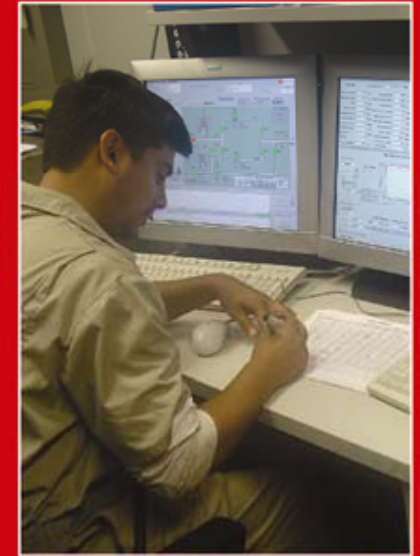




Automated
MPD
Technology



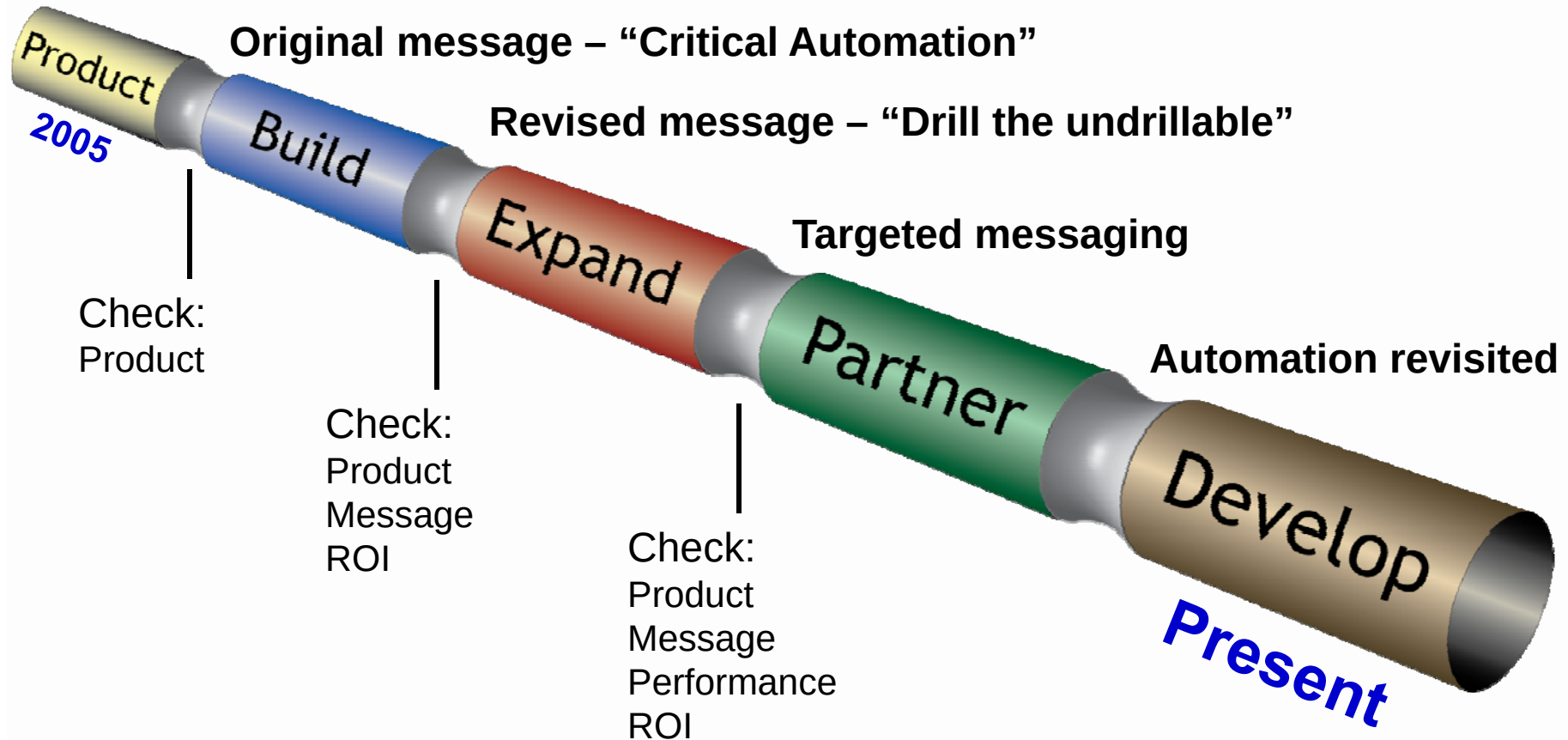
Automation – A Long and Winding Road for MPD

