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Managing Mega Capital Projects

Behind the Façade

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**The Principal Consultant
RISKCORE LTD.**

Riskcore is a project risk management consulting firm registered in the Alberta of Canada offering the following specialized professional services:

- A. facilitating qualitative risk workshops for risk assessment, responses and residual risk severity levels;
- B. soliciting inputs and modelling quantitative cost estimate risks for contingencies, escalation, management and strategic reserves;
- C. providing independent, unbiased and risk-based project governance and construction readiness reviews using comprehensive checklists;
- D. conducting onsite project management gap assessments against the available best practices and proposing improvement solutions;

RISCOR is a Monte Carlo based simulation model developed in 2005 by Riskcore for Class 3 cost estimate contingency, escalation and risk reserves. It has been used on projects worth of \$20 Billion in 2017/18, about \$65B+ in total.



Project Participation with Responsibilities:

- \$9B+ Major Pipeline Project in Canada
- \$11B Major Upgrader Project in Canada
- \$5B Refinery & Petrochemical Project in Canada
- \$3B Oilsands SAGD Project in Canada
- \$3B Offshore Subsea Project in Europe
- \$1B Oil Refineries Projects in USA
- <\$1B Infrastructures & Desalination in UAE

Key Facts

- 30 years experience in construction industry specializing in project risk management, project management office processes and governance, field construction coordination, and interface management.
- Past member of the AACE, CIOB, CII and Professional Engineer Association in New Brunswick.
- MSc. Construction Project Management, Northumbria University, UK.
- BSc. Building Design and Management, Northumbria University, UK.

Despite of extensive researches and studies by both industries & academic institution in past few decades, **no convincing evidences are produced** to aggregate the true root causes of megaprojects' failure.

Because they are woven into the fabrics of an organization's culture, it is nearly impossible to generalize "generic" reasons why projects failed.

This presentation does not reveal anything new but looks at the problems from a different angle.

- Why do owners often invest in megaprojects?
- Who are the victims of major project failures?
- When does OMT lose the controls of projects?

- What are key project success factors for OMT?
- How is an OMT organized to manage projects?
- What are Owner's reasons of project failures?

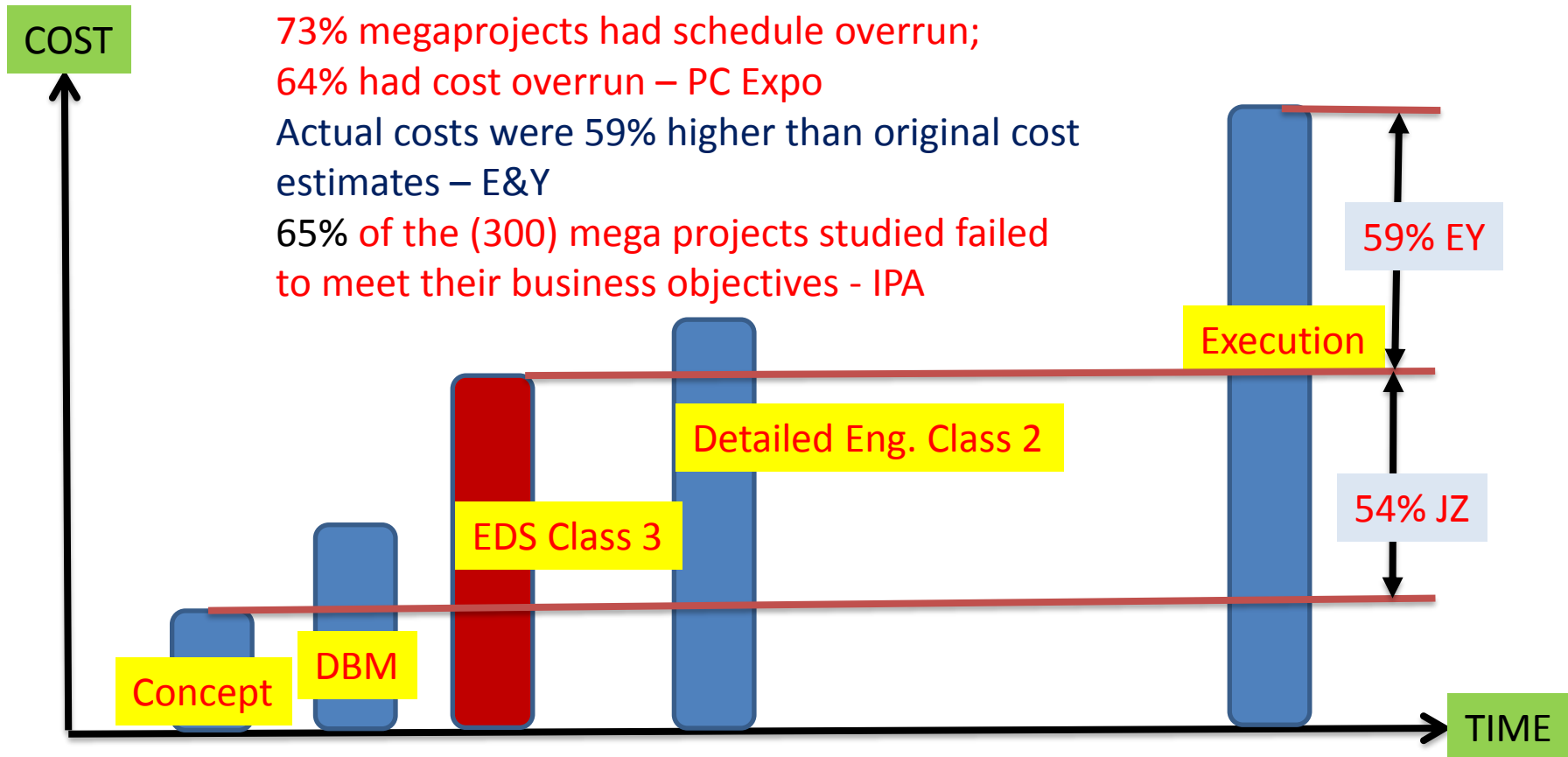
- What are OMT's mechanism to gain controls?
- How does an OMT manage behind façade?
- What are owner's plans for Black Swans?

