Speaker Introductions

**Pete Jackson**
Mr. Jackson is Head of Project Control for Global Engineering at AstraZeneca, a global, innovation-driven, integrated biopharmaceutical company. He has over 20 years of experience in project controls, estimating, scheduling, and project management across several industries including biopharmaceutical, petrochemical, commercial, and hospitality. His career includes experience working for the owner and as a consultant in the capital project delivery field. In addition to work in the US, he has lived and worked in Europe & Asia.

**Herschel Baxi**
Mr. Baxi is PMA’s Managing Principal for its Mid-Atlantic region including New York, New Jersey, Pennsylvania, Virginia, Maryland and Puerto Rico. He has extensive experience in project planning & controls, risk assessments, implementation of project management information systems, project management and controls offices, and business intelligence for project management.
Agenda

• Capital planning processes, performance and the need for improvement
• Typical capital planning scenarios and results
• Improvement option using probabilistic approach & applying risk analysis methodology
• Benefits
• Use and potential for NetPoint / NetRisk for this process
• Additional Considerations
This presentation…

• In development of a general solution to a common business problem … capital portfolio performance
• Not company specific – representative of experiences across several firms / entities
• Share status & methodology
• Seek input / thoughts / suggestions
• Show how this is developed in NetPoint / NetRisk
Capital Portfolio Management

• Business process to establish a capital budget, allocate to specific investments, and execute against the plan

• Basis for this presentation
  • Annual budget cycle
  • Annual capital target established
  • Investments include projects and recurring budgets (facility reinvestment)
  • Finance & Business driven
    • Engineering / Project groups provide input
    • Decision making & perspective
Typical Capital Planning Process

• Annual budget fixed 4-8 months prior to start of year
• Process exists for allocating capital which is a combination of:
  • Top Down: Allocate to business units based on long range plan, high level priorities
  • Bottom Up: Request capital based on specific needs and investment requests (with drivers)
  • Convergence - decision / priorities
• Output:
  • List of Projects / Investments
  • Point estimates
  • Monthly cashflow
  ➔ Deterministic
Why is there Pressure to Deliver Capital Program per Plan?

- Avoid missed opportunities to invest – potential impacts to financials, customers
  - New Products
  - Lower service levels – shortages, delays
- Publicly traded firms
  - Capital performance can be signal to market
- Management accountable to a governing board
- Entity has issued bonds to fund program
  - Funds have been secured w/interest being accrued
- Performance bonuses tied to capital plan delivery
Responsibilities of Owner Engineering / Project Management

Successfully deliver project elements
- Design
- Construction
- Startup

Successfully deliver projects to targets in total
- Safety
- Cost / Schedule
- Quality
- Operability

Develop the right projects / investments
- Solution to a business need. Capital? Other?
- Scope definition

Deliver the capital portfolio that supports the business
### Capital Plan Output

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### List, Timeline, Spend Profile

![List, Timeline, Spend Profile](image-url)
What all too often happens during execution...

**Typical Changes to Capital Delivery**

- **Capital plan execution “not as planned”**
- Project risks and opportunities impact start dates, durations and therefore expenditures.

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**Capital plan execution “not as planned”**

Project risks and opportunities impact start dates, durations and therefore expenditures.
Resulting Year End Delivery of Capital Plan

GAP = Missed commitments
Missed opportunities

Organizations Do Not Meet Targets
Under spend is lost opportunity
Contents of the capital plan have wide ranging probabilistic outcomes, but methodology assumes deterministic certainty

- Steady state – level of effort spend (e.g., minor capital, site reinvestment) – High level of confidence or at least control/influence
- Fully approved projects, in execution (high level of cost & schedule confidence)
- Projects in planning – some design complete / early estimates (medium level of confidence)
- Placeholders -- $$ to hold capital budget availability for potential needs (low level of confidence – “SWAG”)
How Do Some Organizations React to Achieve Goal?

