

**Today's Projects:  
Challenges & Key  
factors of success**



**Hervé Baron  
Nov 29th, 2010**



## Today's Projects:

### The main challenges and the Key factors of success

Overall Contractor responsibility: EPC (Engineering, Procurement, Construction)

Mega Projects: > USD 1bln

Multiple locations & actors: Low cost centers, Construction sub-contracted

Schedule: Drastically tightened





# Project execution synoptic

Design



Procurement



Manufacturing



Shipping



Installation



Construction & erection



Inspection & tests



Hand-over



## What are the main challenges ?

- Technical ?
- Cost ?
- Quality ?
- Schedule ?
- Size ?
- Safety



## The Key factors of success?

### Schedule:

=> adapt to concurrent rather than sequential execution

- Get the design input early... but get it right!
- Avoid changes and re-works
- Integrate the E, P and C work processes

### Size:

=> Develop and implement precise controls

- Know your actual progress!
- Control your suppliers and sub-contractors

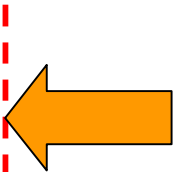
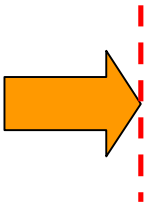
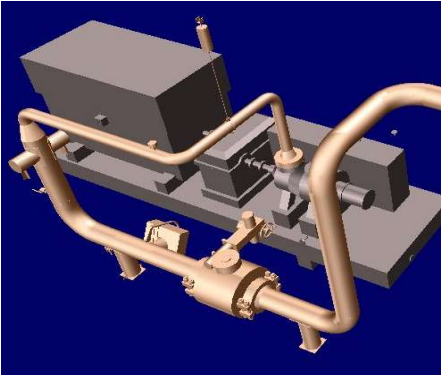


