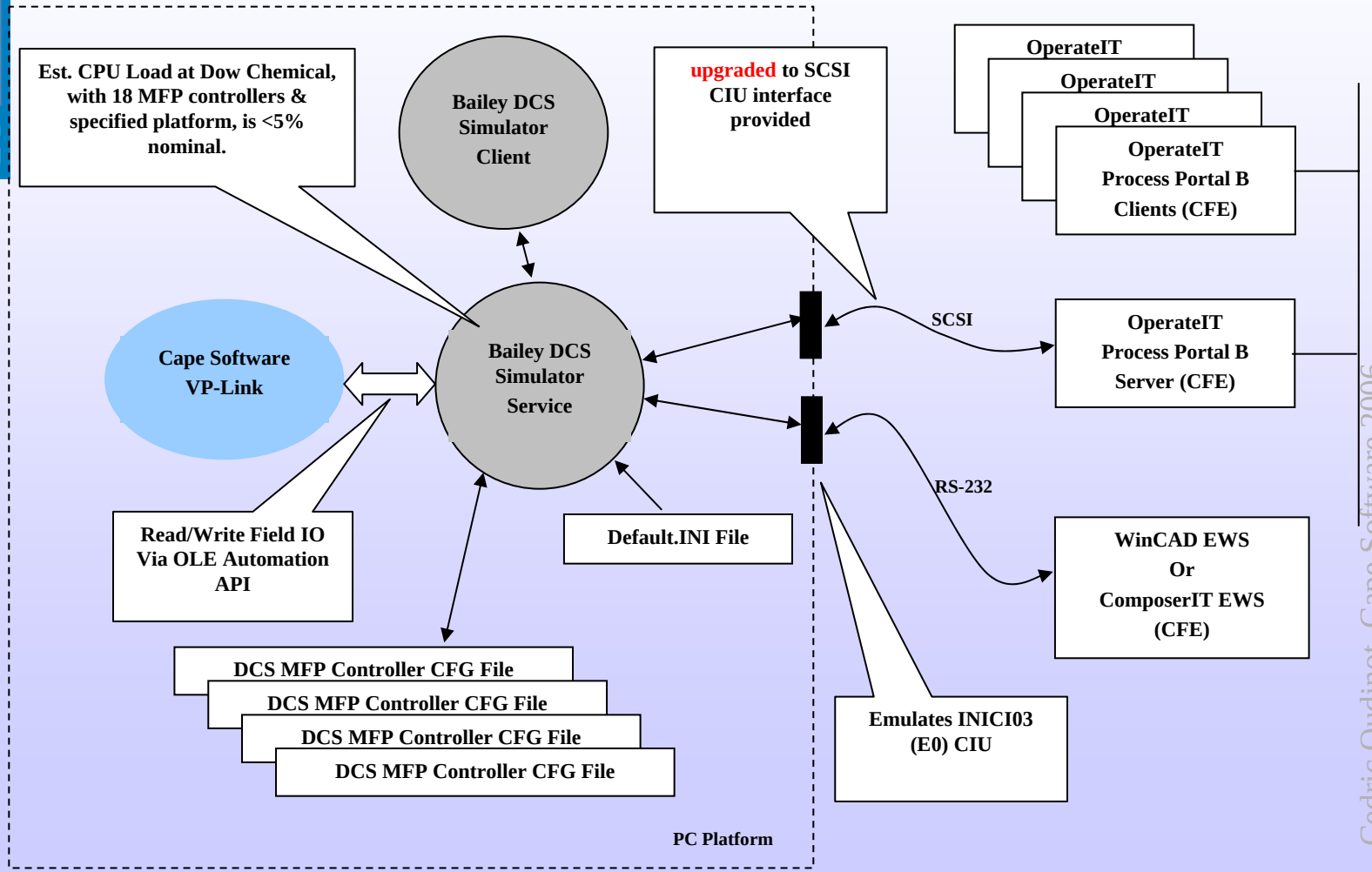


Emulated Vs Stimulated ?