Megaprojects (>US\$1Billion) are crucial to the economic prosperity of growing organizations and public entities such as cities or nations. However more often than not, these projects typically go off the rails, with regard to either budget or time or both.

Behind the epic failures of those massive financial endeavors are pains suffered by owner operators who also struggle to understand the reasons why.

FACTS

73% megaprojects had schedule overrun;
64% had cost overrun – PC Expo
Actual costs were 59% higher than original cost estimates – E&Y
65% of the (300) mega projects studied failed to meet their business objectives - IPA



Dr. Flyvbjerg stated in his research that it is not uncommon for megaprojects to have Up to 100% cost overruns, measured from project initiation phase to final RFO.



**100% cost overrun of this public funded
Megaproject in Newfoundland**

Dr. Flyvbjerg (Oxford University) found the following for megaprojects:

- **Megaprojects always involve the intersection of risk, democracy and power.** Political and regulatory authorities normally define parameters and goals to suit their own ends, but frequently forget the transparency concept in regulatory structures that affect the viability of a project.
- **Megaprojects cannot be planned and executed in a predictable world where cause-effect are evident.** Political interference and changing in governments make imperfect environments on executing megaproject developments.
- **Megaprojects undertaken in emerging economies,** for example, face poor prospects for more transparent stakeholder involvement, efficient and effective public sector risk analysis, and government bodies in emerging economies often **lack the institutional capacity and depth to perform proficient risk assessments**

Merrow (IPA, 2011) stressed on the crucial role played by strong, fully staffed **owner project management teams** on successfully managing megaprojects. OMT has a role to have all facets of the owner organisation's requirements implemented in all phases of a megaproject.

One may think that a large OMT is an unnecessary expenditure because experienced engineering and construction contractors are to be contracted, but this assumption has proven incorrect. (Jurie Steyn & Dirk Lourens, 2014)

It is the responsibility of the OMT to specify exactly what is required and to remain focused on the business objectives.

That an Owner company makes a major capital project's final investment decision (FID) largely wishes to achieve one or more of the following major objectives:

- To strategically position itself for long term benefits of region, industry & company
- To plan for the public & national security, interests, convenience and necessity
- To meet specific regulatory requirements or the conditions of operating permits
- To increase production and meet the increased commercial needs of customers;
- To expand the asset base and diversify or divest certain elements of portfolios;
- To maximize profit margins and shareholders' values in an economic way;
- To sustain and safe guard the existing operations for steady growth;

Regardless of the reasons, all owners wish great success stories of their megaprojects.