# From sequential to concurrent execution...

ENGINEERING

PROCUREMENT

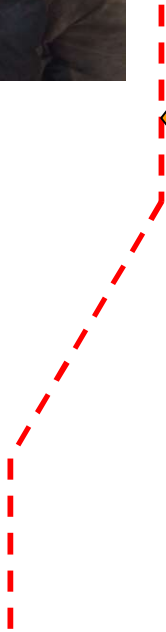
CONSTRUCTION



ENGINEERING

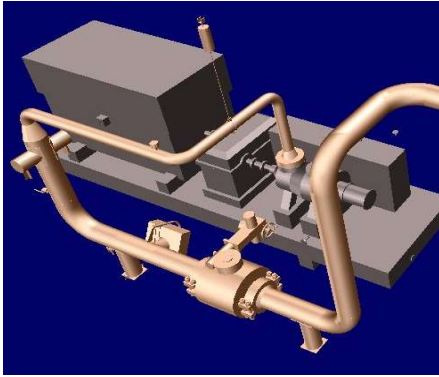
PROCUREMENT

CONSTRUCTION



# The Past: **sequential** execution

ENGINEERING



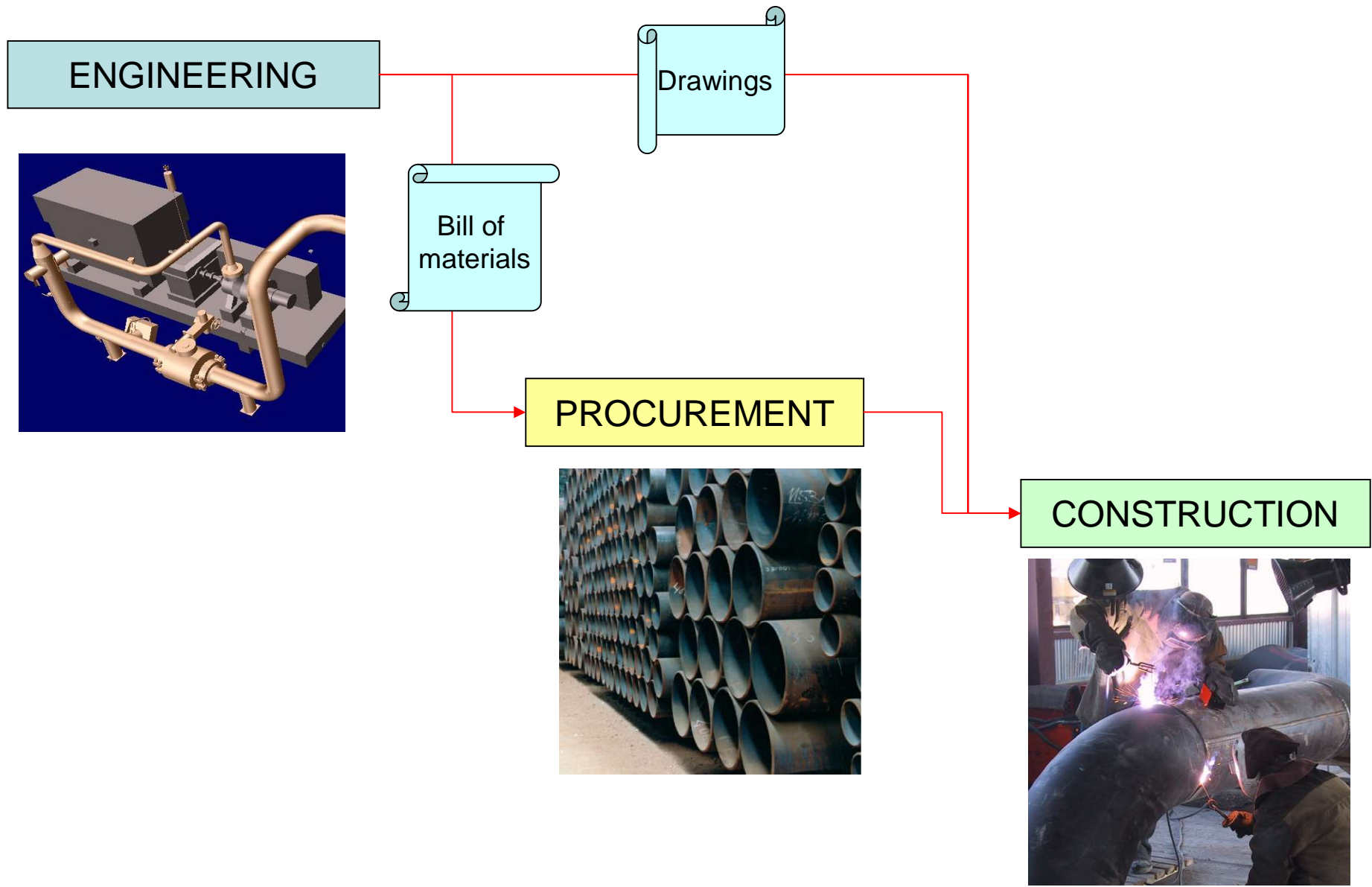
Drawings

Bill of materials