John Samuell
President & CEO
At Balance

Topics

- MPD: From operator development to commercial sales
- Value – Product and Message
- Drivers – Service companies and Operating Companies
- Complexity of MPD Automation
- Example of integrating 3 technologies to provide value
- Where we are, where we are going
- Current Business Models
- The Future
- The Challenge

Value – Product & Message



- Monetizing the investment in automated MPD
 - Servcos – acquire & retain customers, expand market, grow share
 - Opcos – increase production, drilling efficiency, & well control

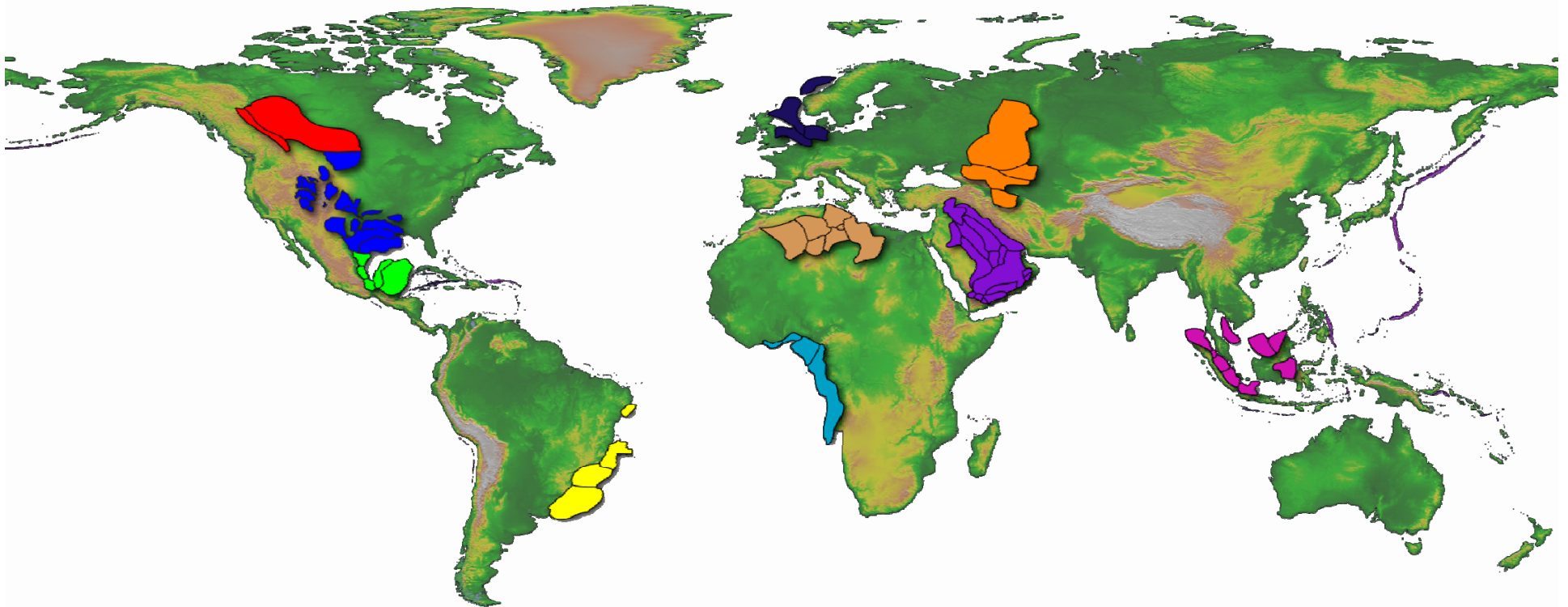
Drivers for MPD Automation - ServCos

- What they want

- Acquire & retain customers
- Grow market
- Expand market share

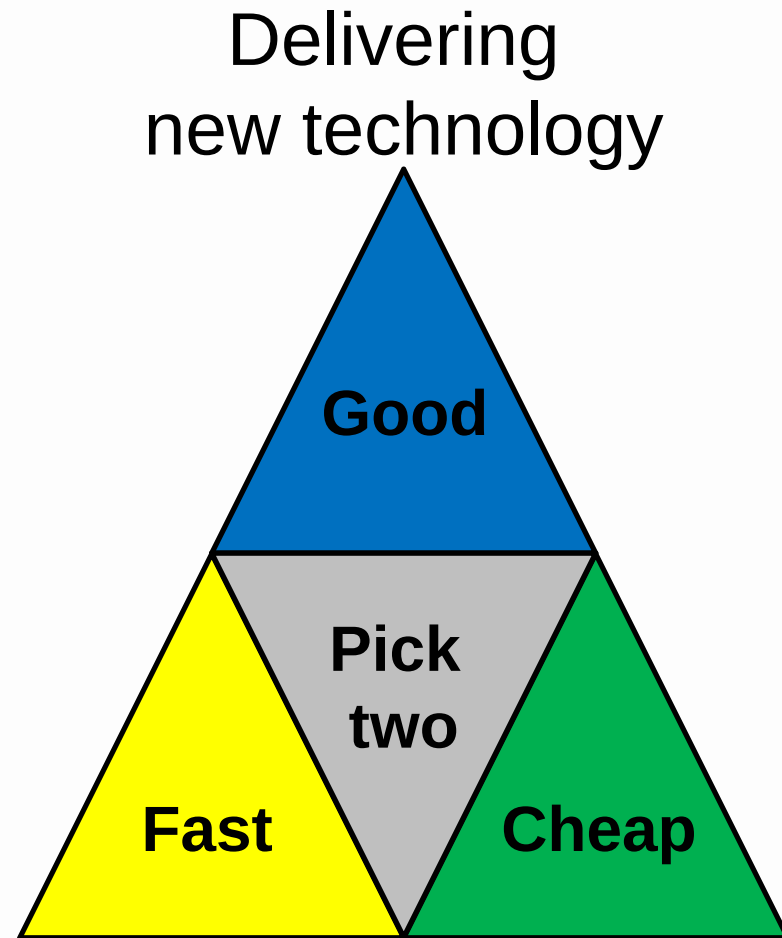
- What they need

- Skilled / competent people
- Sellable product
- Low development & operating cost