An Owner's Megaproject Nightmare

Just imagine and visualize that an Owner's megaproject has appeared in news media with the following:

- ❖ Major Accidents causing a Fatality
- ❖ A two year project turned into a Marathon of 5 years
- ❖ Cost has soared by 50% from its FID
- ❖ The Vice President resigned

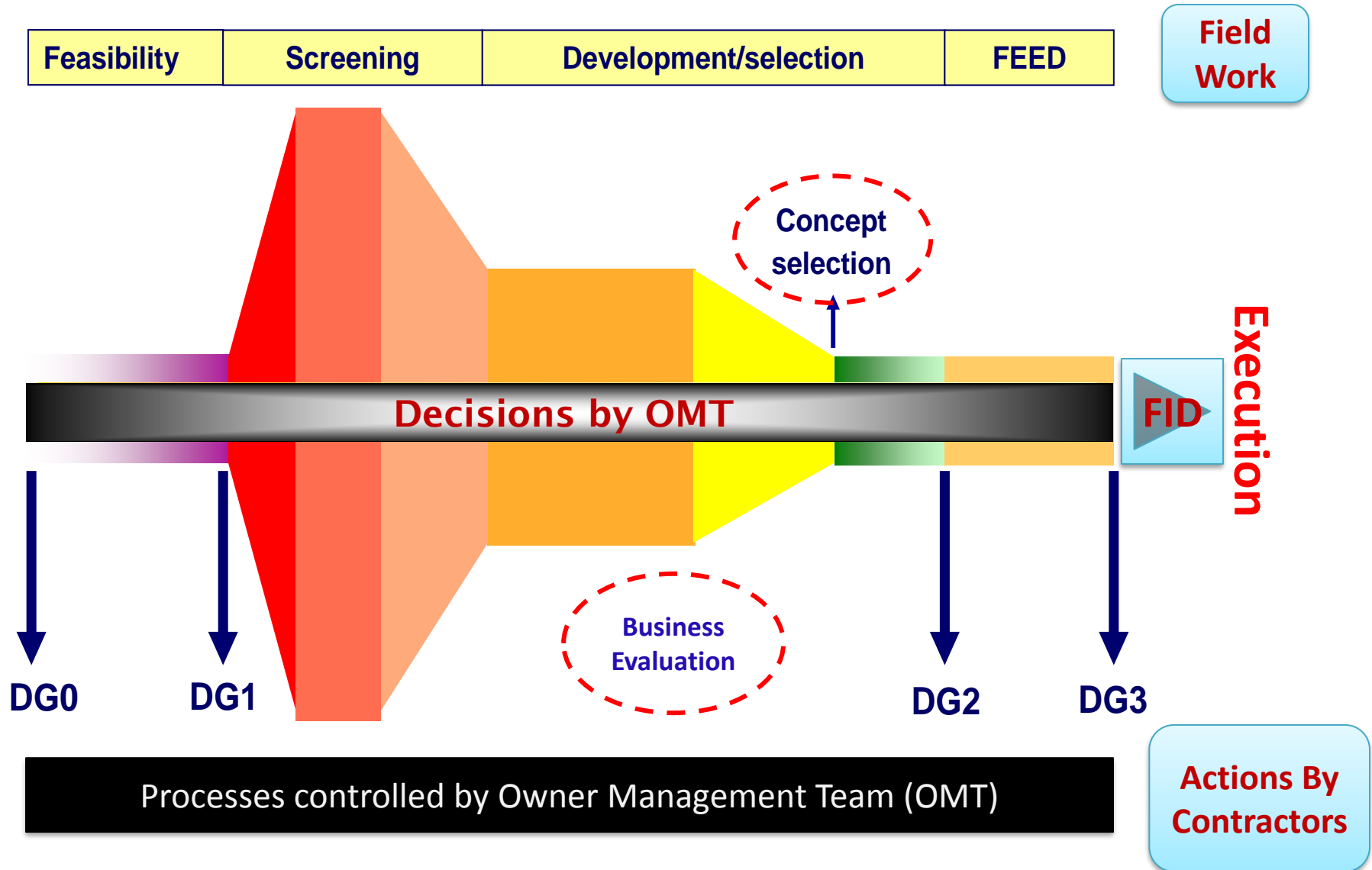
How would the Owner respond to its Board of Directors, shareholders and sponsors?

