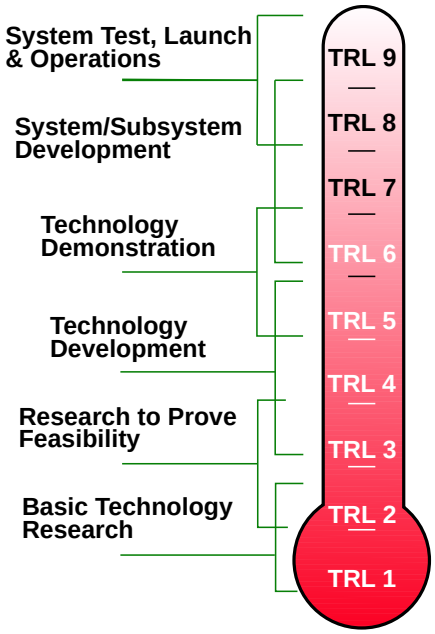
Integration Readiness Level (IRL)

Technology Readiness Level (TRL) : Es un indicador usado para medir la madurez de la tecnología

Integration Readiness Level (IRL) : Es un indicador que orienta sobre el estado del progreso de la integración entre múltiples sistemas y uno nuevo



Partes importantes del paper:

"IRL's original intent was to provide a systematic analysis of integrating different technologies and understanding the maturity between the points of integration (Pittera T, Derrico M, 2011). IRL was focused on being a tool to understand the maturity of technologies used to integrate the systems as opposed to just being a tool to integrate two or more systems."

"One of the goals of this research is to use IRL assessment as a separate evaluation tool from TRL and help facilitate integration of systems instead of the integration of technologies as originally intended for IRL."

"According to Gagliardi, M. et al. (2009), "severe integration problems can arise due to inconsistencies, ambiguities, and gaps in how quality attributes are addressed in the underlying systems." One of the main reasons for this is not identifying the right quality attribute that supports the integration activities early in the process. This is where a set of quality attributes derived from the DoD space system integration issues can be identified to help with systems integration."

"It is imperative that assessment of complex systems must address common interfaces, interoperability, reliability, and operations (Bhasin K, Hayden J, 2008)"

Definiciones de TRL y IRL:

Lvl	TRL	IRL
1	Basic principles observed and reported	An interface between technologies has been identified with sufficient detail to allow characterization of the relationship
2	Technology concept and/or application formulated	There is some level of specificity to characterize the interaction between technologies through their interface
3	Analytical and experimental critical function and/or characteristic proof of concept	There is compatibility between technologies to orderly and efficiently integrate and interact
4	Component and/or breadboard validation in laboratory environment	There is sufficient detail in the quality and assurance of the integration between technologies
5	Component and/or breadboard validation in relevant environment	There is sufficient control between technologies necessary to establish, manage, and terminate the integration
6	System/subsystem model demonstration in relevant environment	The integrating technologies can accept, translate, and structure information for its intended application
7	System prototype demonstration in relevant environment	The integration of technologies has been verified and validated with sufficient detail to be actionable
8	Actual system completed and qualified through test and demonstration	Actual integration completed and mission qualified through test and demonstration in the system environment
9	Integration is mission proven through successful mission operations	Execute a support program that meets operational support performance requirements and sustains the system in the most cost-effective manner over its total life cycle

Table 1-1. IRL and TRL Definitions (Sauser, B. et al., 2010)

Ecuación aplicable para conocer la IRL de un sistema al que se le suma otro sistema:

IRL**Atributo** : Valor del 1-9 en función de dónde concideremos que se encuentre en la definición de la tabla de definición de IRL para ese atributo en paticular

AtributoWeight : Valor del peso que se le asigna al atributo en el sistema al que se va a integrar este nuevo sistema, el paper los calcula con un modelo de regresión lineal que usa como datos información de sistemas espaciales de los Estados Unidos

IRLSoS = (IRLAvailability x AvailabilityWeight) + (IRLComplexity x ComplexityWeight) + (IRLInteroperability x InteroperabilityWeight) + (IRLManagement x ManagementWeight) + (IRLProcesses x ProcessesWeight) + (IRLResources x ResourcesWeight)+ (IRLSchedule x ScheduleWeight)

