

## Computer Based War Gaming

What did you set out to do?

How did you do it?

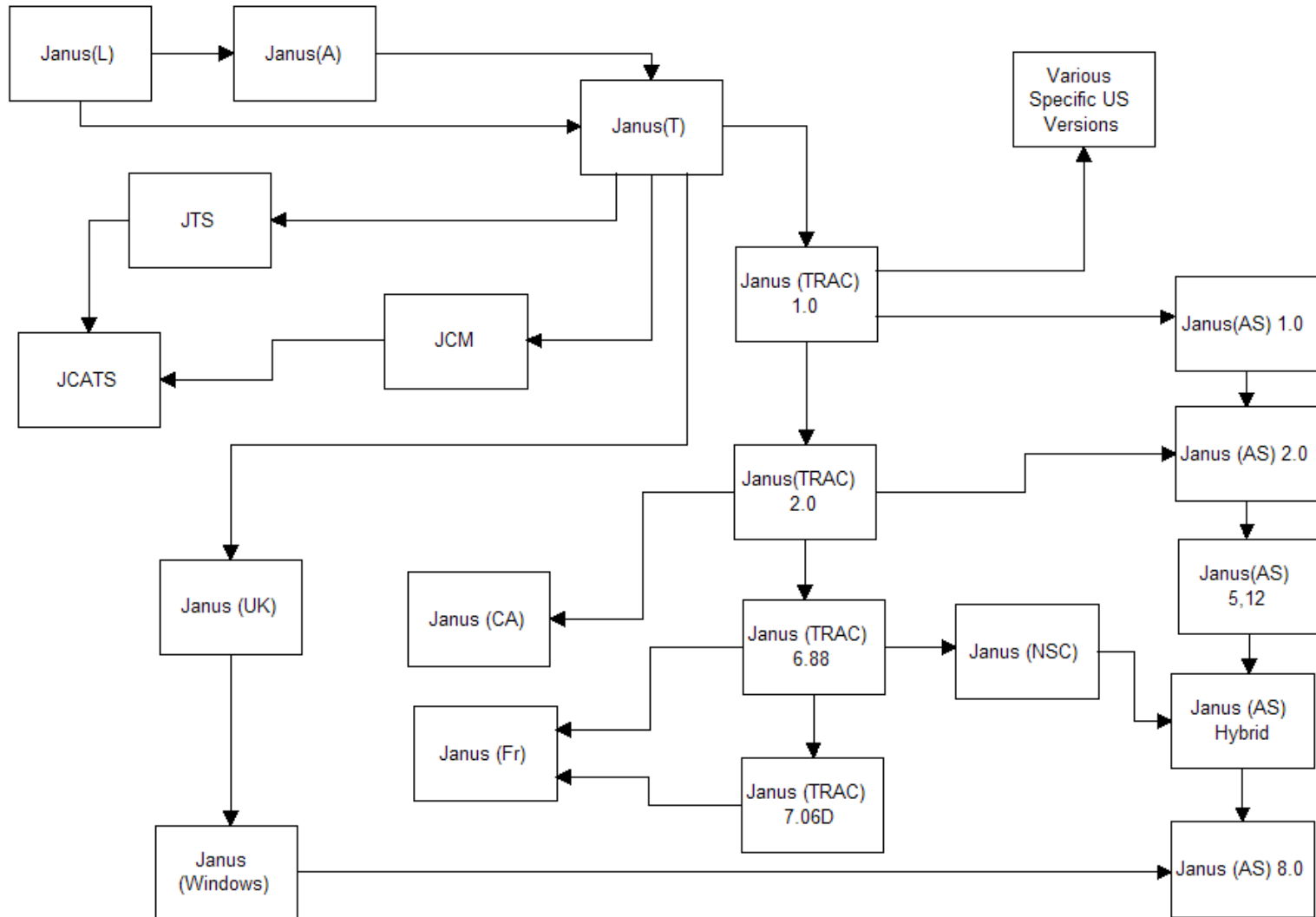
What worked?

How well did it work?

What didn't work?

What are the lessons?

## Janus (AS) History



Nested mounting  
Parachuting  
Maritime movement  
Infantry assault mode  
Reverse movement  
Formations  
DF area effects  
Engagement areas  
Active defence system  
  
UAV  
LOS node  
Offset view  
View to point  
CBR  
Multiple sensors  
Conical view  
GSR  
Multi-mode Radar  
Spot function

## Enhancements

Aircraft bombing  
Laser designation  
Naval Gunfire Support  
Artillery/ Air delivered mines  
Rate of fire/ duration  
Adjusted fire  
Concentration of fire  
Aggregated missions  
Check fire  
  
CASEVAC  
Resupply of specific  
ammunition  
Resupply specific quantity of  
ammo or fuel  
Depleted logistic start states

Minefield panels  
Multiple mine types  
Bridging  
Water depth/ fording  
  
Variable speed  
Suppressive fire  
Partial kills  
Variable altitude  
Stealthy movement  
Activity nodes  
Command fire  
“Actions on” responses  
Explosive Reactive Armour  
  
Interface to C4I System  
Situational awareness display  
3D Display  
External Agent Engine



## Why Is Janus(AS) Successful?

Adaptable      Design

Adaptable      Engineering

Adaptable      Process

# Adaptable Design

Data Driven

Lookup Tables

Stochastic

Generic models with multipliers to represent variation

Extensible by adding extra multipliers or extra tables

## Adaptable Engineering

### Refactoring:

- Modularity
- Optimisation
- Templates

### Tracing

- Testing
- Validation
- Documentation

## Adaptable Process

Agile Principle	Janus(AS) Experience
Our highest priority is to satisfy the customer through early and continuous delivery of valuable software.	All processes were assessed to ensure they contributed to the delivery of software.
Welcome changing requirements, even late in development. Agile processes harness change for the customer's competitive advantage.	Each activity effectively produced a change in requirements. Often, we supported over a dozen activities per year, hence requirements changed frequently.
Deliver working software frequently, from a couple of weeks to a couple of months, with a preference to the shorter timescale.	New functionality was delivered as often as daily.
Business people and developers must work together daily throughout the project.	Preparation for an activity (ie developing a new software build) hinged on frequent interaction between developers and users.
Build projects around motivated individuals. Give them the environment and support they need, and trust them to get the job done.	Users quickly learned that developers wanted to help them
The most efficient and effective method of conveying information to and within a development team is face-to-face conversation.	Whenever possible, developers and users were physically co-located. Often, this meant using one activity as an opportunity to plan for the next one. Prototyping was heavily used.

## Adaptable Process (continued)

Agile Principle	Janus(AS) Experience
Working software is the primary measure of progress.	The time-box and test driven methods were used to ensure that quality was maintained while satisfying fixed exercise schedules.
Agile processes promote sustainable development. The sponsors, developers, and users should be able to maintain a constant pace indefinitely.	Continuous enhancement was maintained for most of the 20 years Janus(AS) was developed.
Continuous attention to technical excellence and good design enhances agility.	Janus(AS) development relied on the foundational design and continual improvement. Award for “technical excellence” in 1994.
Simplicity--the art of maximizing the amount of work not done--is essential.	‘Bang for buck’ was adopted as the primary means of prioritising work packets.
The best architectures, requirements, and designs emerge from self-organising teams.	Teams with different perspectives, motivations and skills tend to avoid ‘confirmation bias’.
At regular intervals, the team reflects on how to become more effective, then tunes and adjusts its behaviour accordingly.	The ‘evolutionary’ approach was refined and adjusted many times over the years. Efforts were made to consult relevant literature etc.



# Questions