But in reality and opposite to the sentiment, many owner companies hailed these failed projects as "Huge Success". **Does it sound familiar in Alberta Oilsands?**

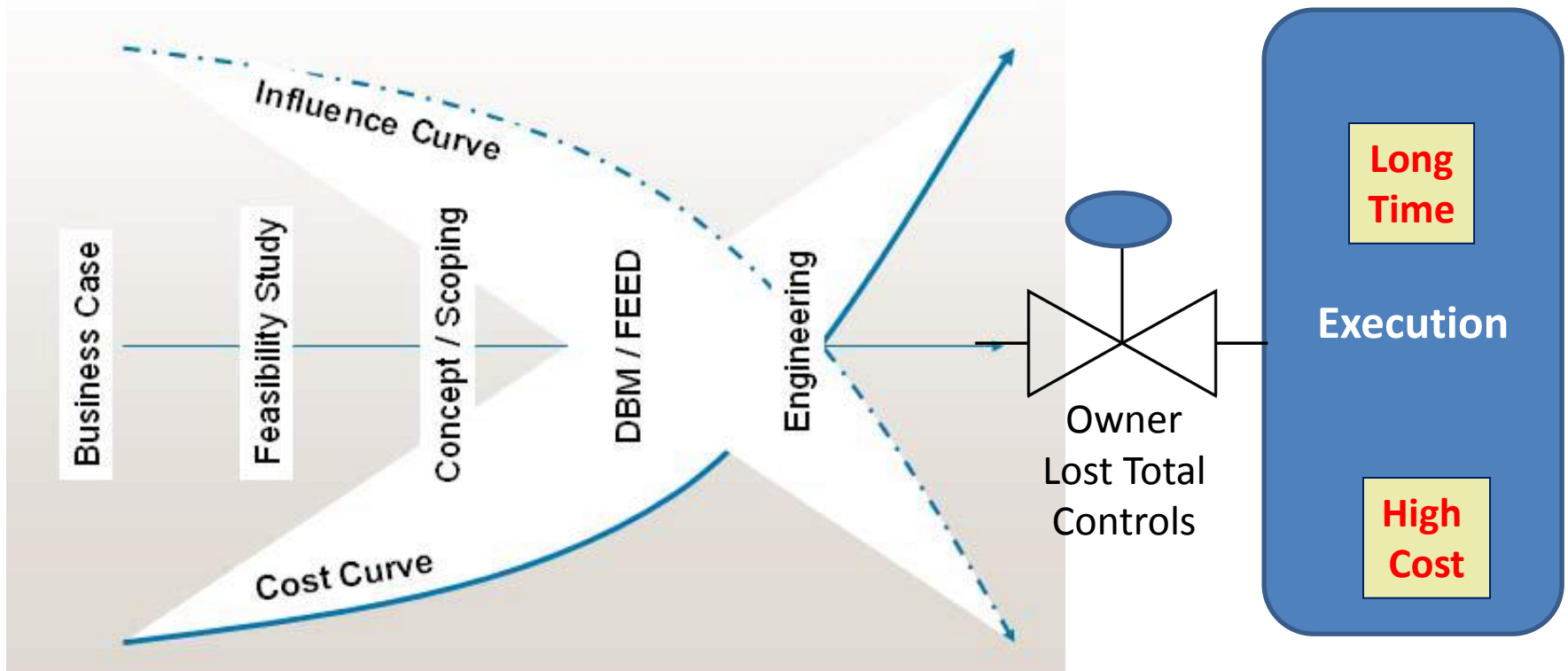
When an investment of a megaproject fails to suffice a company's objectives in a timely manner, the consequences can be dire and fatal in commercial world.

Owner-operators and shareholders are always the victims of megaproject failures and their nightmares become true when their major FIDs fail to materialize as planned.