Virtual Process network topology for Hardware Bailey Infi 90

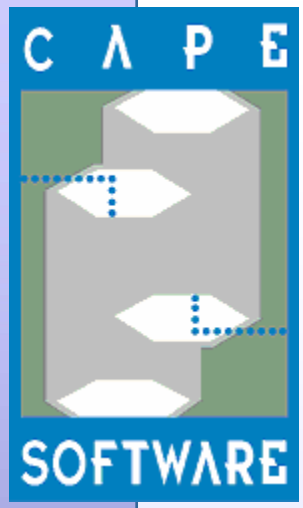


Virtual Process network topology for emulated Bailey Infi 90 system



VP Link for Bailey System Specifics

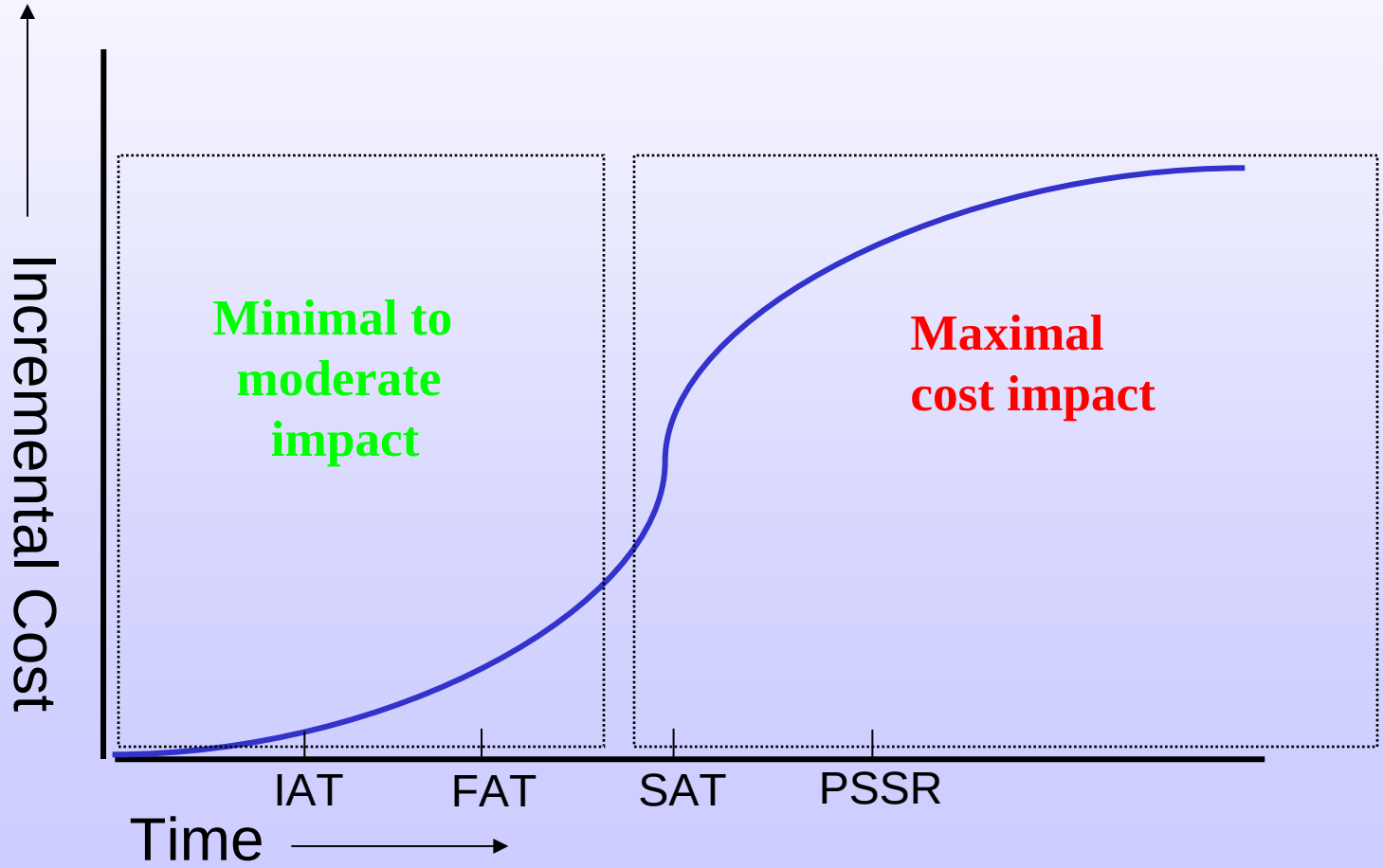
- HMI Graphics Import in Toolbook for realistic trainer interface
- Actual displays used for HIS in Operator Training environment
- Fast *COM* Interface ,over *Ethernet for emulated*
- *Robust Modbus interface* for hardware based system
- Utilization of *non-modified actual Control Program*