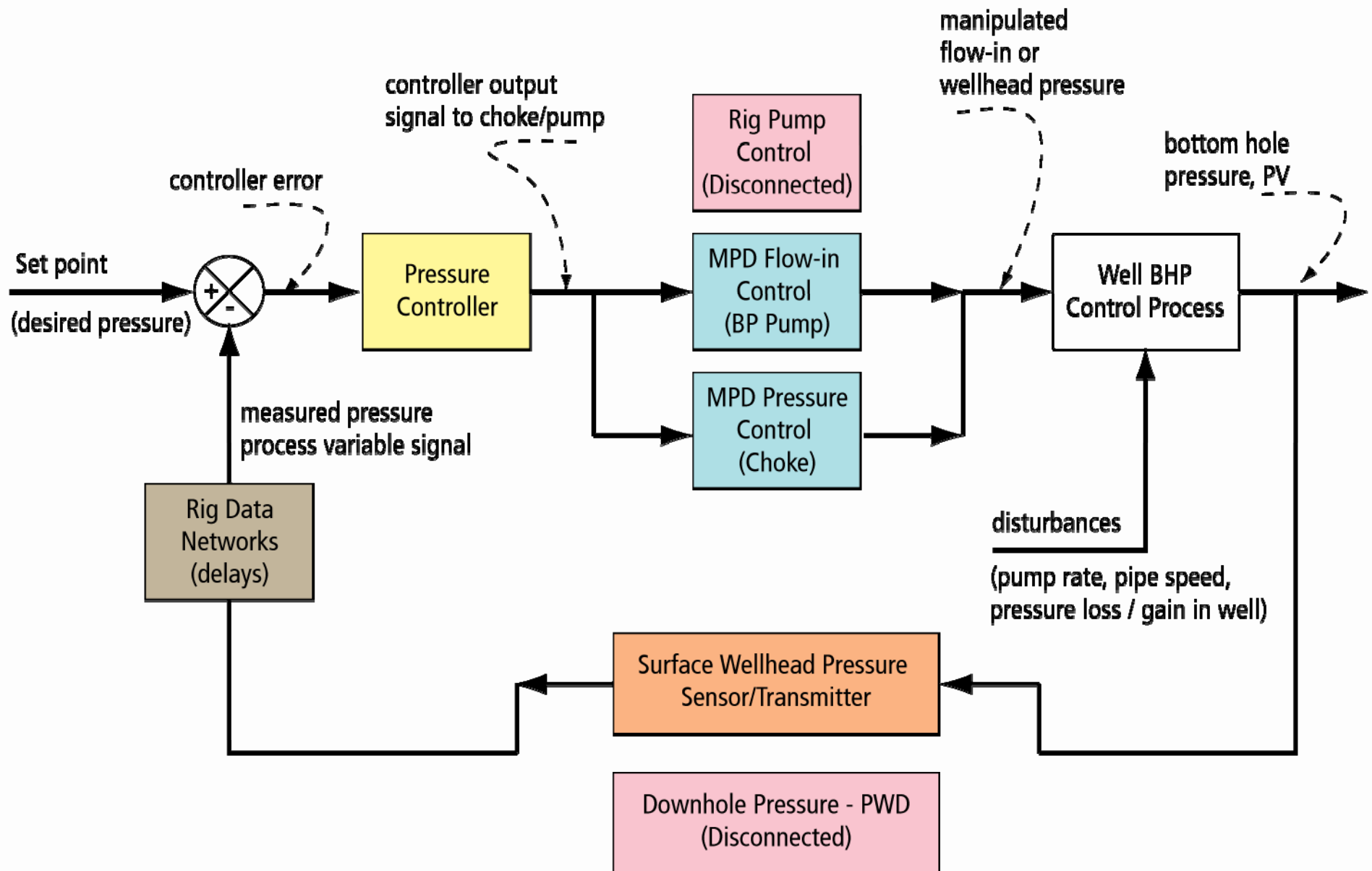
Drivers for MPD Automation - OpCos

- What they want
 - More production
 - Better drilling efficiency
 - Well control insurance
- What they need
 - Reliable pressure control
 - Low prices
 - Automation technology