Project Decisions – By OMT



Owner's Influences Over Project Phases



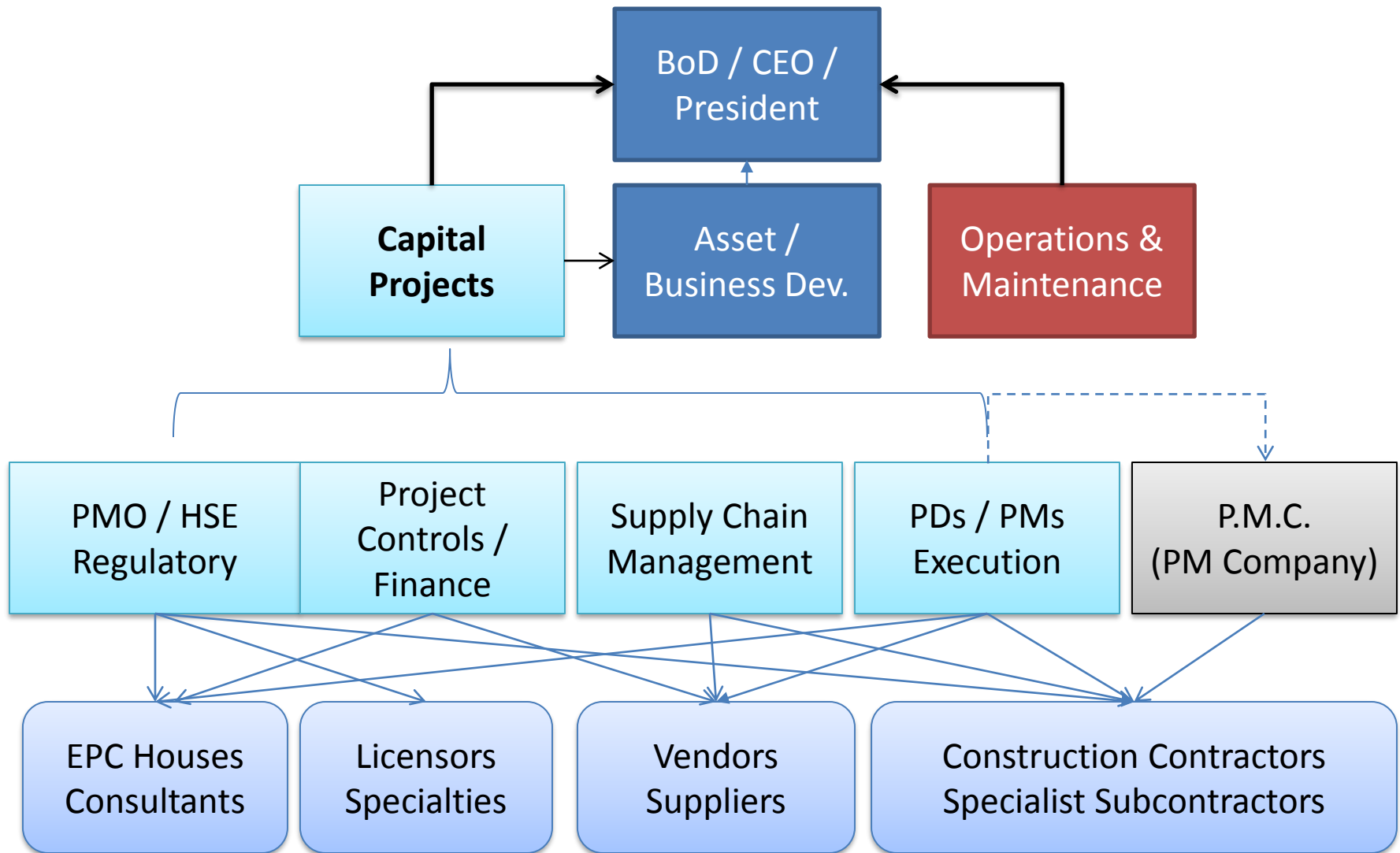
Owner's manageability over project execution decreases

Contractors' controls over project execution increases

A megaproject's key success indicators (KPI), for an owner, would include but not limited to at least the following in

- Meeting BoD and stakeholders' expectations
- Achieving adequate economic returns / IRRs
- **Predictable** final project cost and completion time
- Zero or minimal preventable accidents or incidents
- Compliance to laws, regulations and requirements

OMT's Managing Structure - Typical



* Note communication chaos from OMT function teams is the Cash for contractors.

To manage a megaproject, OMT and relevant owner internal supporting functions typically takes between 5% and 10% of Total Installed Costs (TIC), depending upon the types of contracts with EPC and GCC contractors.

Up to 10% project cost is for front end and detailed engineering.

Up to 80% project costs are spent by suppliers and contractors.

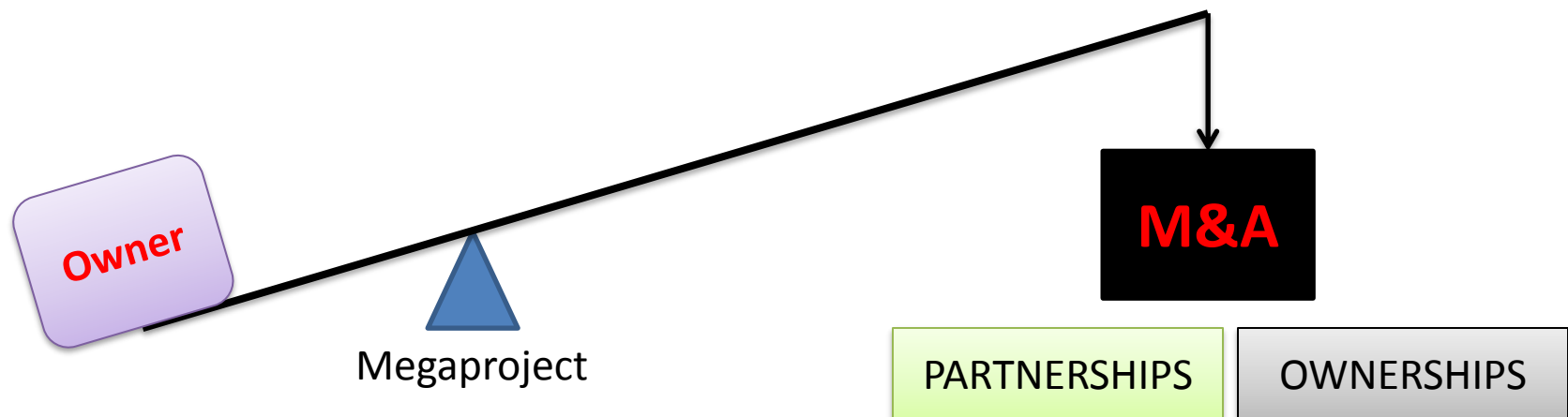
Hence it is extremely crucial for an OMT to have:

- Strict and disciplined financial rules and practices for expenditures;
- Clear roles and responsibilities of Owner's Delegation of Authority;
- Effectuated contractual clauses, terms and conditions, addendum;
- Efficient field change management process for approvals & records;
- Realistic & agreeable performance baseline cost estimate & schedule.

Capital projects are increasingly becoming monolithically massive in size & scale; it is not uncommon to have a single project which is more than \$50Billion (the Gorgon LNG project in Australia).

Megaprojects are:

- Often owned & managed by multiple owners internationally;
- Used for investment, divestment & mergers by owner firms;
- Financial instruments for acquisitions by large conglomerates;
- Funded & built as monumental landmarks for special purpose;

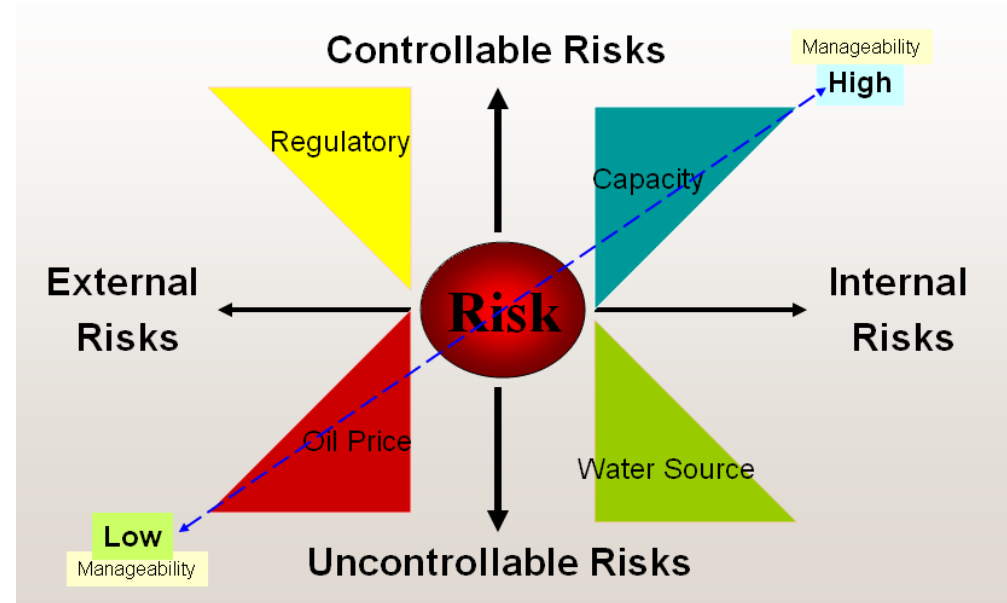


Perhaps an OMT may **not have the following for the one-off megaproject (in their company history):**

- competent & experienced in-house key PM / CM members,
- mature and proven project management process & systems,
- cohesive stakeholders and consistent organizational teams;
- practical and realistic final cost and schedule expectations;
- locally acceptable & workable contracting strategy & model;

Generalized Reasons why megaprojects Failed

- Inadequate internal structure & competence
- Uncontrollable contracting strategy & models
- Unproven systems to manage external risks
- No contingency plans for occurrences of black swans



- **Inadequate size, skills, and experience** of project management teams within owner's organization to professionally handle megaproject's complexity;
- Owner Project Management Team's or Key Individual's **Optimism Bias**, over-confidence and complacency, quoting their sustaining projects' experiences;
- Unrealistic, unconditioned and **not-risk-adjusted cost estimates** and time schedule as FID baseline for the measurements of project successes / KPIs;
- Claim laden, **hostile contractual relationships** with experienced contractors;

An OMT always fights to gain controls over project execution and would not recede to give up its predominance , so they should

- Allow competent contractors to execute projects with their skills and experiences via pre-qualification selections;
- Use customized lump-sum or fixed fee conversion contracting model to hold contractors accountable for execution risks;
- Increase opportunities for international contractors to attend open tendering processes for competitive costs & deliveries;
- Hire temporary seasoned PM / PMC professionals to manage megaprojects professionally using proven governance process;

Play the Game with the Game Rules

Up to FEED Phase

Open bids for EPC or EP only

Reimbursable for Class 3 estimate

During Detailed Eng.