Steps often taken to mitigate in a deterministic world

- Additional cost (overtime, etc.)
- Organizational “churn”
- Low return projects added
Possible Result of Reactive Recovery

Target Achieved Through Chaotic Add / Acceleration of Projects

Sub-optimal spending – May have spent the planned amount but did not deliver planned benefit to the business
Confirmation of Premise...?
Improving the Capital Planning Process

• Change is inherent to projects yet we use deterministic estimates to develop capital plans

• In the representative example we walked through –
  – Initial capital plan based on deterministic estimates of time and money
  – Plan recovery based on –
    • Deterministic estimates of remaining work
    • Addition of new work based on Deterministic estimates

“...all knowledge degenerates into probability;..”, David Hume, A Treatise of Human Nature [1739]
Recap - Deterministic Capital Planning

A deterministic plan

Reacting to a deterministic plan
How do we accomplish this?

• Apply probabilistic / risk principles to the portfolio of projects (capital spend)
• Account for each project
  – Start Risk
    • Business case delay, justification / approvals take longer
  – Duration Risk
    • Project activities extend beyond plan / assumptions
  – Cost Risk
    • Cost variation, dependent on definition
  – Existence Risk
    • Is investment no longer needed?
    • Budget placeholder – higher risk
Probabilistic Planning

Account for Start Risks and Duration Risks

Account for Cost Risks
Requirements for Planning Probabilistically

• All projects must have a form of risk assessment to build model
  – Many projects will have only high level assessment (especially budget “swag”s)
  – Others may leverage full quantitative assessments completed as part of a project process
  – Approaches will vary but must develop a probabilistic view for each project with input from knowledgeable stakeholders

• Organization must define capital performance tolerance & goal
  – Does +5% to target provide same pain as -5%?
  – Define ideal capital uncertainty window for target
Develop as iterative process

- With proper inputs, can iterate making changes to the portfolio that results in different outcome possibilities

Base Scenario:
Sub-optimal – not hitting target
Develop as iterative process

- After iterations are complete
- Probabilistic outcome is optimized for the organization
- Using NetPoint / NetRisk – Interactive planning & Iteration

Outcome curve shifted through proactive measures:
- Addition of projects
- Adjust timing
Throughout the year

• After the initial plan has been completed
  – Update the model throughout the year
  – Reflect changes / actuals / new risks
• Active management using tools & information that reflects the reality of the data
• Allow for early & dynamic reallocation of capital
  – not possible with deterministic view
Benefits of successful probabilistic portfolio planning

- By spending on planned projects vs. reactive projects, the Value of the spend can be greater to the organisation
  - ROI of planned projects likely > reactive projects
  - Utility to organization likely > reactive projects

➡ Develop Utility model for capital effectiveness (Net Portfolio ROI or other equivalent measure)

<table>
<thead>
<tr>
<th>Type of Portfolio Planning</th>
<th>Likely Outcomes/Utility Value</th>
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<tbody>
<tr>
<td>Deterministic</td>
<td>Underspending</td>
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<tr>
<td>Deterministic w/ Reactive Recovery</td>
<td>Sub-Optimal Spending</td>
</tr>
<tr>
<td>Probabilistic</td>
<td>Optimal Spending</td>
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Benefits of successful probabilistic portfolio planning (continued)

• Higher likelihood of achieving the target
  ➔ Meet commitments (board, wall street, etc.)

• Reduce churn and wasted efforts to meet capital targets
  ➔ Organizational efficiency
Probabilistic Capital Planning

...From Deterministic Planning and Reactive Recovery

...To Probabilistic Planning & Forecasting
Why NetPoint/NetRisk

- Solution must appear intuitive to ensure support & stakeholder involvement (Finance, Business)
  - Not a “black box”
  - Easy to grasp quickly and understand
  - Interactive sessions with real-time feedback & results

⇒ Leverage GPM for Portfolio Planning

- Cost risk features, once incorporated into NetRisk, will enable NetPoint to be a comprehensive portfolio planning / forecasting tool

- NetPoint/NetRisk will facilitate seamless transition from capital portfolio planning from deterministic to probabilistic

- Conduct Schedule Risk Assessment within the same portfolio
  - Same tool
  - Real-time project planning based on real-time risk analysis
Path forward

- If you build it…
Discussion
Closing Thoughts… Innovation

- Structured approach to creativity
- Work inside familiar world
- Use of templates

Techniques
- Subtraction
- Division
- Multiplication
- Task Unification
- Attribute Dependency
Task Unification

Integrate existing functions into a new process
To produce improved results
Additional considerations

• Incorporate project dependencies into model
• Model systemic / portfolio risks
  – e.g., impact of statutory change that could impact many investments
• Cost & Schedule risk integration