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Value of Seamlessly Collaborative Integrated Studies

Presented by
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OUTLINE

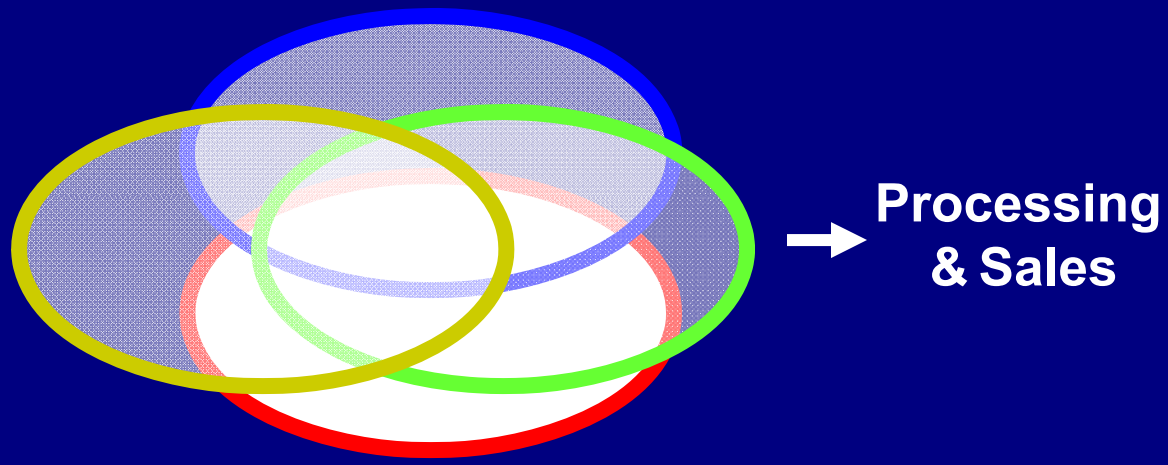
- Introduction
- Objective
- Premise of Collaborative Studies
- Critical Resources/Drivers
  - Qualified Professional Manpower (Minds)
  - Multidisciplinary "Know-How" (Expertise)
  - Integrated Decision Analysis (IDA) - *The Process, Bases and Methodology*
- Conclusions : *A Corporate Check List*

Introduction
Sequential vs. Collaborative Processes

- **Sequential "Asset Team" Approach** (Late 1980's)

Sub-Optimal Solutions

- **Seamlessly "Collaborative Team" Approach** (During 2000's)



Parallel workflows & synergies captured: Optimal Solutions. ★

Objective

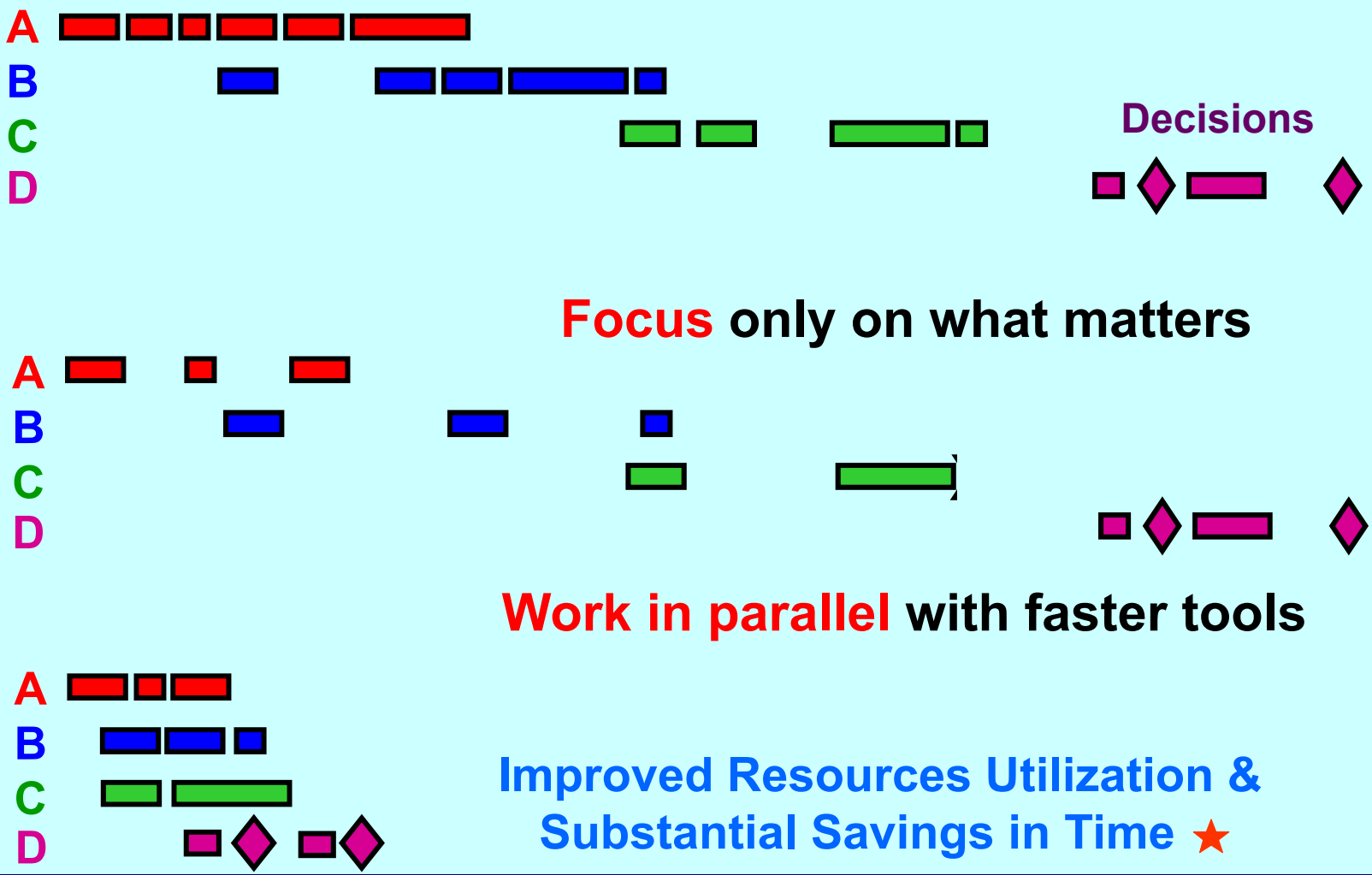
Create Value and Maximize Shareholders' Wealth through Synergizing minds, tools and database.

HOW?

- **Educate, Recruit, Develop and Retain Qualified Professional Workforce**
- **Integrate Multidisciplinary "Know- How"* to carry out appropriate studies to help make rational investment decisions.**

*** Defined as Core Competencies/Expertise in Technical, Business and Leadership Skills ★**

Collaborative Studies
The Premise

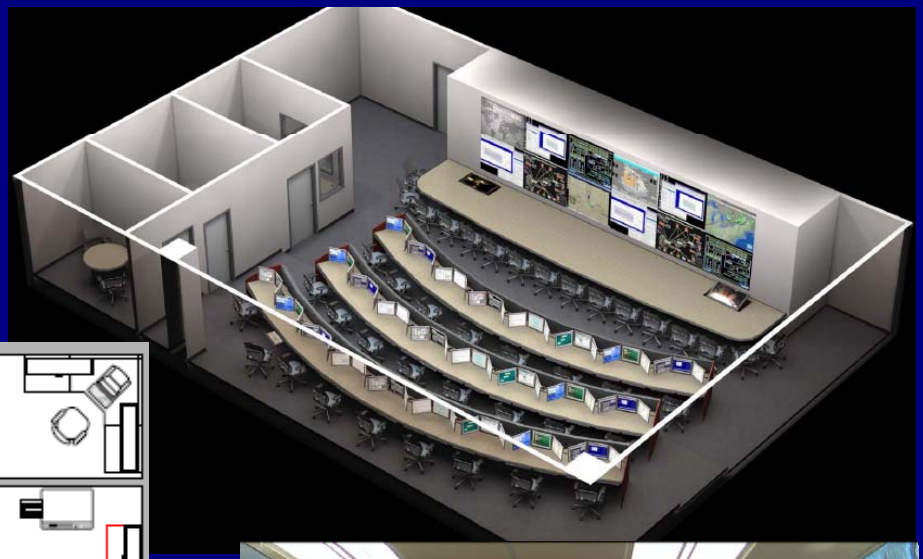


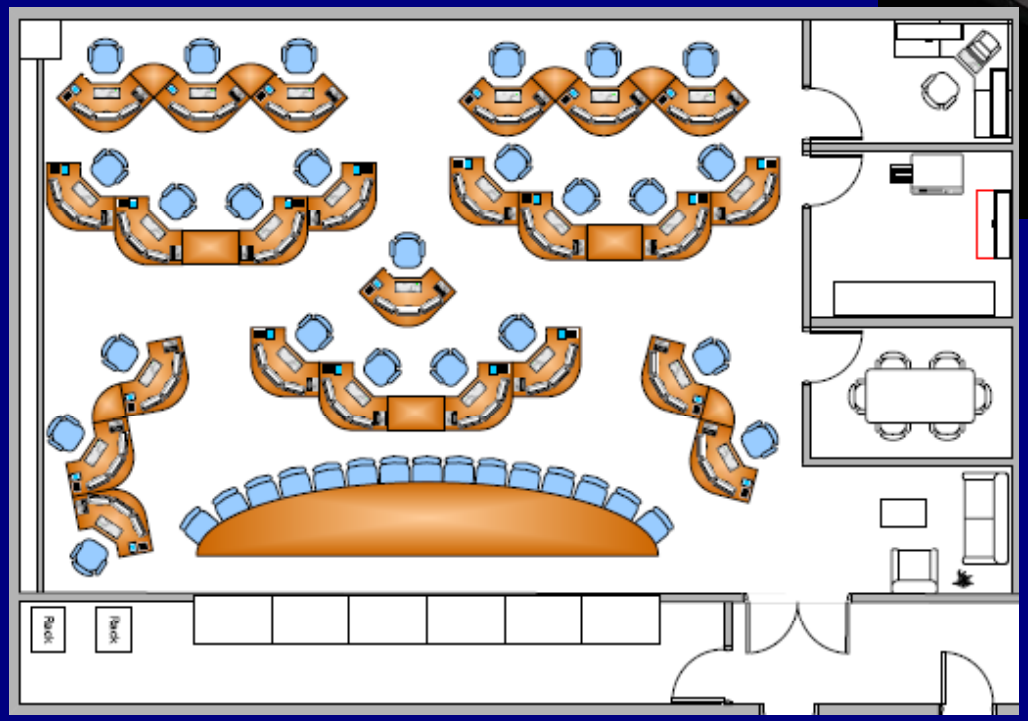
Collaborative Studies
Key Attributes

- Multi-disciplinary / Cross-Functional Teams
- Dedication & Focus
- Parallel Workflows
- Full Spectrum of Alternatives
- B-i-C Integrated Decision Analysis (IDA)
- Better & Faster Results and Decisions
- Synergy (Minds, Tools & Database) ★

Collaborative Studies

Synergies Captured: Minds, Tools & Database





Critical Resources / Drivers

- **Qualified Professionals: Minds**

  Key Attributes, Education, Learning & Development (L&D)

- **Multidisciplinary "Know-How" : Expertise**
- **Integrated Decision Analysis (IDA):** ***Putting it all together to capture synergies of Minds, Tools and Database***