Open bids for GC only

Fixed Fee for Class 2 estimate



Construction Phase

Lump-sum Conversion Process

Phase 1 Construction

Fixed Fee for Release 1
Unit Price for Phase 1
T&M with Target Price

Option 1 for Phase 2

Lump-sum for Completion

Option 2 for Phase 2

Open-bids for Fixed Price

C&SU Support

T & M for Service

Pulling strings behind the curtain requires skills, bravery and knowledge on how the game is played, and the ability to withstand risky consequences (higher risk tolerance):

- Strong financial capability and continued support from O&M for probable cost over-runs & delayed revenues
- Ability to retain competent contractors with bonus / incentives and long term partnership or alliances for future work
- Successful negotiation with bullet-proof contractual clauses & claim avoidance strategy agreed to by qualified contractors
- Employment and deployment of professional PMC or agents to face off with contractors for contract management

“BEST” – “TEAM” Approach

	DG 0 – DG 3: Business Case to FEED	
B	Business Feasibility confirmed and validated	Business case
E	Economic Viability calculated and verified	Economic returns
S	Social Licenses granted and communicated	Regulatory approval
T	Technological Applications checked & implemented	Commercialized “T”
	DG 4 – DG 5: Construction to RFO	
T	Transferring Execution capability to contractors	Contracts & CEP
E	Eliminating Impassable Execution Obstacles	Constructability
A	Accepting Residual & Uncontrollable Risks ALARP	Contingency Plan
M	Mitigating Controllable & Internal Execution Risks	Project Management

*BEST is developed to aid decision-making process via risk-based KT option selections;

*TEAM has been used as a part of Riscor’s qualitative risk response planning strategy;

Please Do not

- Change your minds (PFDs) after the FEED phase
- Add or increase scopes (SoW) after detailed engineering
- Revamp execution strategy & contracting model (PEP)
- Defer or postpone defined project execution timeline
- Manage or interrupt construction sequence / work directly
- Let incompetent personnel hold important PM positions
- Commence field construction unprepared and unready
- Rush with regulatory approval process by “shortcutting”

Please Do

- Trust competent PM professionals and let them do the tricks
- Enforce contractors' delivery and contractual obligations
- Reinforce owner teams harmony and interfaces for delivery
- Strengthen PM governance and risk oversight capability
- Ensure full compliances to laws, conditions and regulations



Does an Owner Have That CRYSTAL BALL?

Systemic risks may have profound negative impacts on project objectives but are intangible, invisible, elusive and inherent to an organization's culture, not only difficult to identify but also hard to be included in risk assessment such as

- Owner company's culture (operation oriented vs. project oriented)
- Project leadership style (Laissez-faire vs. autocratic leaders)
- Maturity of PM systems, processes and tools (developed vs. developing)
- Market conditions & assumptions (labor, materials, escalation, etc.)
- Optimism biases for megaproject's complexity and challenges

However there are processes, advocated by QRA professionals, to capture such Systemic Risks thanks to the recent development in Project Risk Management.

How about those rare-event driven, low probability, uninsurable and residual-style risks, or Black Swans?