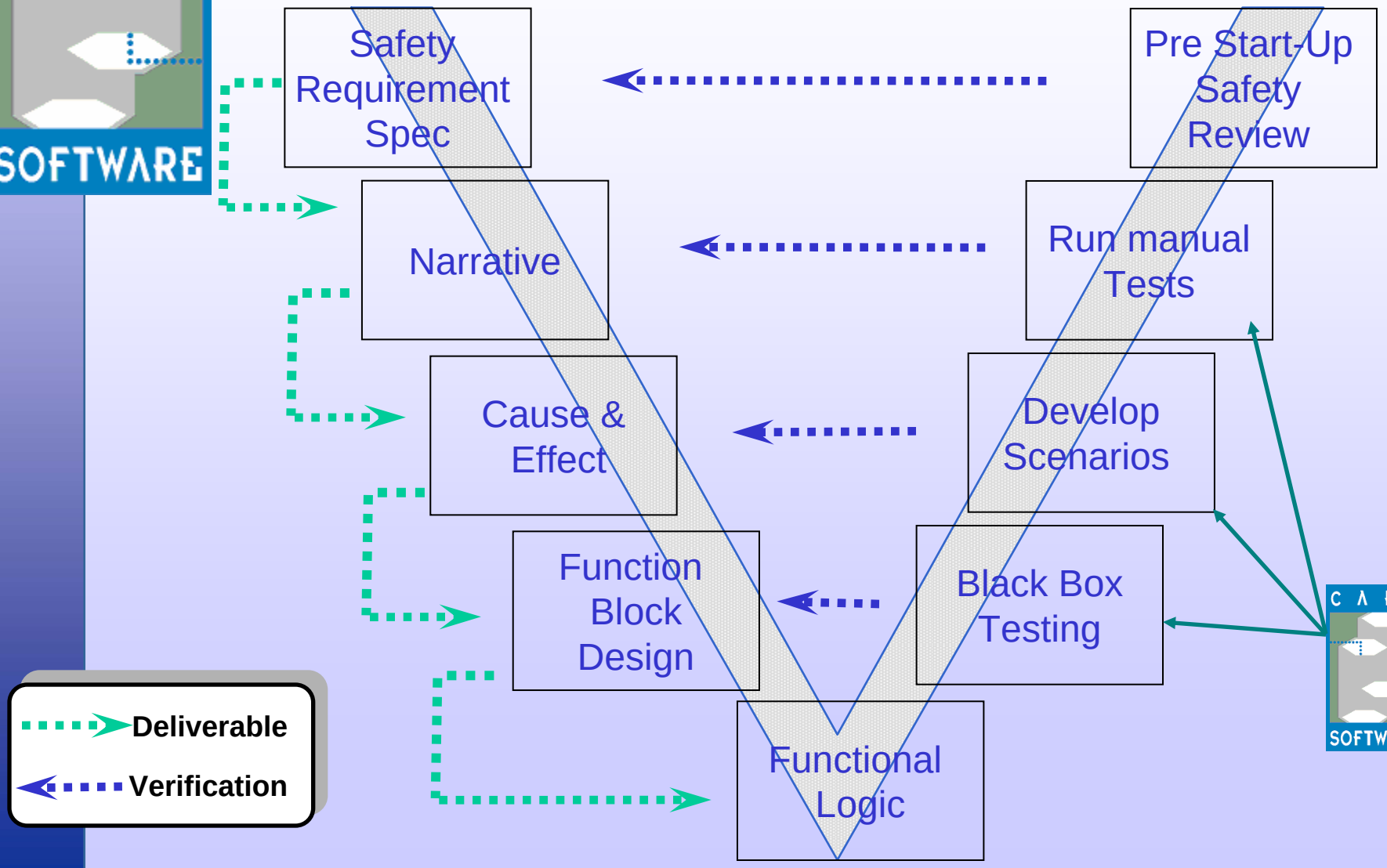
VP Link Applications

I- Logic Validation

Cost of changes over a typical project development cycle



V-Approach methodology: application to validation

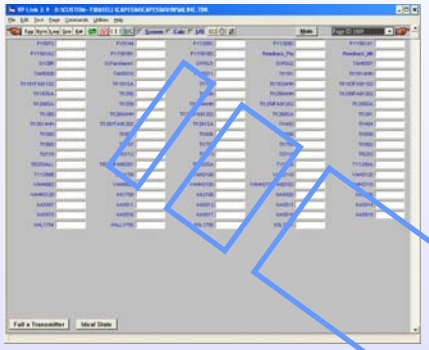


Logic Validation with VP Link

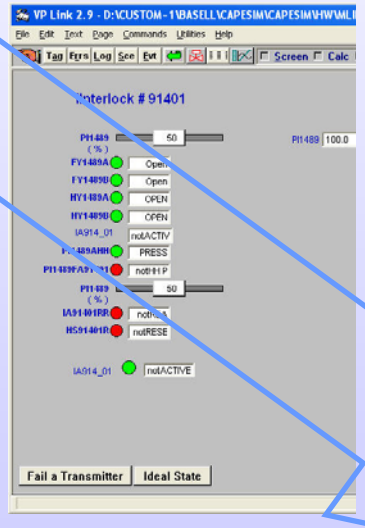
- ✓ VP Link Allows:
  - ✓ Graphics verification
  - ✓ Logic checkout at I/O / block / module / system level
  - ✓ Interlock schedule approval
  - ✓ Integrated Testing :Mapping to DCS and interaction between DCS/PLC logic (gateway points tests)
- How ?
  - Automates repetitive testing task (ie resets etc…)
  - Facilitates FAT with customized graphics
  - Collaborative testing framework thru distributed architecture
- Thoroughly debug prior to online download, ie, Management of Change and periodical testing
- **Test Compiler complies with IEC61508/61511**