Qualified Professionals
Key Attributes

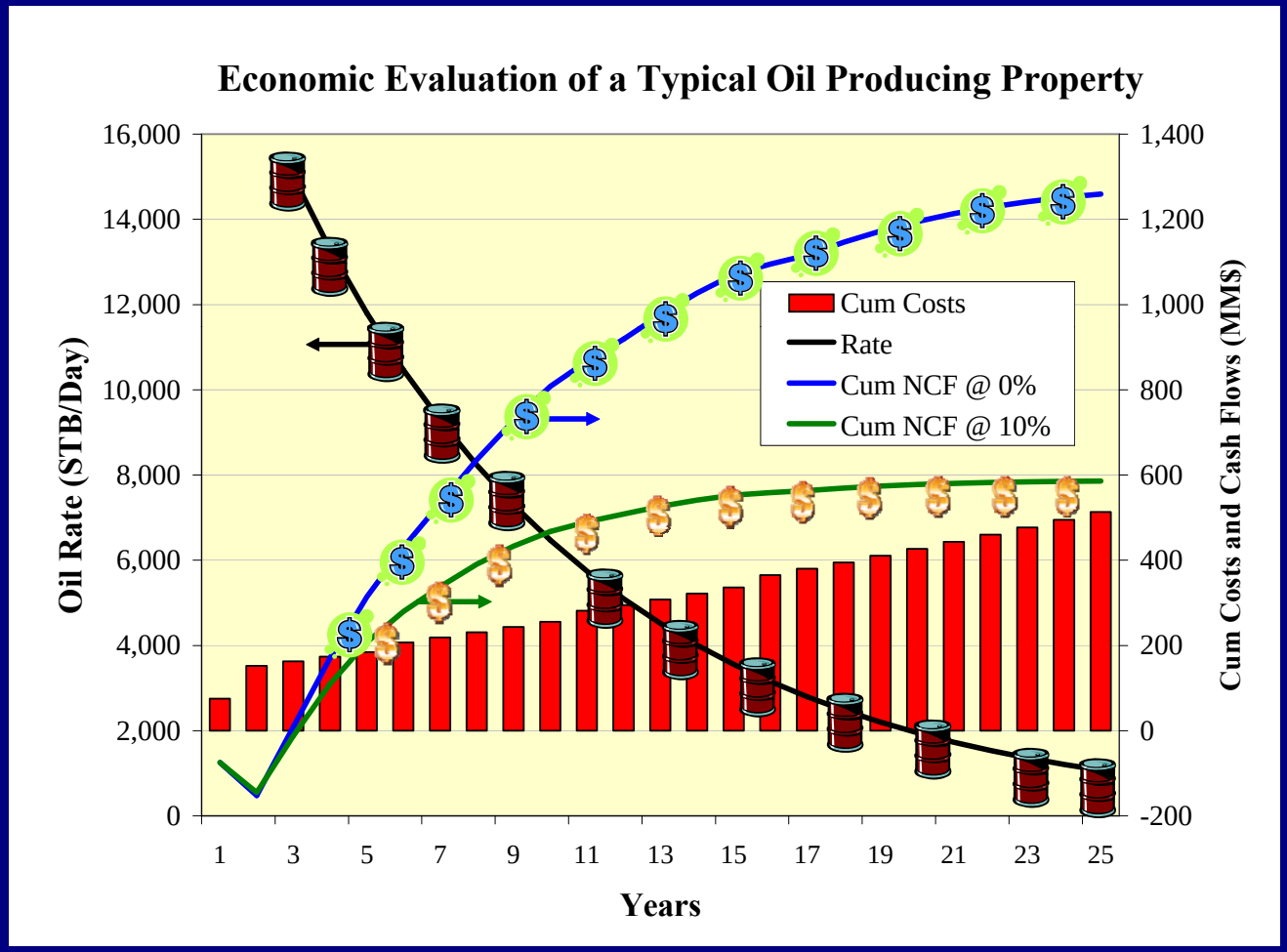
Successful Professional

Jasper King, The Way Ahead, SPE Publication (Vol.3, No.1, 2007)

- **Ambitious**
- **Results-Oriented**
- **Technically Proficient**
- **Team Player**
- **Effective Communicator**
- **Business Savvy**

Summary: Possess Technical, Business & Leadership Skills

Qualified Professionals…
University Education: Rethink & Reengineer



The Key Hypothesis*

Q vs. t

★

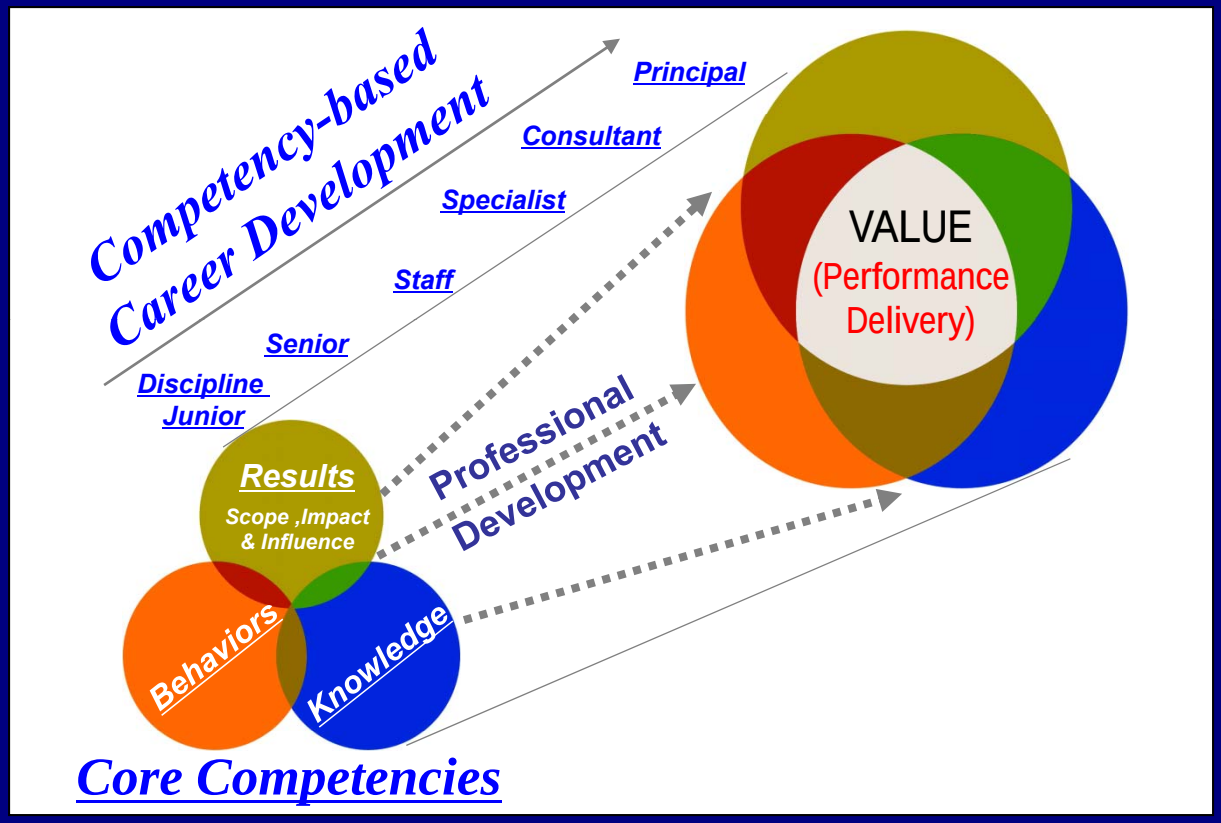
*** How learning the topic like porosity (e.g. reserves) is going to contribute to this bottom line must be emphasized.**

Qualified Professionals…

L&D – Competency Development Cycle

Adapted from " Oxy's input to PetroSkills (2004 Conclave, Houston, TX)"

Qualified Professionals…
L&D - Career Progression & Value Added



Measures Progress & Sets Expectations for Performance Delivery ★

Adapted from " Unocal's input to PetroSkills (2004 Conclave, Houston, TX)"

Critical Resources / Drivers

- Qualified Professionals - Minds
- Multidisciplinary "Know-How" - Expertise

  Technical, Business and Leadership Skills
- Integrated Decision Analysis (IDA)

Multi-Disciplinary "Know-How"

Three (3) Core Competencies / Expertise:

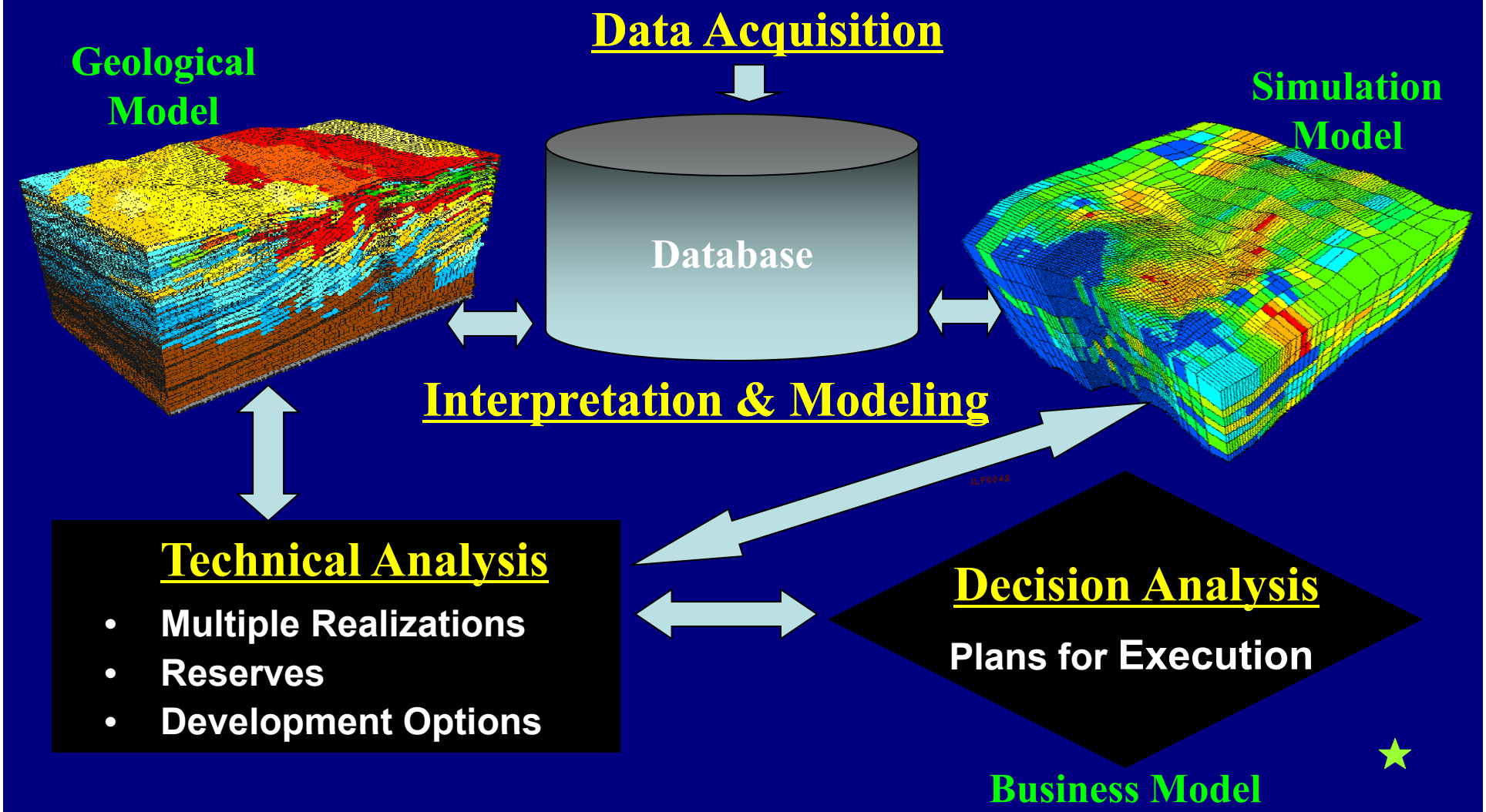
- **Technical Specialties/Skills**
  - ✓ **Earth Sciences –** *Geology & Geophysics*
  - ✓ **Petrophysics**
  - ✓ **Engineering -** *Drilling & Completion, Reservoir, Production & Facilities*
  - ✓ **Statistics & Decision Analysis**
  - ✓ **Maintenance & Operations, etc.**
- **Business Skills - Economics & Finance**
- **Leadership Skills – Knowledge Sharing, Communication, Impact & Influence, etc** ★