Potencial adaptación del método de definición de los pesos para el modelo de regresión:

Componente de motodología original	**Componente de metodologá de remplazo**
DoD Space Systems Reports (Integration Issues)	Conflictos de integración habituales del tipo de componentes que se estén queriendo integrar[1]

[1]Si se va a integrar un sistema de ciber con uno de reproducción de video, tomar los conflictos comunes de cada uno de esos sistemas para el análisis

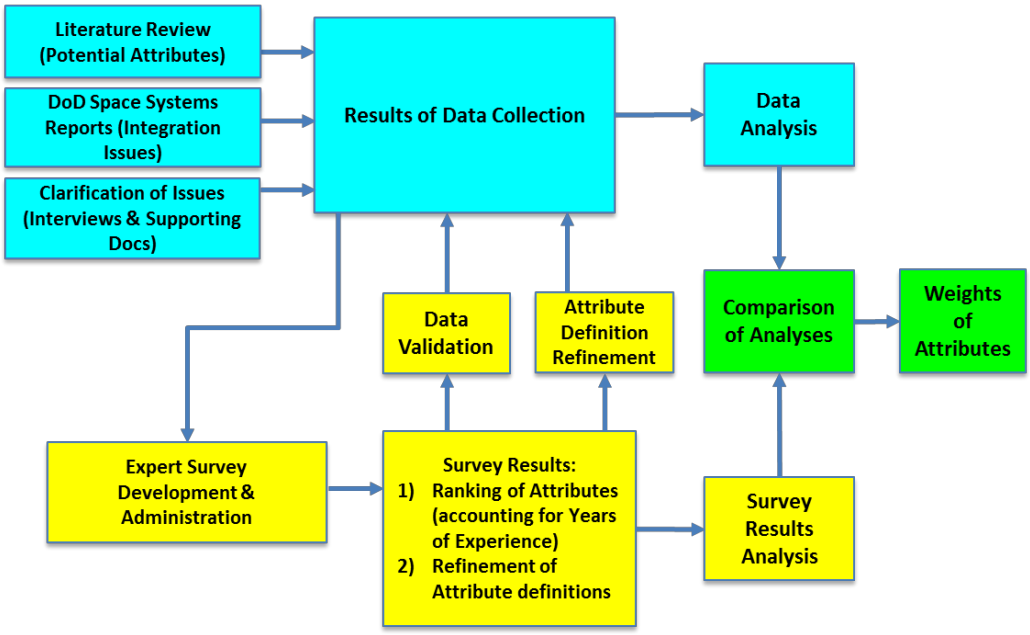


Figure 5-4. Research Framework to Derive Weights of Attributes

Opiniones e ideas:

Una medición exacta de el estado de la integración no parece ser tan sencillo dado que el peso o importancia que se le asigna a cada atributo está sujeto a bastante subjetividad por parte de los especialistas que se puedan consultar. Por otro lado es lógico que para el caso de un conjunto sistemas espaciales ciertos atributos pesen más que otros, por ejemplo la complejidad, interoperabilidad y disponibilidad. Podrían variar los pesos en función del conjunto de sistemas evaluados para integrar.

La idea principal del paper me parece sólida, identificar los atributos, cuánto peso/valor/importancia le asigno a cada uno en el contexto de mi sistema receptor, después identificar en qué nivel de la definición de IRL se encuentra el sistema a integrar y hacer el cálculo total de IRL para el sistema resultante. La clave está en encontrar un método fiable para asignar los pesos/valores/importancias. Sugeriría seguir el método de entrevista de expertos del paper con alguna posible modificación.

Key words: System integration strategies, Technology Readiness Level (TRL), Integration Readiness Level (IRL), System of Systems (SoS)

Source:
"*Beyond Integration Readiness Level (IRL): A Multidimensional Framework to Facilitate the Integration of System of Systems*" by Clarence Lacar Eder