Simulation Screen shots

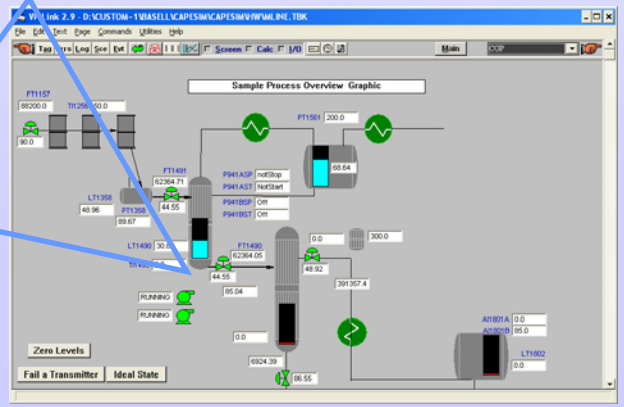
Automated Tag sheet



Input/Output sheets per ESD



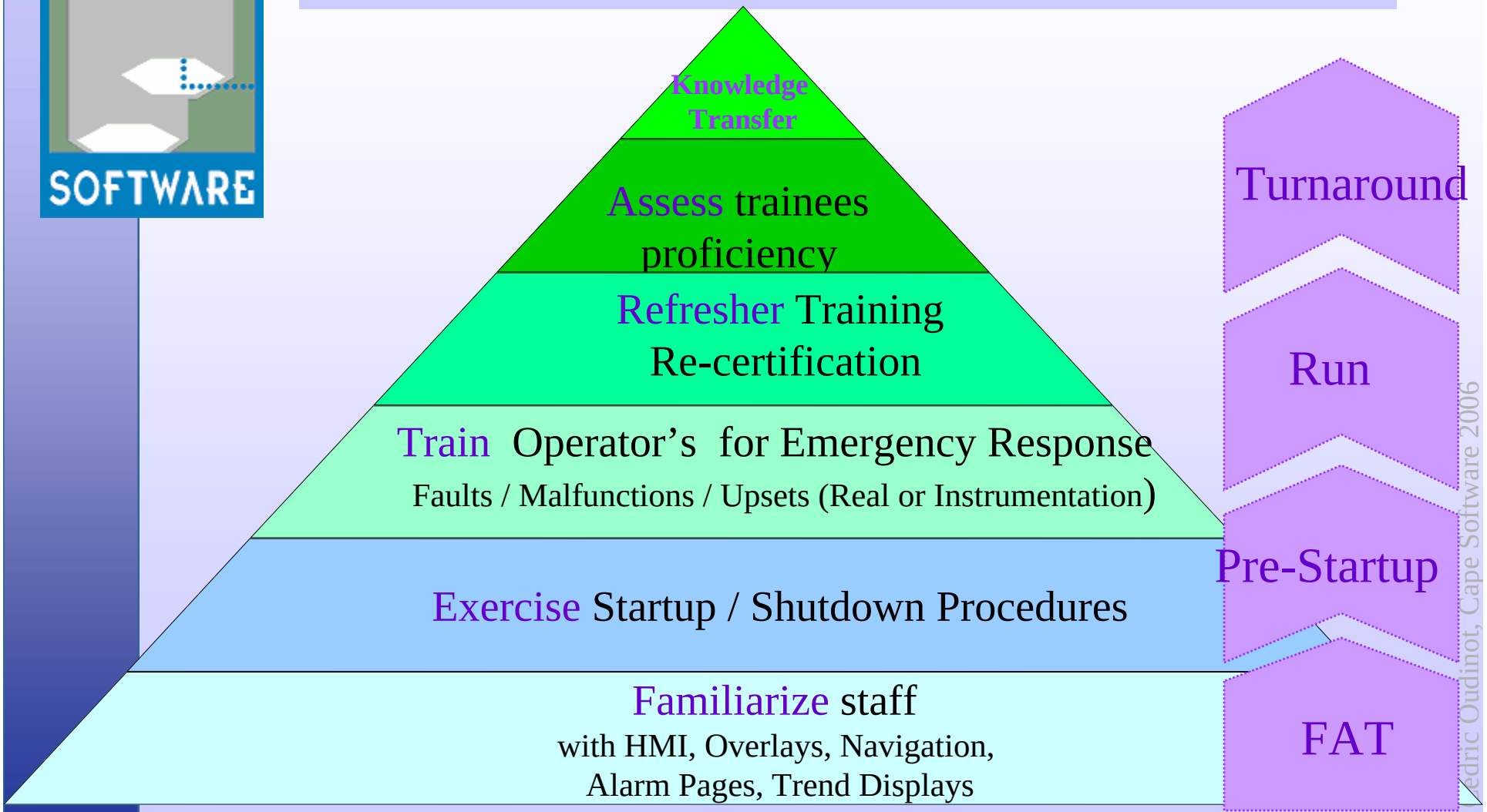
HMI for advanced testing or training



VP Link Applications

II- Operator Training Simulator (OTS)

II- Goals of Operator Training



To ESD, or not to ESD ?