Critical Resources / Drivers

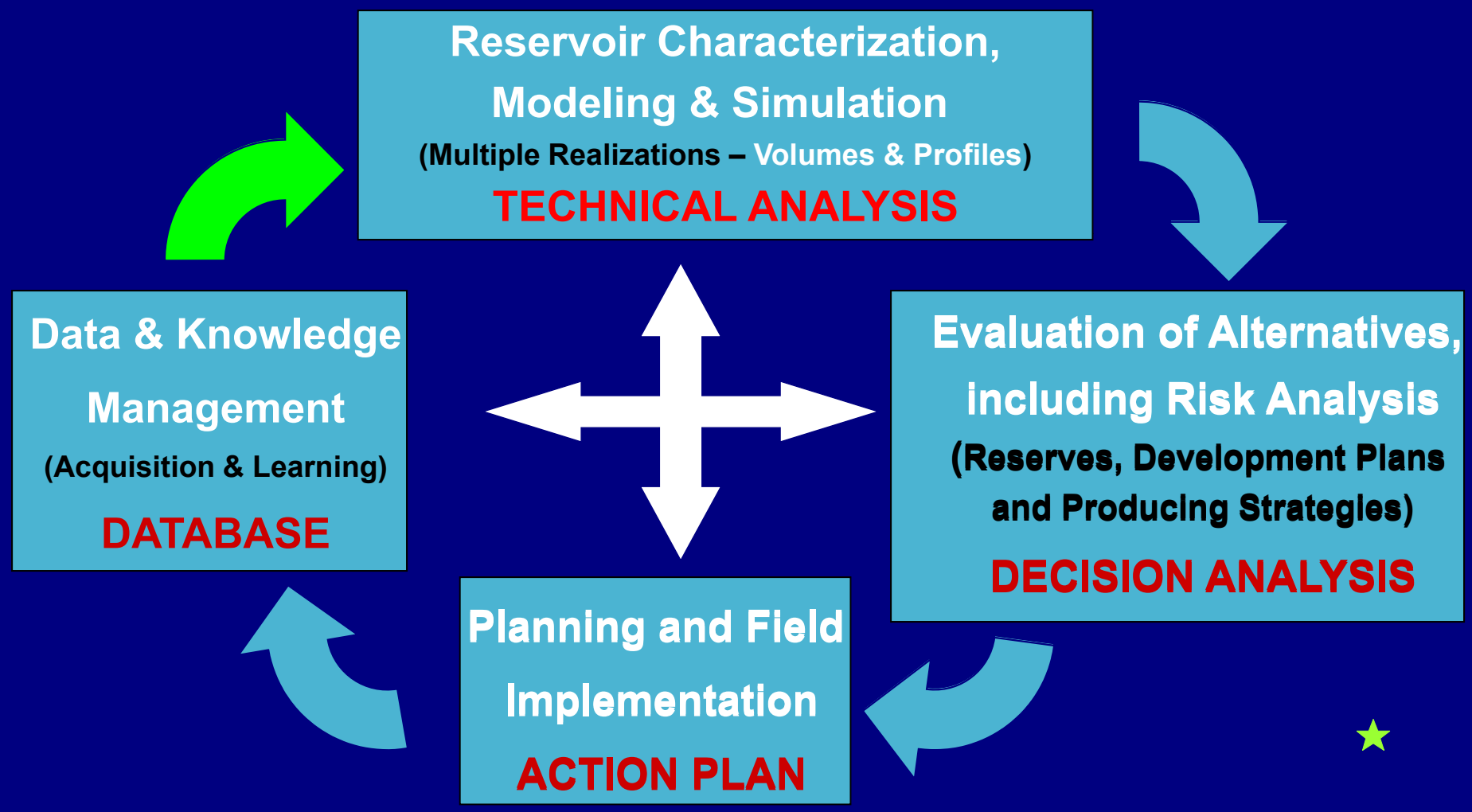
- **Qualified Professionals - Minds**
- **Multidisciplinary "Know-How" - Expertise**
- **Integrated Decision Analysis (IDA)**

  Synergies captured thru Minds, Database & Tools

Integrated Decision Analysis (IDA)
The Process – A Pictorial View



Integrated Decision Analysis (IDA)
The Process – A Conceptual Premise

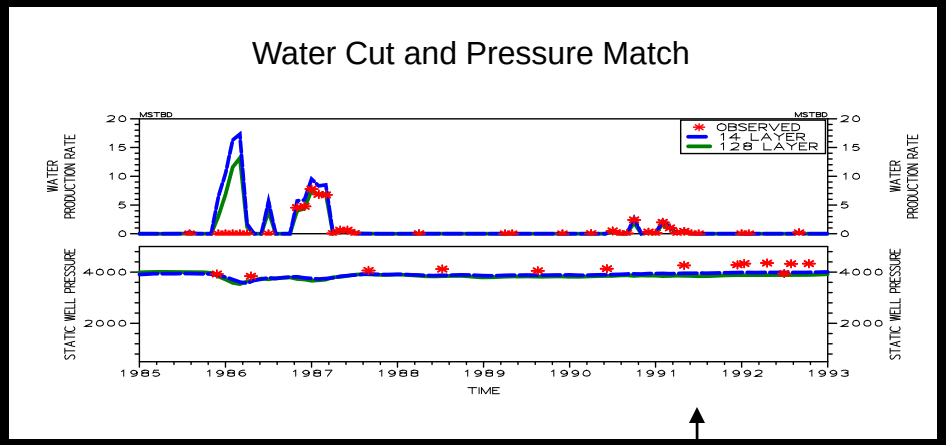


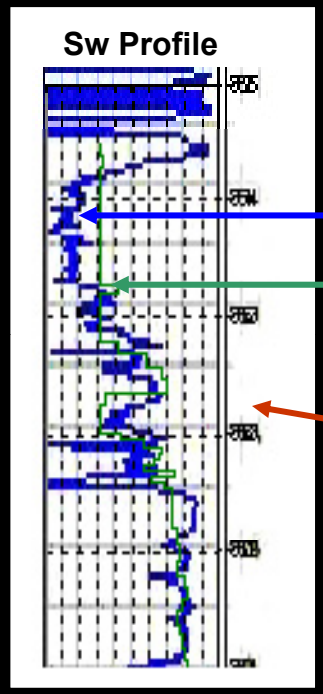
Integrated Decision Analysis
Technical Issues – Key Parameters

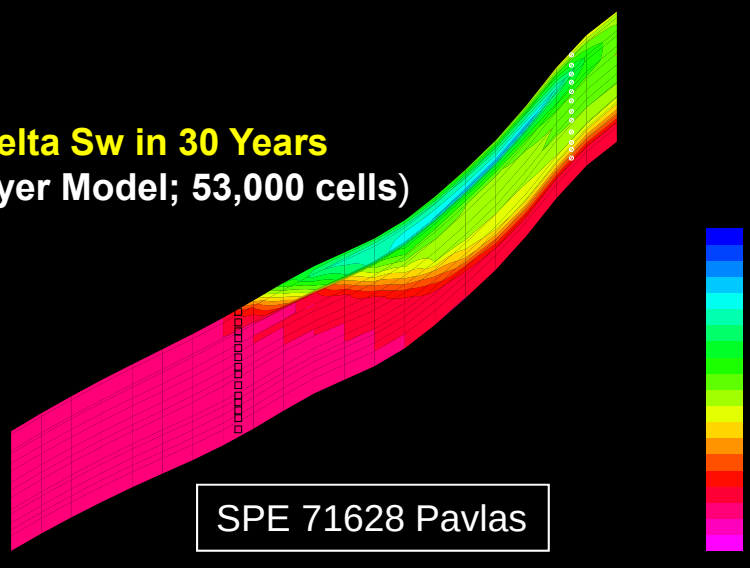
With Significant Impact on Results:

- Proper Physics
- Details - Grid Size, Number of Layers
- Petrophysical-based Rock Typing
- INPUT DATA Quality – Static and Dynamic
- Initialization – How to propagate & distribute data?
- Simultaneous Nodal Analysis (Reservoir, Completion, Wellbore & Surface) ★

Integrated Decision Analysis
Technical - Location of Trapped Oil Example







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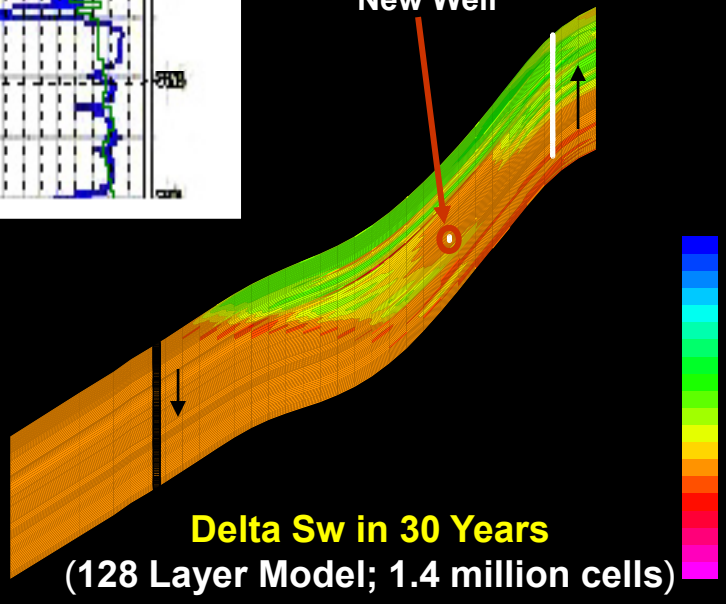
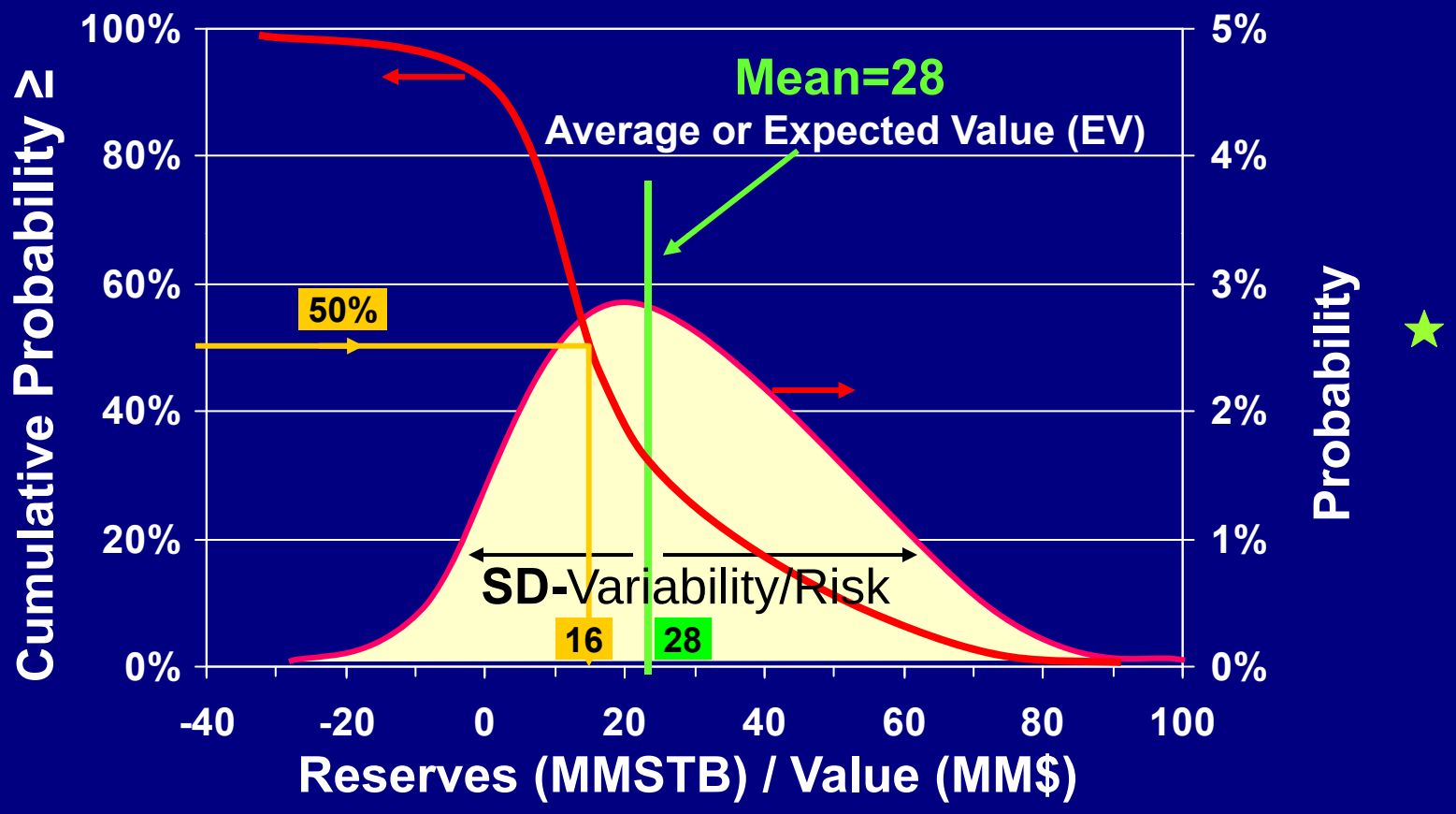


