



## Dar Al Riyadh Insight #17

### Flows in Large Complex Projects – Partial Listing of Flows Impacting Large Complex Projects

*Dar Al Riyadh Insights reflect the knowledge and experience of our Board, executives and staff in leading and providing PMC, design and construction management services. Dar Al Riyadh believes in the importance of broadly sharing knowledge with our clients and staff to improve project outcomes for the benefit of the Kingdom of Saudi Arabia.*

In our last Insight we defined three types of flows in large complex projects: the classical **Transformative Flows**, but now accompanied by additional flows we call **Influencing Flows**, which arise from outside the project since large complex projects are not so well bounded (certainly not as Gantt would have experienced), and a third type of flow, **Induced Flows**, that arise from the interaction of a multiplicity of flows with each other.

The table that follows provides a partial listing of flows that may impact large complex projects, with the potential impacts being related to:

- Whether they were planned or unplanned.
- Whether they were coupled or decoupled temporally and otherwise.
- The point and place at which they arise.
- The extent of their influence (number of tasks affected; number of other flows affected).
- Their persistence (duration); stability (static, dynamic, chaotic); and second (and third) order effects.

It broadly groups the flows as:

- Logistical
- Information
- Economic
- Environmental
- Stakeholder
- Technological



Partial Listing of Flows Impacting Large Complex Projects	
<b>Logistical</b>	<ul style="list-style-type: none"> <li>• Logistical flows between tasks (movement of people, materials and equipment)</li> <li>• Supply chain flows from raw materials through intermediate goods to final items of supply and their transfer to site</li> <li>• Flow of indirect factors such as food, shelter (man-camp), fuel and other consumables</li> <li>• Logistical disruptions on project-related flows arising from project activities or arising from others</li> <li>• Logistical disruption of others arising from project-related flows</li> </ul>
<b>Information</b>	<ul style="list-style-type: none"> <li>• Delayed, non-transparent information flows giving rise to degradation of trust, slowness in response and undertaking required actions</li> <li>• Non-secure information flows create project impacting cyber-risks</li> <li>• Poor knowledge latency associated with weak knowledge management</li> <li>• Social media creates uncontrolled or even fake narratives</li> </ul>
<b>Economic</b>	<ul style="list-style-type: none"> <li>• Market based factors (supply, demand, price point) modify planned flows and flow rates of materials and equipment</li> <li>• Economic based factors (inflation/deflation; availability of capital; currency stability and convertibility) act to modify project objectives and schedule</li> <li>• Financial factors may act to limit availability of subcontractors and suppliers that the project requires (unavailability of bonding; inadequate capitalization)</li> <li>• Labor market constraints derived from either aggregate labor demands; skilled labor shortages; or industrial actions</li> </ul>
<b>Environmental</b>	<ul style="list-style-type: none"> <li>• Flows arising from the physical environment (heat, wind, water, dust/sand)</li> <li>• Changing constraints with respect to the project's interaction with the physical environment (e.g. noise levels lead to reduced work hrs)</li> <li>• Flows from the natural environment impacting the project (disease, pestilence, fire)</li> <li>• Flows from the project adversely impacting the natural environment (discharges, spills, runoffs, destruction of protected areas)</li> </ul>
<b>Stakeholder</b>	<ul style="list-style-type: none"> <li>• Investor/owner stakeholder changing requirements (SBOs change) or constraints (e.g. cash flow)</li> <li>• Politically driven changes that accelerate, decelerate, modify through sovereign action, legislation</li> <li>• Regulatory driven requirements requiring response or modify work processes and timing. Delayed permits and authorizations</li> <li>• Tort and other judicial actions impacting project objectives; funding and financing; schedule and sequence of activities; means and methods</li> <li>• A change in stakeholder interest create "interest flows" (e.g. sustainability; social justice)</li> <li>• Directly affected third parties (traditional view of stakeholders) whose support and acceptance is effectively required and whose actions/inactions impact the project</li> <li>• Indirectly affected third parties (issue- oriented organizations and non-government organizations (NGOs)) whose support is desirable but who act and influence project processes either directly (through political, regulatory or judicial action) or indirectly (through interaction with owners/operators or directly affected third parties)</li> <li>• Broader ecosystem of stakeholders which represent a source of modifying behaviors on all parties directly and indirectly affected third parties and from which new issues and requirements may emerge</li> <li>• Collectively, stakeholders are not manageable but can be engaged and influenced, effectively modifying what otherwise may have been more disruptive flows impacting the project</li> <li>• A significant set of flows can give rise to changed stakeholder behaviors. These impacts may be positive (economic activity; jobs; community improvements) or negative (traffic congestion; environmental degradation; negative social effects)</li> </ul>
<b>Technological</b>	<ul style="list-style-type: none"> <li>• New technologies arising during project execution can modify project requirements; means and methods; stakeholder expectations</li> </ul>

The various flows can occur in three fundamental ways:

- *Transformational Flows*, first envisioned by Gantt, yet as suggested by the table may no longer be as static and predictable. Complexity and both unnecessary and hidden coupling of activities and constraints further act to impact projects.
- *Influencing Flows* that arise from outside the project team from a myriad of directions.



- *Induced Flows* that arise from the interaction of the various *Transformative* and *Influencing Flows*. In some instances, these may represent second or third order effects, while in other cases they may represent short-lived but turbulent and impactful events.

These will be discussed in a subsequent Insight.