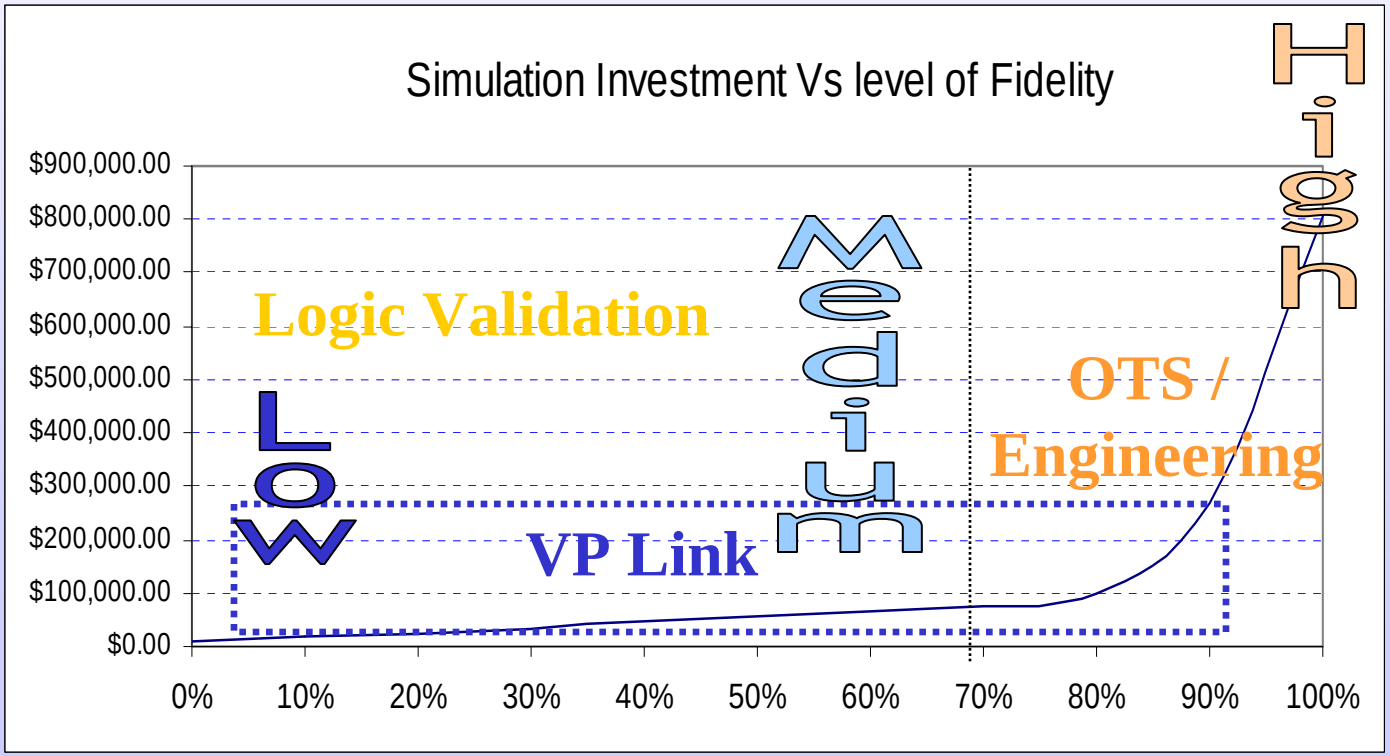
- Essential for training simulator realism/operator buy-in
  - Behaves the same as the real system (no runs out of normal operating conditions)
  - Form operators on proper sequences and thought processes, with real alarming monitoring and trip/shut-downs
- Emulated ESD or Hardware can be used
- Single VP link database used for DCS & SIS
- Communication between DCS and SIS is usually enabled natively
  - If not, VP Link can act as data gateway

What kind of process simulation do you need ?

A closer look at the competition…

Marginal cost Analysis of process model fidelity

- ~ 2,000 I/O
- Oil Refining unit(FCC, HDC etc)



Why is Hybrid modeling more cost effective ?

<u>A note about “Fidelity”</u>

Fidelity is perceived by Operators ONLY through monitored process variables

Fidelity should reflect the *overall accuracy* of the SYSTEM= process simulator + “control environment”

seamlessly

– Approximations compensated for by the control outputs

- Layer Approach minimizes model upkeep costs
- VP Link allows exactly for desired model fidelity
- Accuracy: 99% quasi Steady State / 85% full transient

Operator Knowledge Assessment : the Scoring Engine

- Excel configuration Front End
- Scenario launched sequences
  - Targets (timing, rate, value, tolerance window)
  - Actions (I/O activity)
  - Order (logical relationship between steps)
- Independent trainees logs with:
  - normalized scores
  - relevant actions & timing

Operator Training System (OTS) using VP Link

- *Actual control program* is solved in native environment for realistic control response
- Trainees operate the virtual plant using the actual *field consoles, graphics and keyboards*
- *ESD* (Emergency Shutdown Device) is fully integrated in the process model and OTS
- *HMI graphics are imported* in VP Link to offer an intuitive trainer interface
- *High Quality* process modeling tools, simulating the most complex chemical processes (Rx,Dist,Compressors…)
- *Scoring Engine* for knowledge retention metrics
- *Experienced* , in-house Chemical engineers to deliver turnkey, customized training solutions for your process