Integrated Decision Analysis
Technical - Quantifying Uncertainty

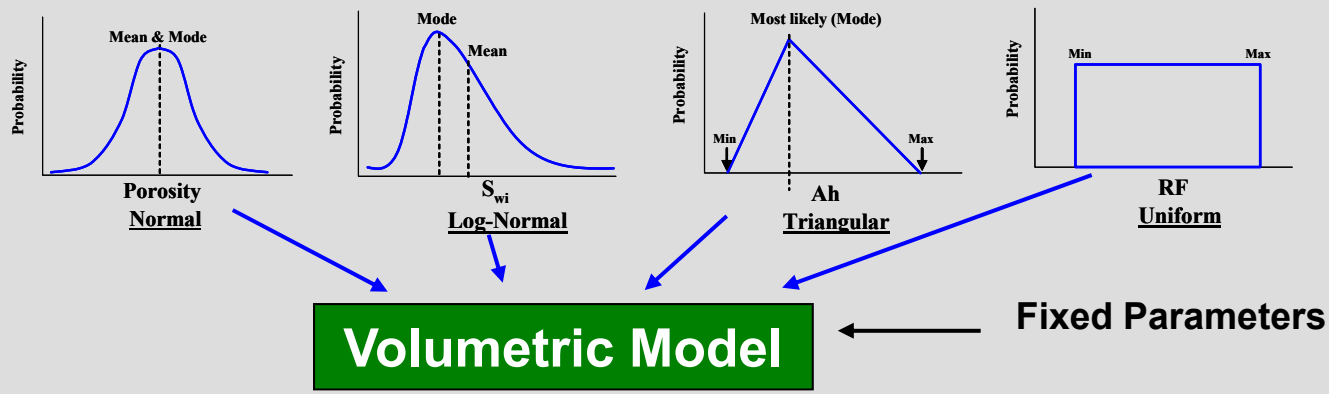


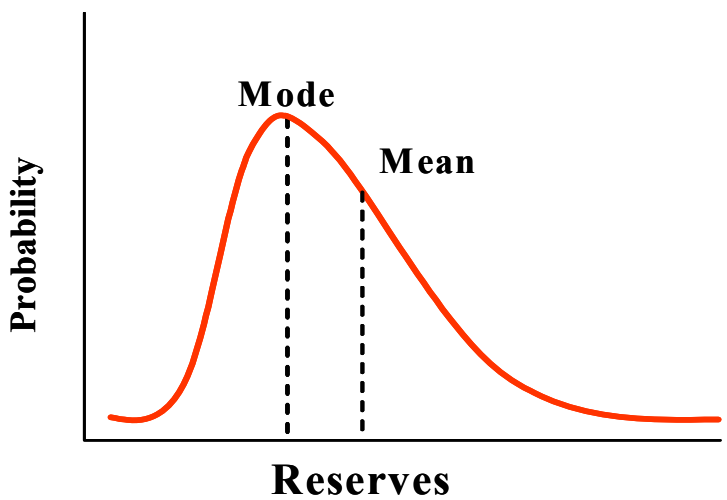
Risk Profile & Expectation Curve

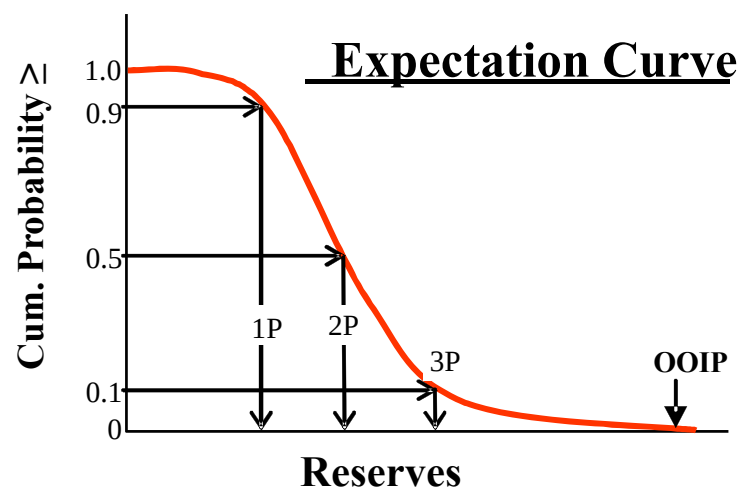
Integrated Decision Analysis
Technical - Reserves Assessment (Static)

Volumetric Equation: EUR = [A x h x Ø x (1- Swi) / FVF] x RF

Random Variables
(Probability Distributions)

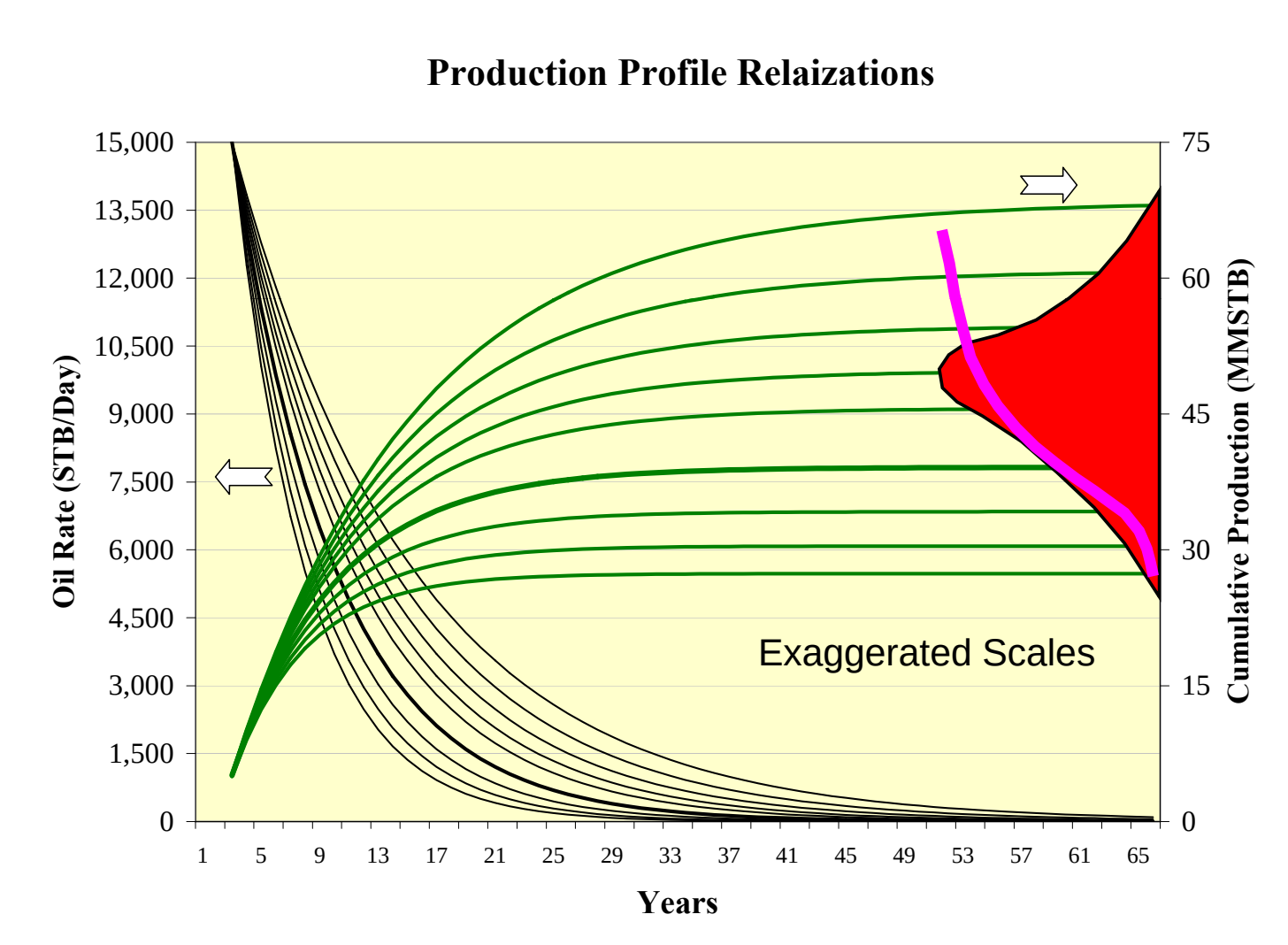






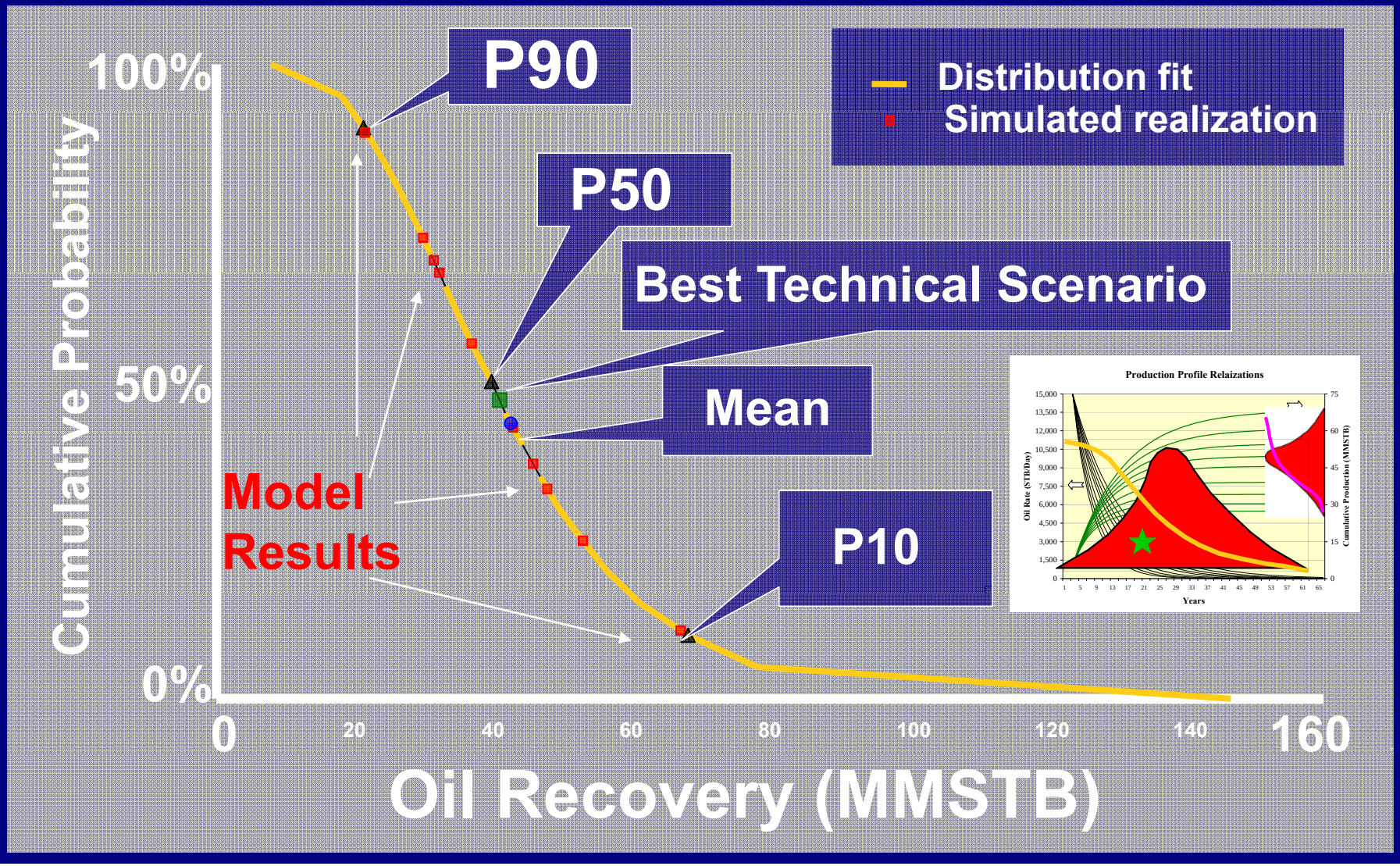
Integrated Decision Analysis

Technical - Reserves Assessment (Dynamic)