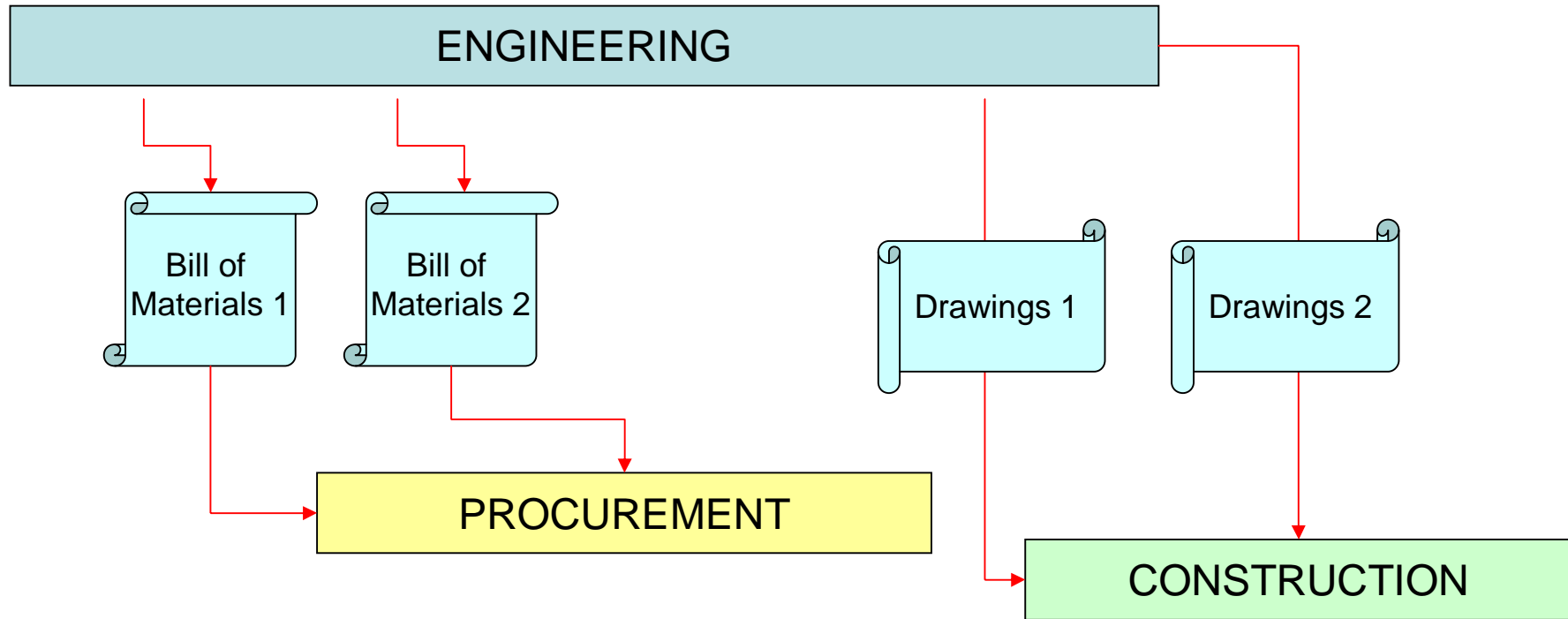
PROCUREMENT



CONSTRUCTION



## The Present: **concurrent** execution



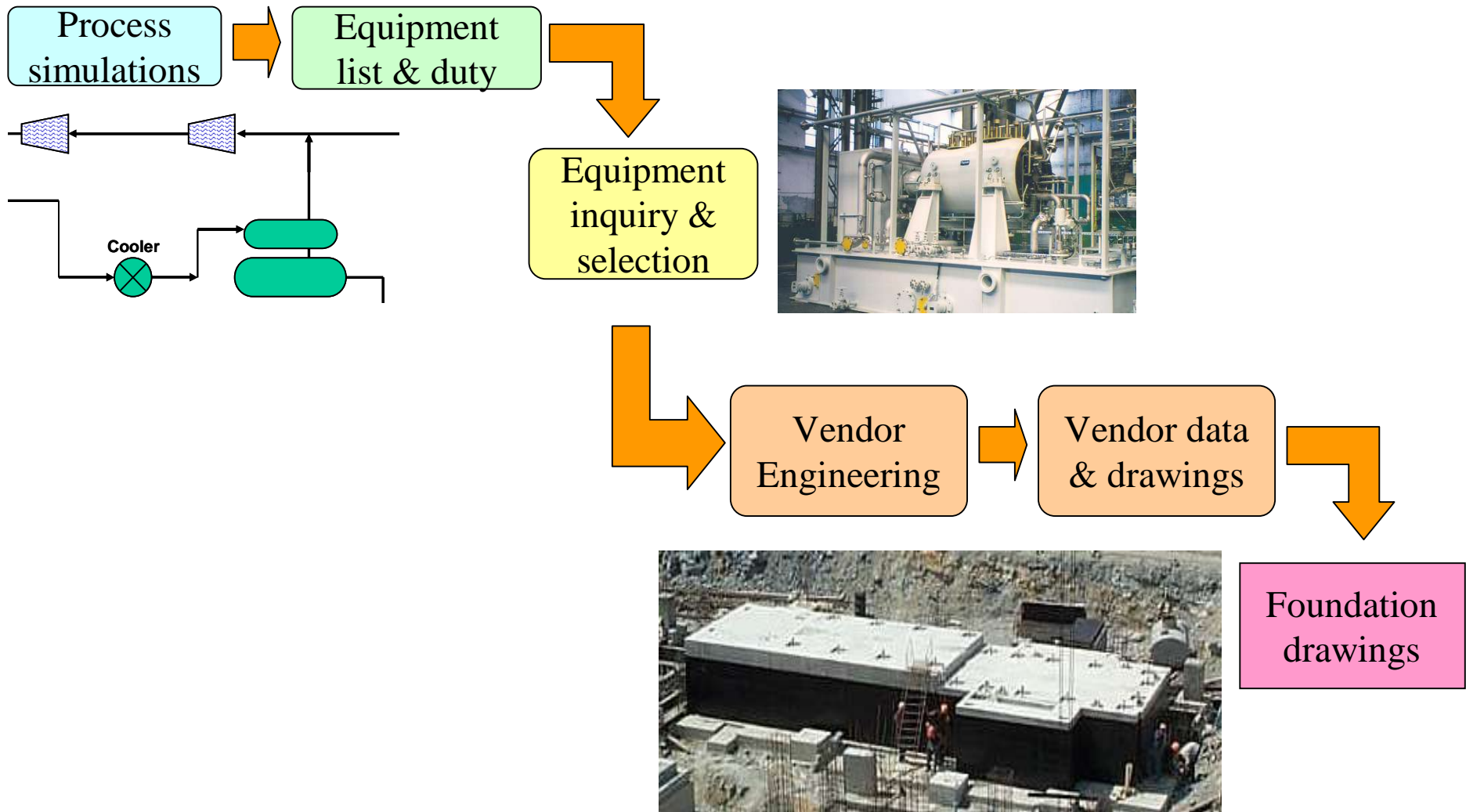
### Derived challenges:

- Get the design input early
- Avoid changes and re-works
- Integrate the E, P and C work processes



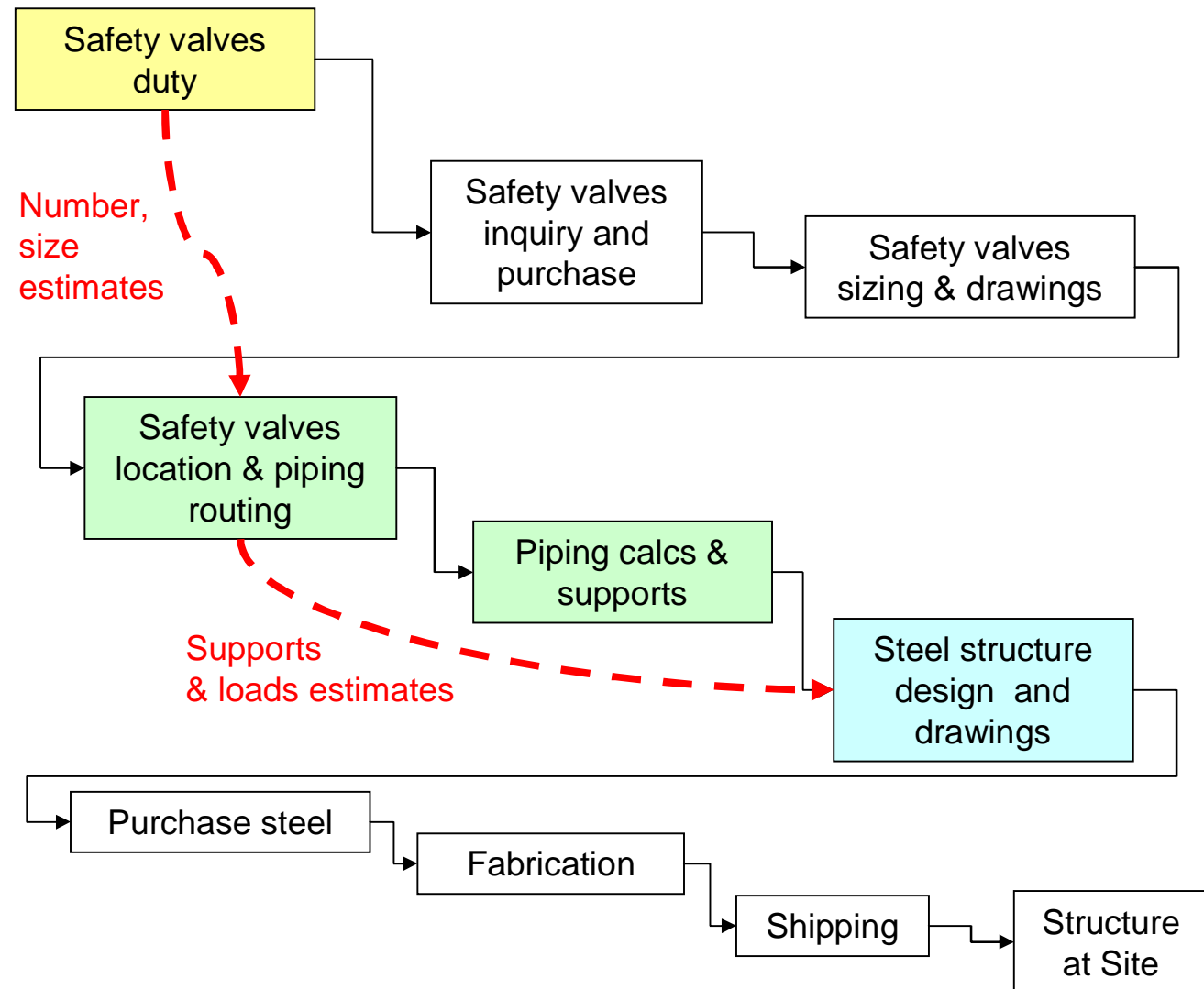
# Getting the design input early

**Engineering is the integrator of the Plant equipment, and is highly dependent on vendor data**



# But get it right!

Engineering must be right first time, which requires experience, good coordination between disciplines and anticipation



## Integrate the work processes

The Construction Sub-contractor is paid a fixed amount for a ton of steel installed  
It is uncertain about the actual delivery schedule of drawings and materials, wants to avoid stand-by

Engineering to up-date the Construction sub-contractor with **work volumes** and **delivery schedules** for Construction sub-contractor to plan and mobilize efficiently



Structure Identity	Latest weight (MT)	Fabrication	Galvanizing	Inspection.	Delivered to Site Status				Foreact delivery completion date
		comp.%	comp.%	comp.%	Frames Wt. (MT)	comp.%	Bolts + Misc Qty.	comp.%	
80-PR-03E	24.12	100	91	91	21.97	91	26-Nov-07	100	25-Dec-07
80-PR-07E	22.32	100.0	59	31	7.00	31	partially del. 26-11-07	99	07-Jan-08
92-STG-063	13.88	100					26-Nov-07	100	27-Jan-08
95-STG-61	22.07	100	100	100	22.06	100	07-Oct-07	100	



# Integrate the work processes

Develop Engineering /  
Construction synergies

- Constructability reviews
- Pre-fabrication
- Engineering schedule to match Construction priorities/sequences
- Engineering deliverables tailored to construction execution needs



# Avoid changes

## Sources of changes:

- Inherited/Open technical issues
- Design development & Reviews
- Client's new requirements
- 3rd party at interface

Avoidable/  
Unavoidable ?



- Resist avoidable changes – Contractual management  
Impact of changes is exponential with time: implement early!
- Interface management,
  - System to identify all impacts and track implementation of changes

## Know your Project's progress

### The principles:

- Draw the list of work items, total = 100%
- Actual progress =  $\Sigma$  individual progress over all work items

### The challenge:

- The list of work items keeps changing – difficulty to keep track
- The total work volume (100%) keeps changing
- Increase by up to 30-50% are common