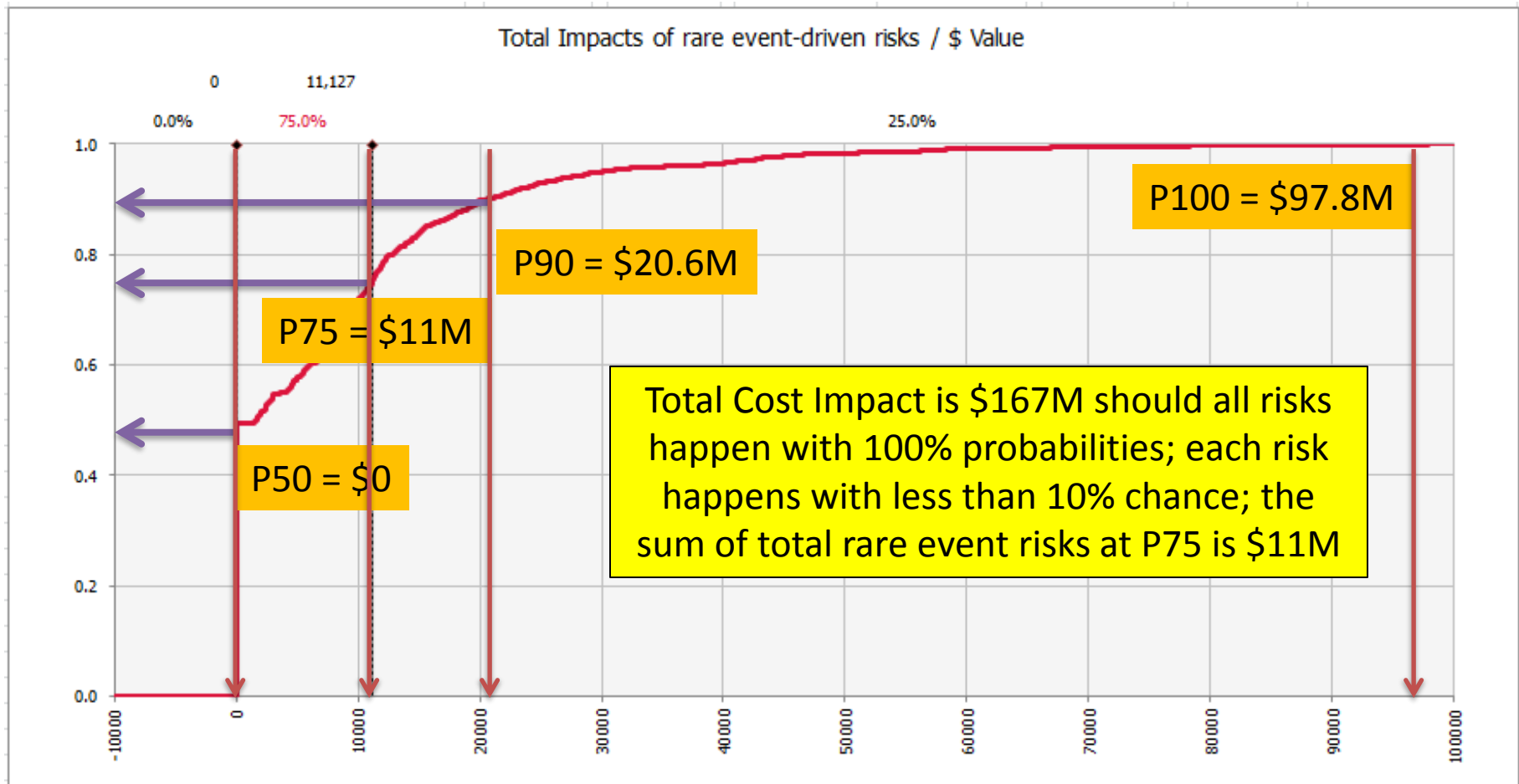
Based on a recent industry survey that was informally conducted, it was found that the majority of owner companies do not fully understand the concepts of and set aside sufficient funds for:

- Management Reserve
- Organization's Strategic Risks
- Contingency and Crisis Management

Project execution plan, estimate & schedule assumptions, the risk analysis and the industry practices have excluded or limited these risks, because they are often treated as “force majeure” events.

**And these are project killers Owners will pay for them.
But owners are not really well prepared for them either!**

Management Reserve Interpreted



The Management Reserve is the simulation result of residual risks and rare-event driven risks at chosen confidence level. It is not a part project contingency but additional reserve.

Owner project management leaders:

- Must have holistic and strategic visions of project's entirety
- Must manage overarching project strategy with planned tactics
- Must get ready to sacrifice parts for the gain of the whole
- Must behave to lead the direction and make decisive decisions
- Must be the cohesive core of all fragmented project elements

Further more, owner organizations shall not

- Keep incompetent key managerial project members
- Ignore project management systems & governance process
- Allow silos and fragmented functional teams for inconsistency
- Tolerate under-performing & uncooperative contractors
- Have operation-driven mentality to drive megaproject delivery

OUR PROMISE: To provide value-added project management and risk analysis, data analytics and benchmarking services

OUR EXPERTISE: To focus on specialty and niche skills by working with competent & experienced professionals collaborating as a team

OUR SERVICES: To timely deliver promised scope of work with right expertise within the quoted budget for the expected quality

***Specializing in Quantitative
Risk Analysis of Capital Cost
Estimates Supported
By Proprietary RISCOR™
Monte Carlo Simulation
Model***