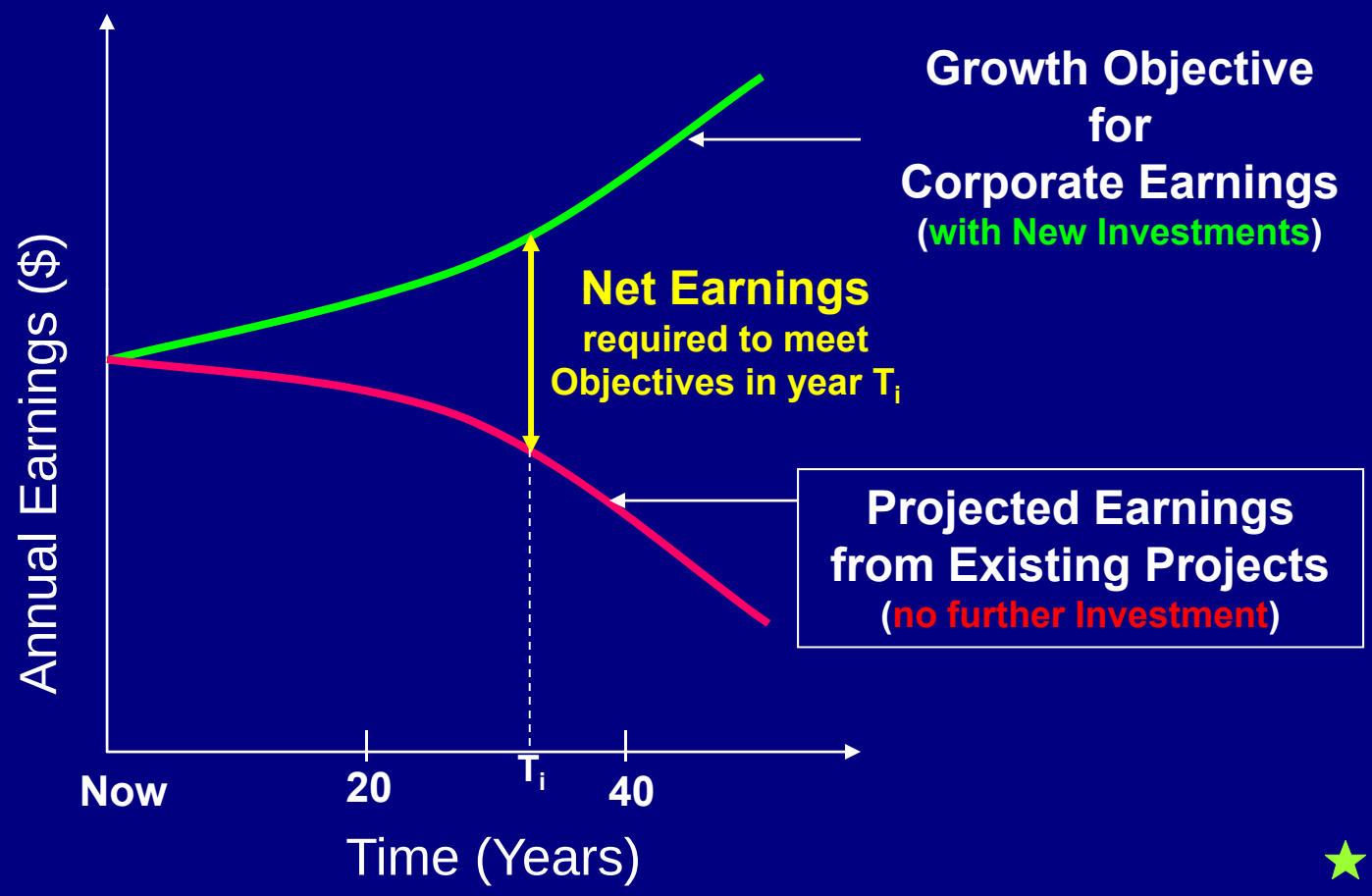
Integrated Decision Analysis

Technical - Reserves Assessment (Dynamic)



Integrated Decision Analysis

Business Issues - Sustainable Earnings Growth



Earnings Gap Analysis (Newendorp & Schuyler, 2000)

Integrated Decision Analysis
Business - Corporate Objectives

- Maximize shareholders' value (SHV) while
  - minimizing exposure to loss; and
  - ensuring earnings growth at a stipulated rate
- Preferable when the Corporation
  - makes Profit each year,
  - stabilizes Profit and sustainable Growth,
  - maintains Liquidity and Solvency, and
  - is a good Corporate Citizen. ★

Integrated Decision Analysis
Business - How to Maximize SHV?

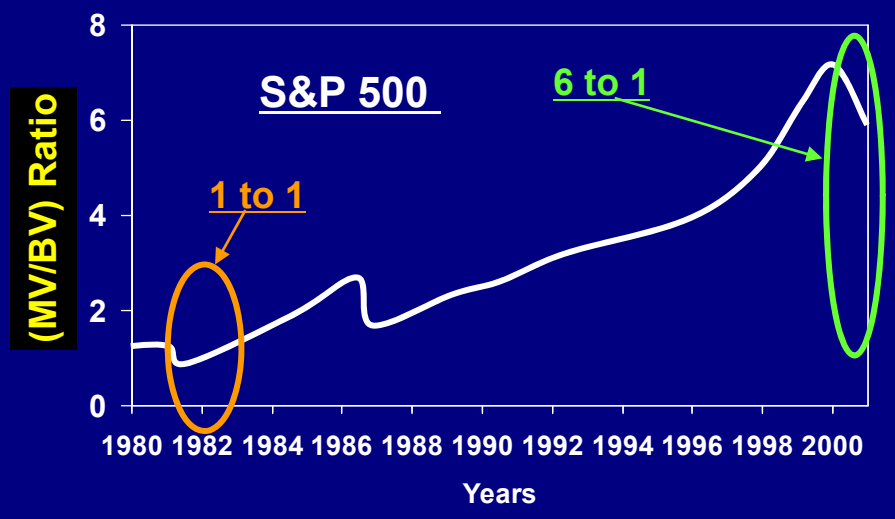
Maximize Market Value Added (MVA)

MVA = Market Value (MV) – Book Value (BV)

Maximize (MV:BV) Ratio thru making continuous and sound new investments

Balance Sheet explains **15%(1/6)** of **Value Added** only.

Remaining **85% (5/6)** by **Talent & Intelligent Assets** ★



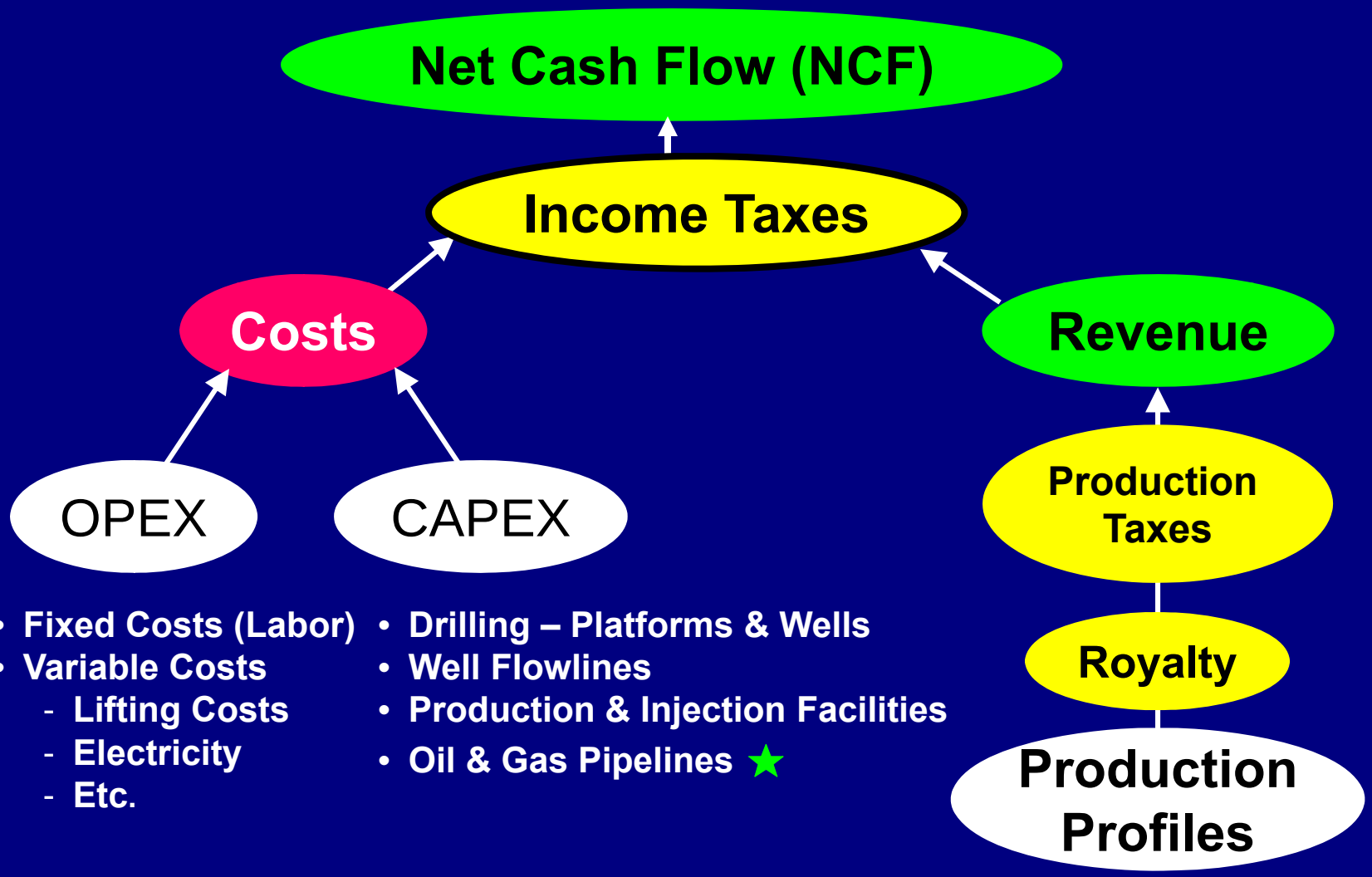
Integrated Decision Analysis
Business - Valuation/Appraisal Model

- Has Appropriate Business Model
- Accounts for the Time Value of Money Concept
- Quantifies Judgments about Uncertainty and incorporates the Risks in project cash flows.
- Uses realistic Company Discount Rate (or MARR)
- Has a Figure of Value, the best value measure:
  - **NPV @ MARR %** (Deterministic Analysis)
  - **EMV @ MARR %** (Probabilistic Analysis)