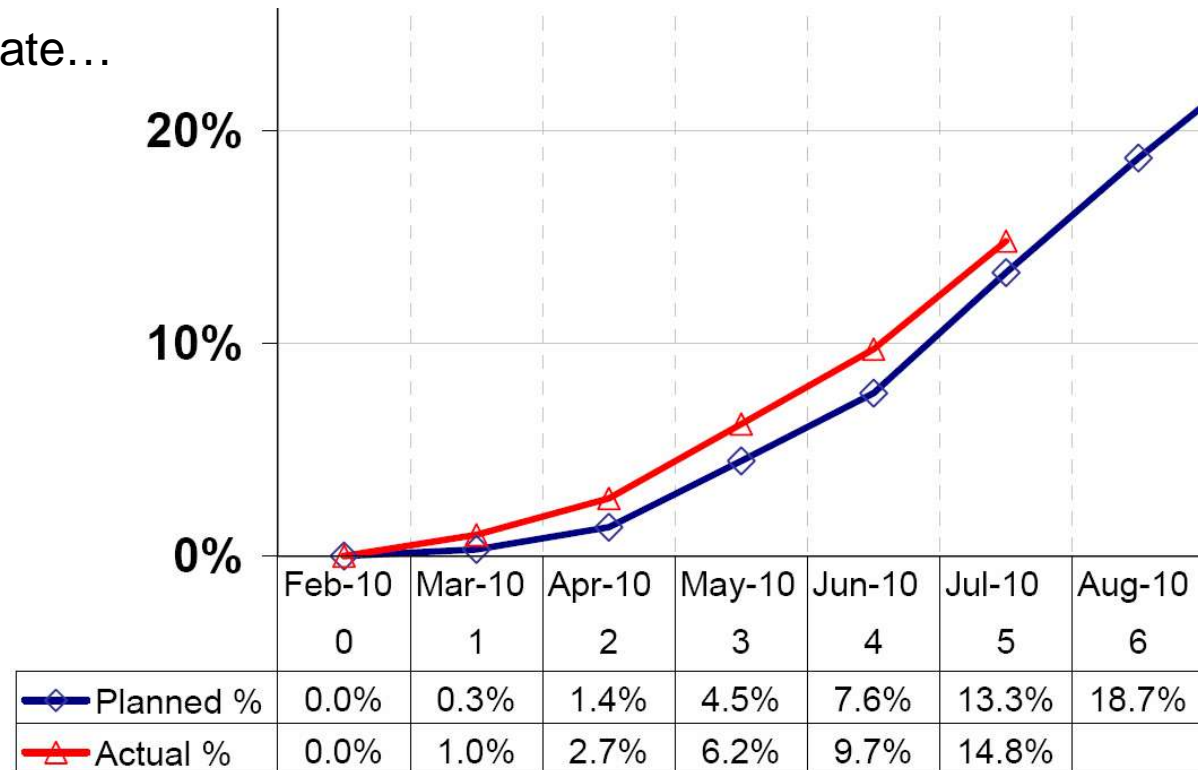
### The keys:

- Overall progress from detailed breakdown by individual work item/steps
- Monitoring from up-to-date list of work items



## Set-up an accurate progress measure

The overall picture is accurate...



If :

- its derives from progress of **elementary** work items
- It reflects the true work volume, i.e., is based on **up-dated** list of work items

## How are the electrical works doing?

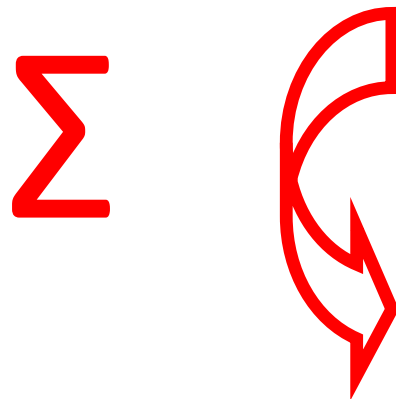
How to monitor construction progress, the case of Electrical cables for a FPSO:  
254 km of Electrical cable to pull, gland, terminate. **What is the progress?**