The law of scope
Can't get all three

Control Loop – MPD



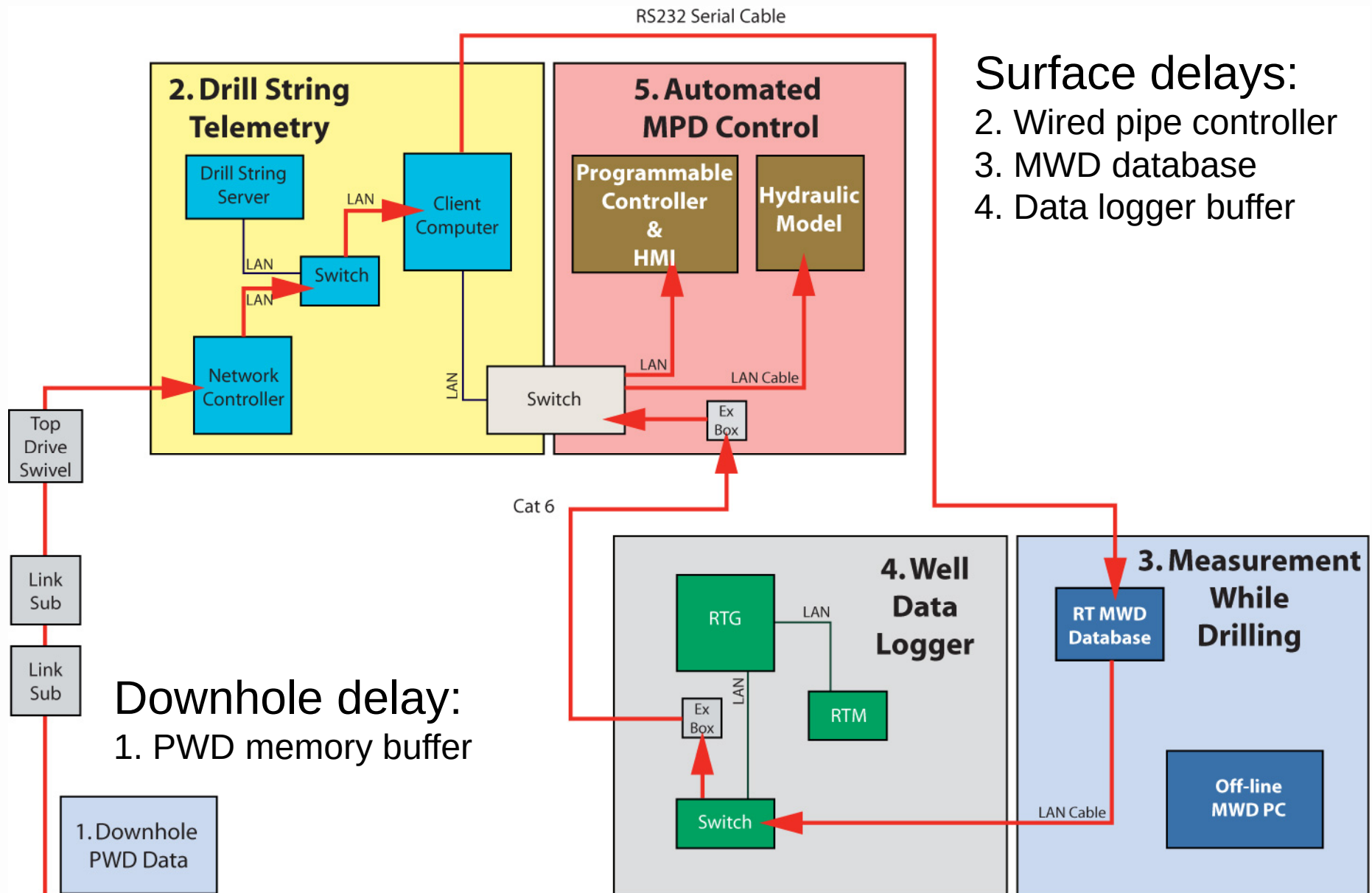
Automated MPD Control with Wired Pipe



Petronas drilling risks

- Gas kick
 - Time to contain kick – minutes
 - Likely to break shoe at shut-in
- Uncertain shoe strength
 - Low kick tolerance at shallow depth
 - Weaker than expected shoe
 - Narrower than expected margin
- Rig manual pressure control
 - Limit fluctuations to +/- 50 psi
 - Manual fluctuations +/- 100 psi
 - Certain to break down shoe
- Gas Plume – moored ship

Non-integrated Network: Delayed Data



Sheridan's Automation Scale

- 0 Executes Action or set-point determined by human
- 1 Offers no assistance; human must do it all
- 2 Suggests alternative ways to do the task
- 3 Narrows down the alternatives and suggests one
- 4 Selects one way to do the task which the human approves for execution
- 5 Gives the human a chance to reject its way before automatic execution
- 6 Executes automatically and necessarily informs the human
- 7 Executes automatically, and then informs the human only if asked
- 8 Executes automatically and ignores human.

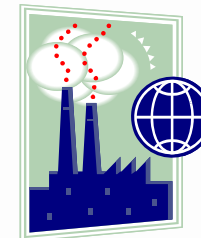


Long Term MPD

- Short term deployment and installation
 - Reduce readiness time-scale – days / weeks vs. weeks / months
- Faster response
 - Sudden, rapid demands for control – rig failures, kicks
- Reduce POB
 - Remote connection, input and control
- Integration
 - Automated interface with rig equipment
 - Total system, e.g. seismic, LWD, MPD,
 - Plug & play software – e.g. hydraulics mode
- New markets
 - UDW floaters
 - Onshore

Business Models

- Current models – non-integrated “cottage industry”
 - Separate Day Rate / Footage Contracts
 - Turnkey – service specific, integrated services
 - Performance based – none for MPD nor automation
 - Combination day rate with one-sided performance requirements
- New model - industrialization of drilling process
 - Need integration of automated systems
 - Virtual enterprise tied to one set of objectives
 - Common set of performance standards
 - Common set of risks / rewards



The Future: Integration

Here are some of the issues:

- Data sharing
 - Will / can we share data?
 - Can we have open platforms?
- Data Quality
 - Are we prepared to link compensation to automatic KPI reporting?
- Liability
 - Who's in charge? Who's liable?
 - If we share data do we share liability?
 - Regulatory / statutory restrictions
- Human
 - New skill sets – Could automation attract more young blood?

The Challenge

- Other than figuring out how to integrate all of these processes:

Develop a new business model to capture and share the value while integrating various automated systems to automate the entire drilling process.



Thank You