Decision Rule: ***Accept if Project NPV or EMV≥ 0*** ★

Integrated Decision Analysis

Business - Cash Flow based Valuation Model



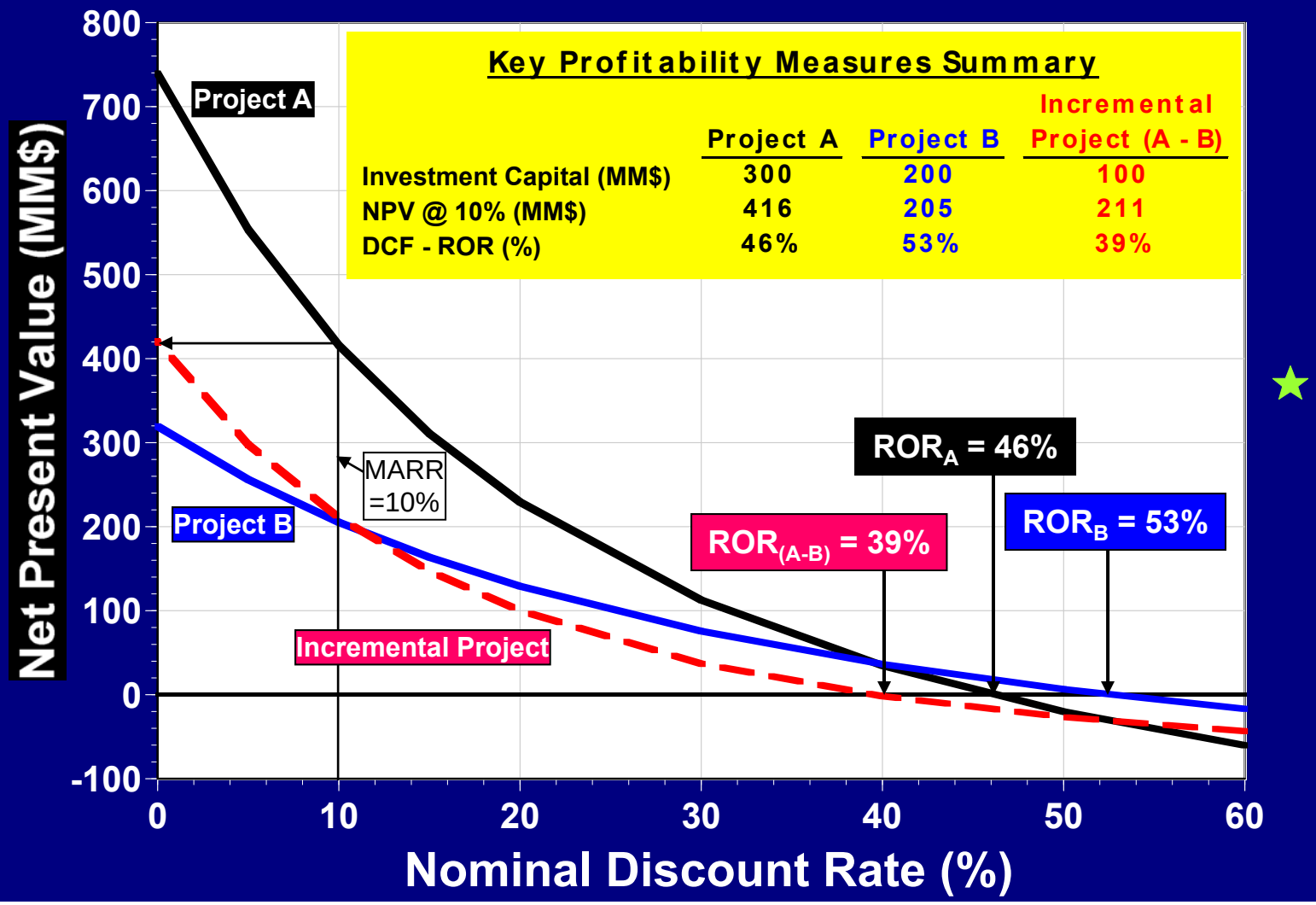
- Fixed Costs (Labor)
- Variable Costs
  - Lifting Costs
  - Electricity
  - Etc.

- Drilling – Platforms & Wells
- Well Flowlines
- Production & Injection Facilities
- Oil & Gas Pipelines ★

Integrated Decision Analysis
Business - Evaluation Methods (How?)

- Deterministic Methods
  - DCF Analysis and NPV Profiles
  - Sensitivity Analysis
- Probabilistic Methods
  - Decision Tree Analysis
  - Monte Carlo Simulation

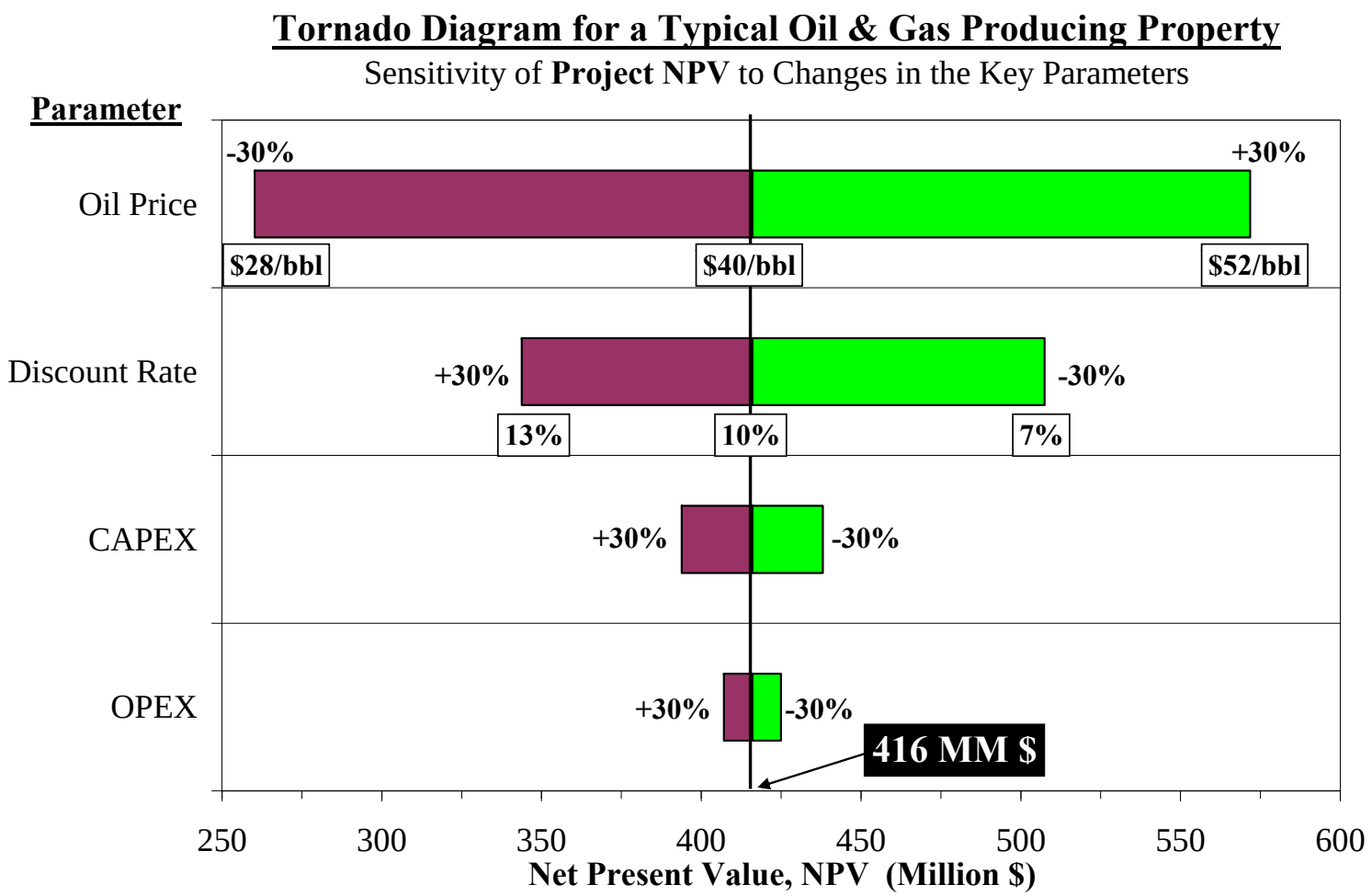
Deterministic Approach
Comparing Projects by NPV Profiles



Integrated Decision Analysis
Business - Evaluation Methods (How?)

- **Deterministic Methods**
  - DCF Analysis and NPV Profiles
  - Sensitivity Analysis
- **Probabilistic Methods**
  - Decision Tree Analysis
  - Monte Carlo Simulation

Deterministic Approach
Sensitivity Analysis – "Project A" NPV



Integrated Decision Analysis
Business - Evaluation Methods (How?)

- **Deterministic Methods**
  - DCF Analysis and NPV Profiles
  - Sensitivity Analysis
- **Probabilistic Methods**
  - Decision Tree Analysis
  - Monte Carlo Simulation

Decision Tree Analysis
"Project A" Expected Value Estimates

Reserves Size (MMSTB)	NPV @ 10%	EMV @ 10%
80	$200 MM	$60 MM
120	$400 MM	$240 MM
200	$700 MM	$70 MM
		$370 MM

$370 MM

EMV of the Project A

0.3

0.6

0.1

EV of Reserves → 116 MMSTB

EMV = $370 MM (probabilistic)

versus

NPV = $416 MM (deterministic)

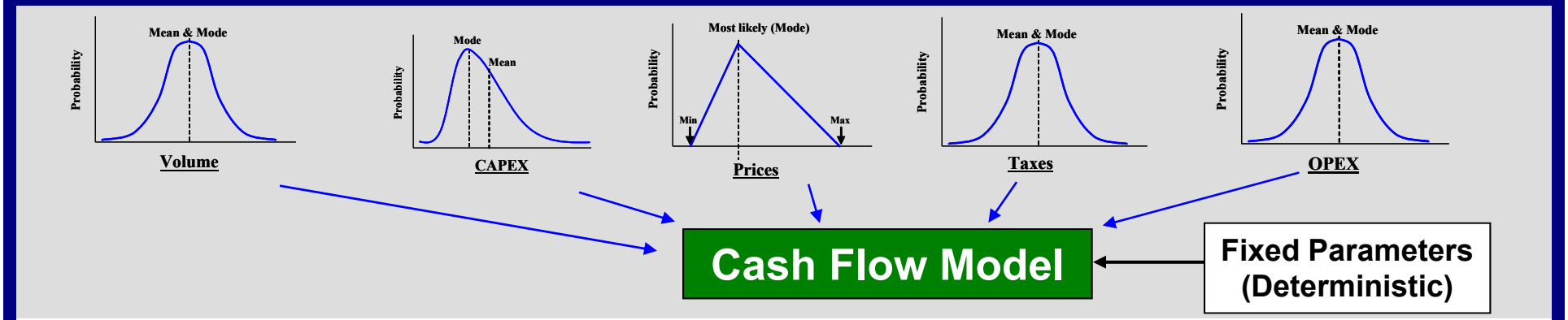
Decision Rule: ***Higher the EMV better the project profitability.*** ★

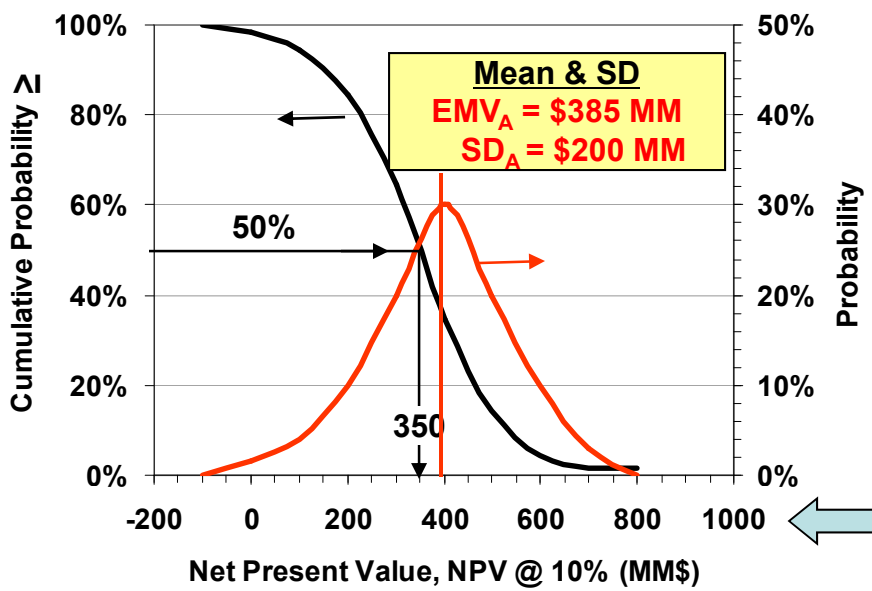
Integrated Decision Analysis
Business - Evaluation Methods (How?)