# How are the electrical works doing?

Individual item (cable) and work step (pull/gland/terminate) status

Cable tag	From_tag	To_tag	Date pulled	Date Gland From Tag	Date Term. From Tag	Date Gland To Tag	Date Term. To Tag
C-1-A-FAN-43802-A	1-A-CPL-43801	1MC-LV23	8-Mar-05				
C-1-A-FAN-43802-B	1-A-CPL-43802	1-CPL-0886-2/13/14	8-Mar-05				
C-1-A-FAN-43803-A	1-A-CPL-43801	1MC-LV22	8-Mar-05				
C-1-A-FAN-43803-B	1-A-CPL-43802	1-CPL-0886-2/13/14	8-Mar-05				
C-1-A-LCS-1WBE-83124	1MC-LV24	1-A-LCS-1WBE-83124	2-Mar-05				
C-1-A-LCS-1WBE-83131A	1MC-LV24	1-A-LCS-1WBE-83131	2-Mar-05				
C-1-A-LCS-1WBE-83131B	1MC-LV24	1-A-LCS-1WBE-83131	2-Mar-05				
C-1-A-LCS-LV-01-A	1-A-EMG-UCP-01	1-A-LCS-LV-01	4-Mar-05	20-Mar-05	21-Mar-05		
C-1-A-LCS-LV-01-B	1-A-EMG-UCP-01	1-A-LCS-LV-01	4-Mar-05	20-Mar-05	21-Mar-05		
C-1-A-LCS-LV-02-A	1-A-EMG-UCP-01	1-A-LCS-LV-02	4-Mar-05	20-Mar-05	21-Mar-05		
C-1-A-LCS-LV-02-B	1-A-EMG-UCP-01	1-A-LCS-LV-02	4-Mar-05	20-Mar-05	21-Mar-05		
C-1-A-LES-1WAL-41105	2MC-LV07	1-A-LES-1WAL-41105					
C-1-A-LES-1WAL-41110	2MC-LV07	1-A-LES-1WAL-41110					
C-1-A-LES-FAN-43802	1MC-LV23	1-A-LES-FAN-43802	8-Mar-05				
C-1-A-LES-FAN-43803	1MC-LV22	1-A-LES-FAN-43803	8-Mar-05				
C-1BC-DC26	1-A-MCC-MCD-01	1BC-DC26					
C-1-B-FAN-43801-A	1-B-CPL-43801	1MC-LV24	3-Mar-05			12-mars-05	13-Mar-05
C-1-B-FAN-43801-B	1-B-CPL-43801	1MC-LV24	3-Mar-05			12-mars-05	13-Mar-05



Description	Electrical
Total cable quantity (nos.)	5 377
Quantity pulled (nos.)	4 438
Balance quantity to pull (nos.)	939
Total glands (nos.)	10 754
Total termination (nos.)	10 754
Completed gland (nos.)	5 280
Completed termination (nos.)	5 267
Balance to gland (nos.)	5 474
Balance to terminate (nos.)	5 487



# Control your suppliers and sub-contractors

“ You get what you inspect, not what you expect “

- Know your supplier work process/steps
- Implement tight follow-up/expediting
- Access you supplier's systems



Job	Descr	Weight	Drawing Office	Planning	Fabricated	Sub Treatment	Treated	Loaded	% Fabricated	% Galvanized	% Delivered
60307	80-PR-13E	65.3864	0	0	0	0	0	65.3864	100.0%	100.0%	100.0%
60308	80-PR-12E	32.6998	0	0	0	0	0	32.6998	100.0%	100.0%	100.0%
60310	80-PR-19 (Pat -01)	56.1923	0	0	0	0	0	56.1923	100.0%	100.0%	100.0%
60311	80-PR-18	234.6891	0	0	0.6278	47.7529	0	178.7163	76.4%	76.2%	76.2%
60312	80-PR-27 (part - 02)	83.2827	0	0	0	0	0	83.2827	100.0%	100.0%	100.0%
60313	80-PR-19 (Pat -03)	126.7195	0	0	0	5.0505	0	121.669	96.0%	96.0%	96.0%
60314	80-PR-19 (Pat -02)	145.2883	0	0	10.2572	0.6449	0	129.3894	96.1%	89.1%	89.1%