- **Deterministic Methods**
  - DCF Analysis and NPV Profiles
  - Sensitivity Analysis
- **Probabilistic Methods**
  - Decision Tree Analysis
  - Monte Carlo Simulation

Monte Carlo Simulation
"Project A" NPV Risk Profile

$NCF_t = Volume_t \times Price_t - Royalty_t - OPEX_t - CAPEX_t - Taxes_t$





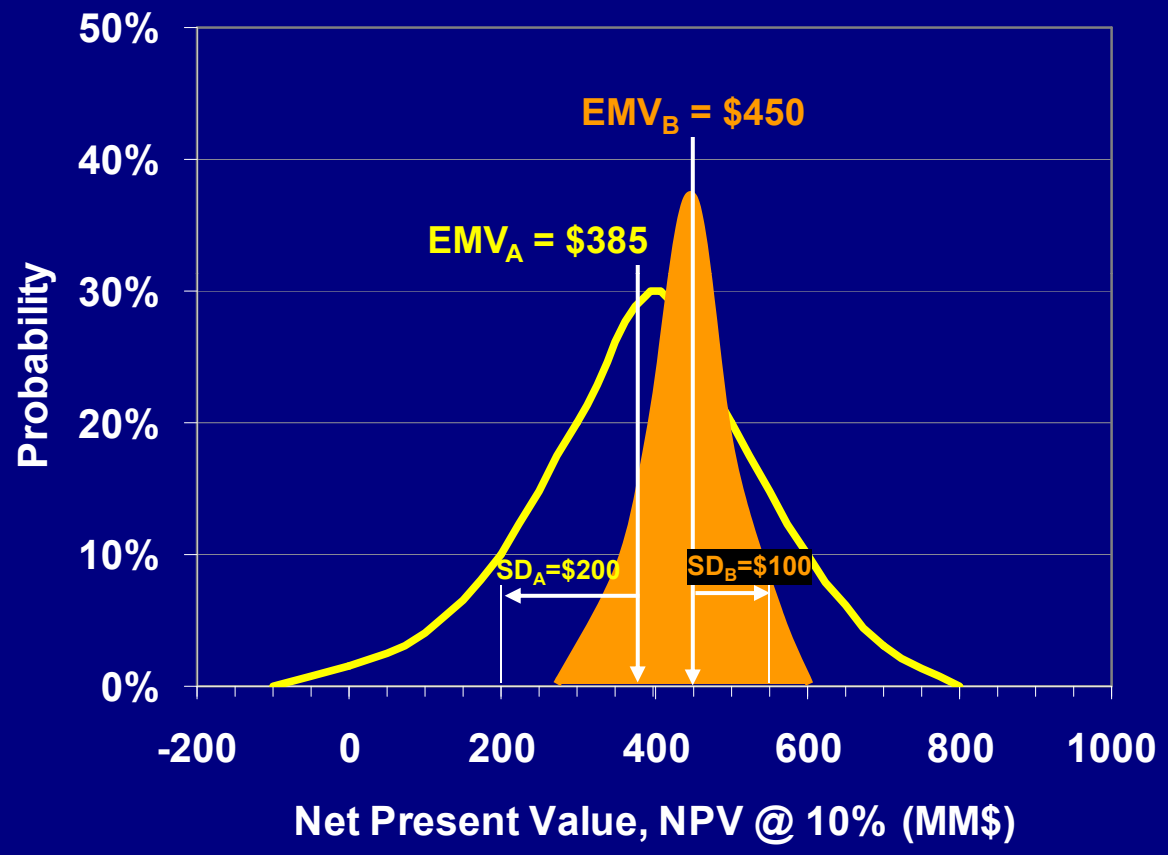
Profile with an **EMV** of **$385 MM**

as compared to ★

Single NPV Estimate of **$416 MM**

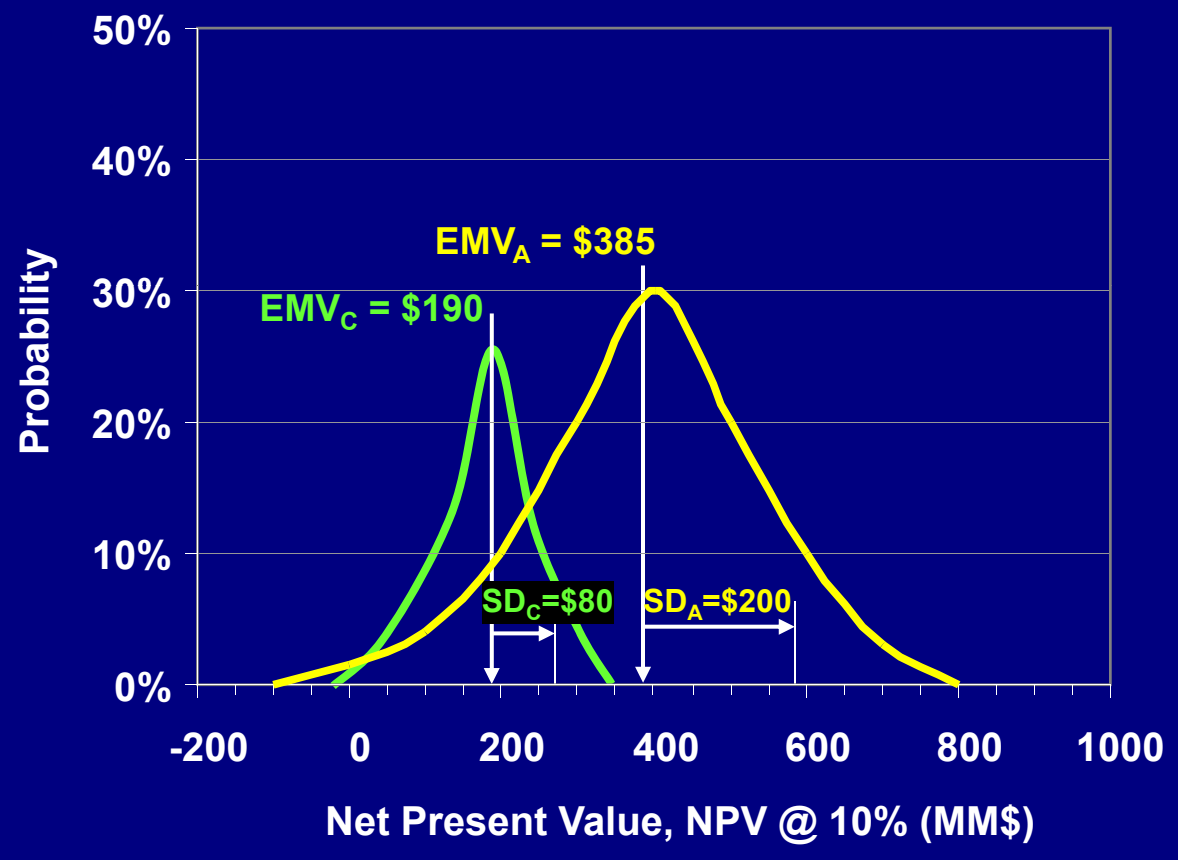
$$NPV@10\% = \sum_{t=0}^{t=n} NCF_t/(1+MARR)^t$$

Probabilistic Analysis
Comparing and Ranking Projects



Decision: ***Project B is clearly superior to Project A.*** ★

Probabilistic Analysis
Comparing and Ranking Projects



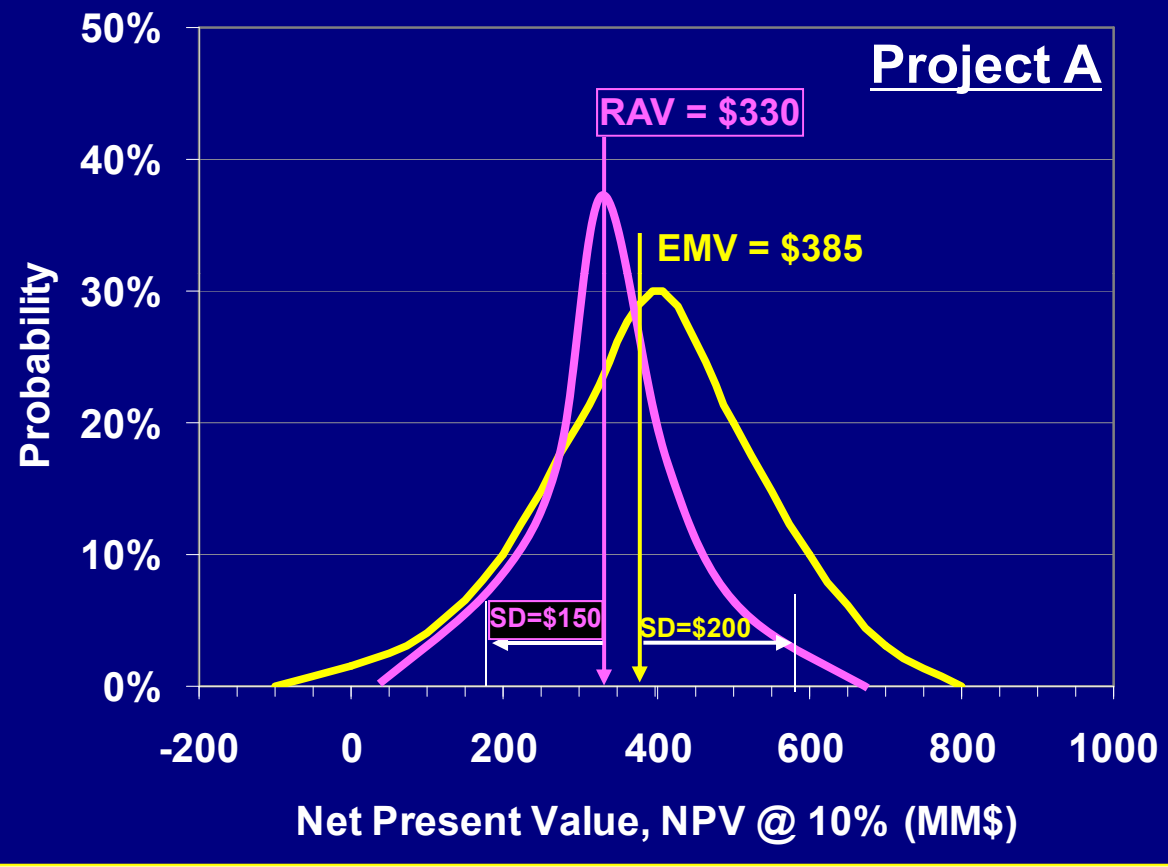
Decision: *1) For a risk-neutral investor, Project A is better than Project C.*

2) For a risk-averse investor, it is not clear & further analysis required. ★

Probabilistic Analysis

Comparing Projects - Risk Neutral vs. Averse

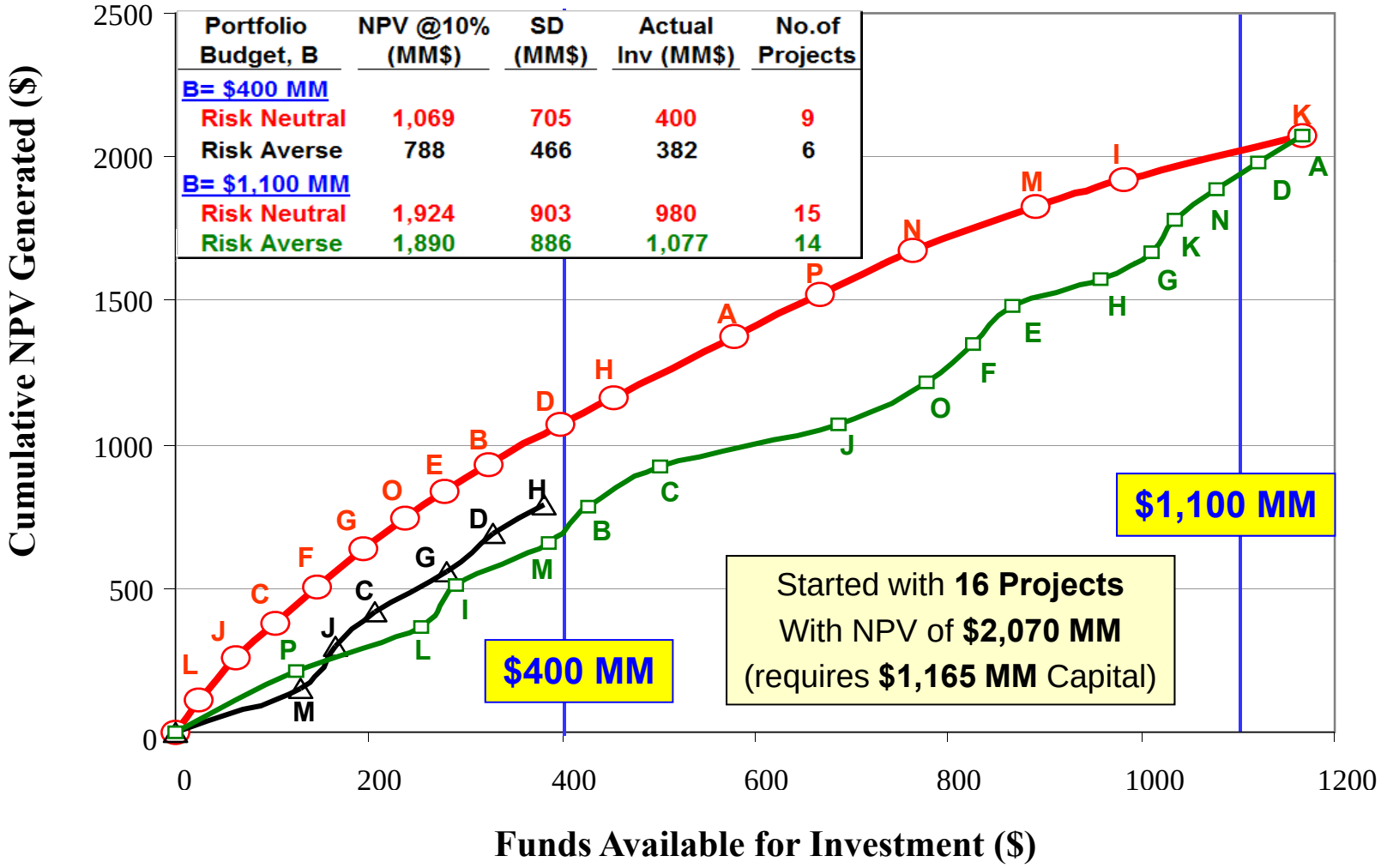
Risk Adjusted Value, RAV =EMV – $\sigma^2_{NPV}/(2B)$



Decision Rule: **For a given Budget (B), the *higher the RAV, better is the project profitability.*** ★

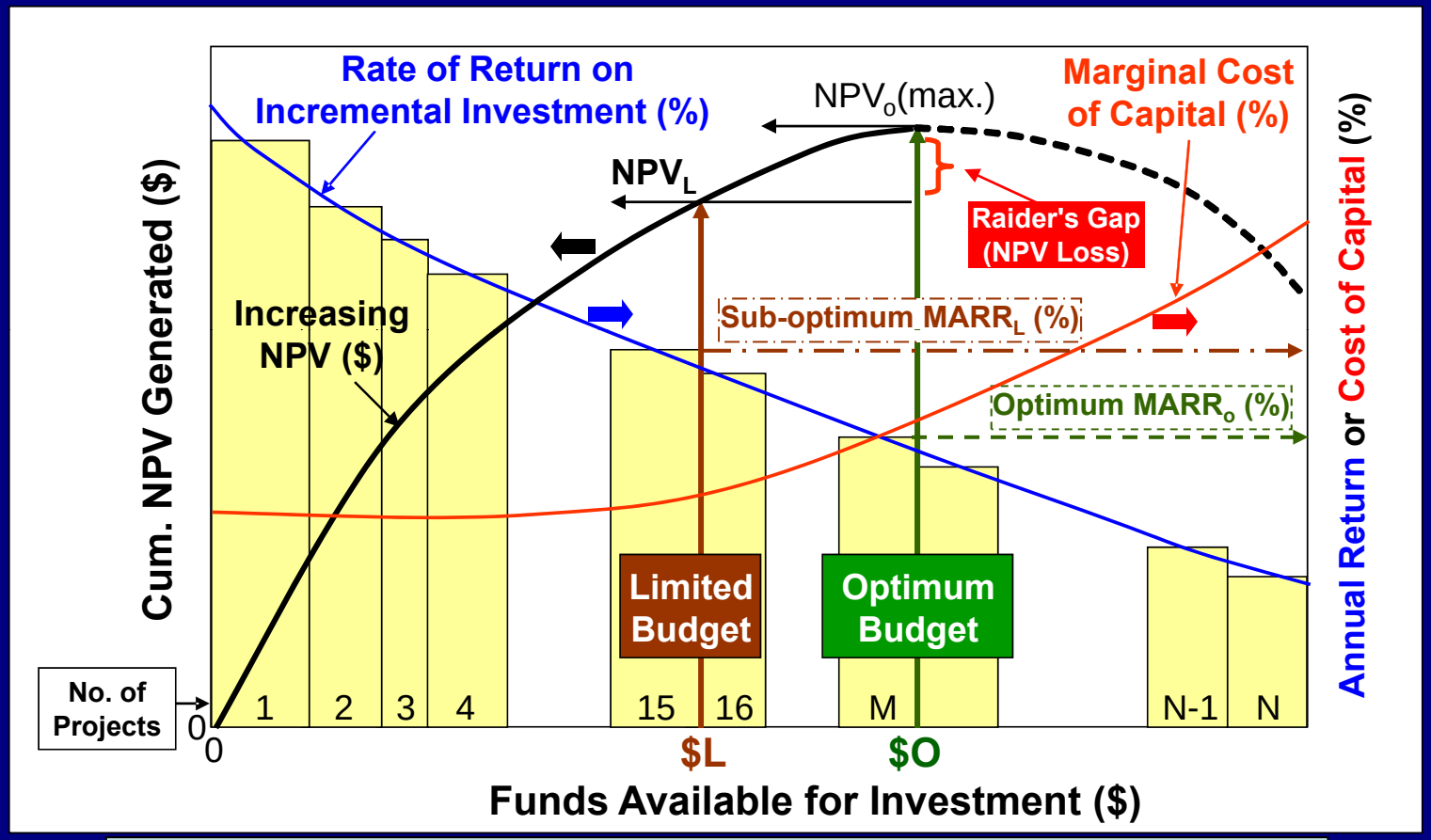
Portfolio Optimization

Example Investment Portfolios



Portfolio Budget, B	NPV @10% (MM$)	SD (MM$)	Actual Inv (MM$)	No.of Projects
B= $400 MM				
Risk Neutral	1,069	705	400	9
Risk Averse	788	466	382	6
B= $1,100 MM				
Risk Neutral	1,924	903	980	15
Risk Averse	1,890	886	1,077	14

Investment Portfolio Optimization
Ideal vs. Actual

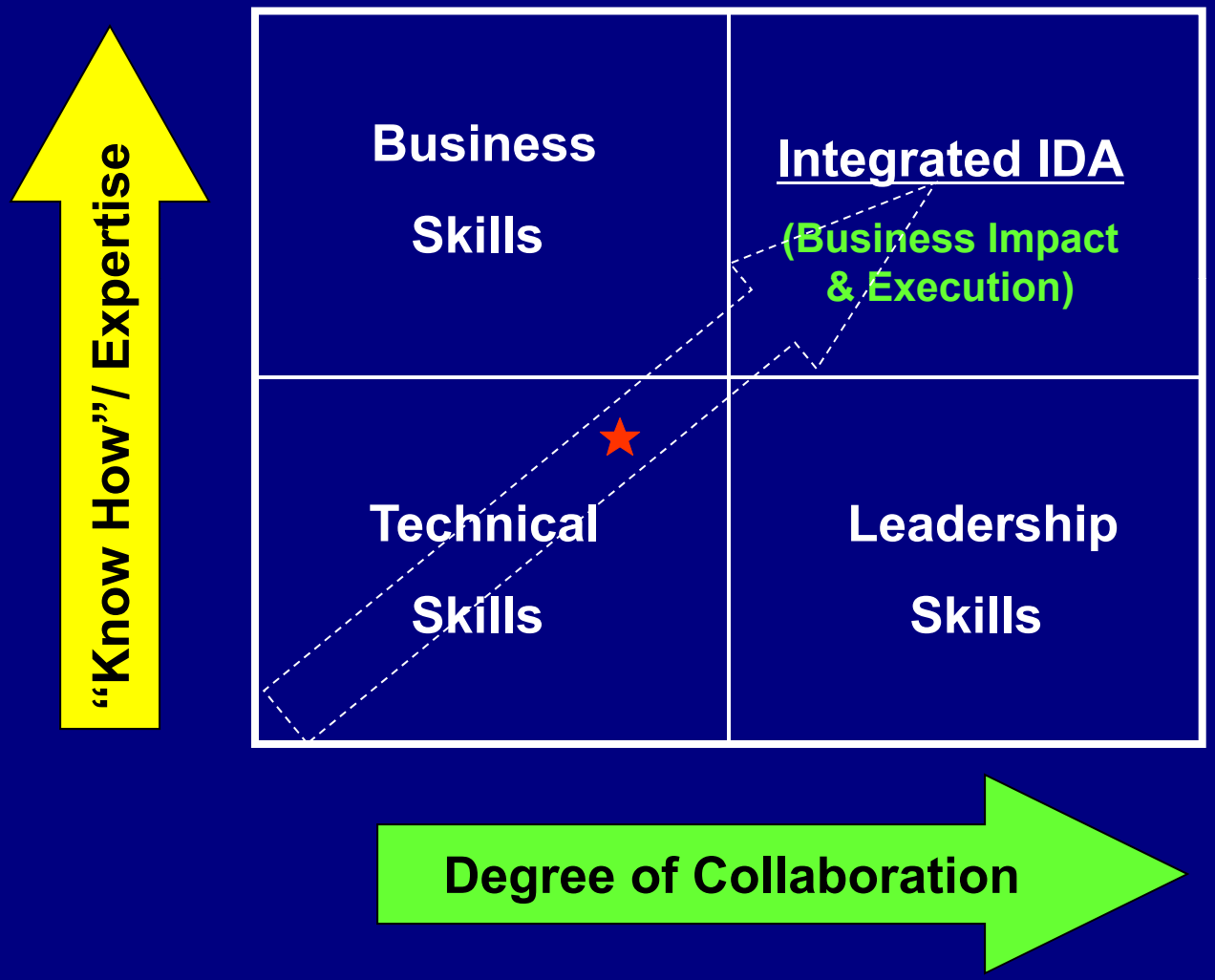


Maximizing Shareholder Wealth (or MV) requires:

- **Optimized Capital Structure** with **Optimal D/E Ratio** & minimized **MARR**
- **Maximized Return** on **Existing Projects** (Capital)
- **Maximized Value Added** by the **New Investment Portfolio ($A** w/ **$Y)** ★

Seamlessly Collaborative Studies

Putting it all Together: Maximize Shareholders' Wealth



CONCLUSIONS

VALUE of Collaborated Studies

A Corporate Check list, Do You HAVE?

- Qualified **Professional Workforce** – Educate, Recruit, Develop & Retain
- Optimized **Capital Structure** and **Minimized Raider's Gap**
  - Survival of the fittest
- Ranked Risk Adjusted **Inventory of Investment Opportunities**
- Continuous Development & Execution of **Optimal Business Plan Investment Portfolios (Repeatability)**
- Sustainable **Earning Growth**
- Distinct **Competitive Advantage** (Intelligent Assets)

END RESULT: Maximized **Shareholders' Value** because of

VALUE CREATION thru **Synergies Captured** via **Integration**, **Technology** & **Scale** ★

Thank you…