

Meta-Design for Agile Concurrent Product Design in the Virtual Enterprise

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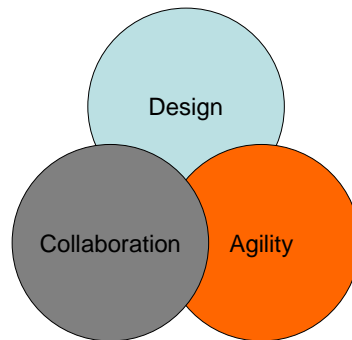


Presentation Structure

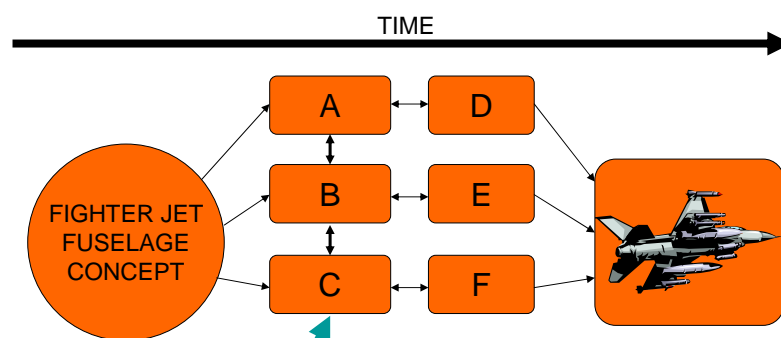
- Background
- Sample Case Study
- Hypothesis
- Methodology
- Results
- Conclusions
- Future Work



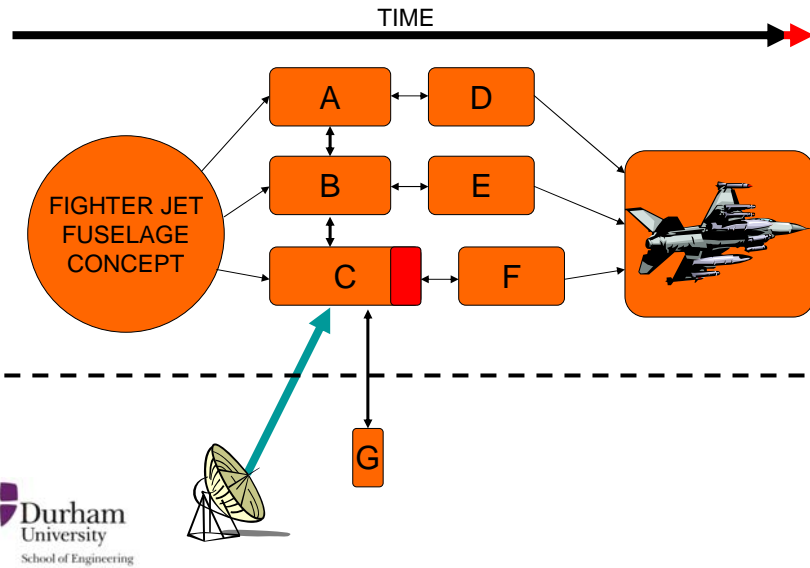
Background



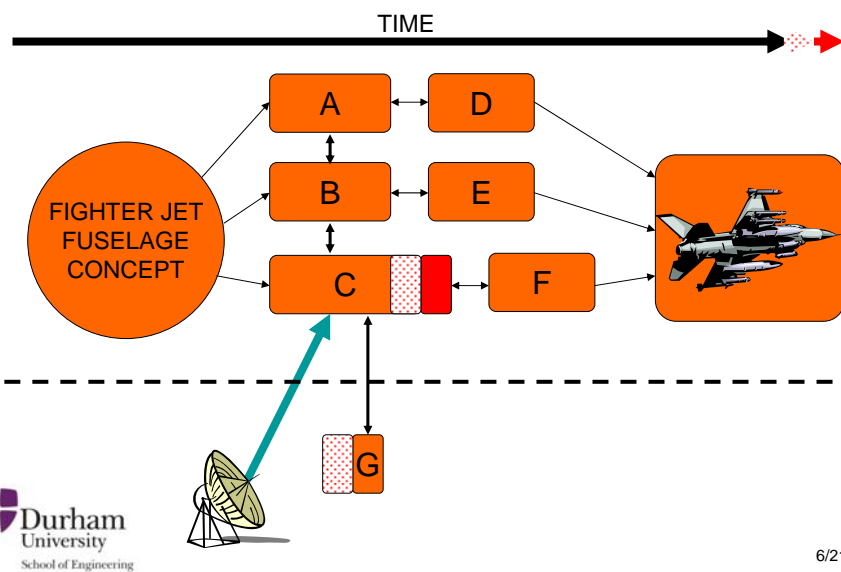
Sample Case Study



Sample Case Study

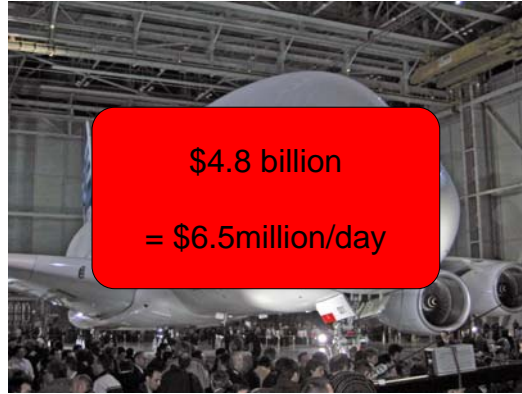


Sample Case Study

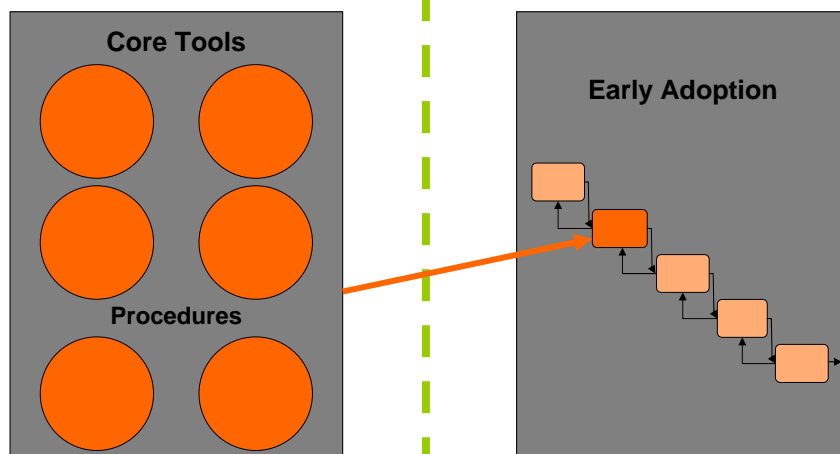


Industrial Case Study

1999 TIME 2006 2008



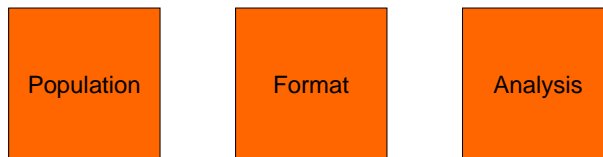
Hypothesis



Methodology

Strongly agree Strongly disagree

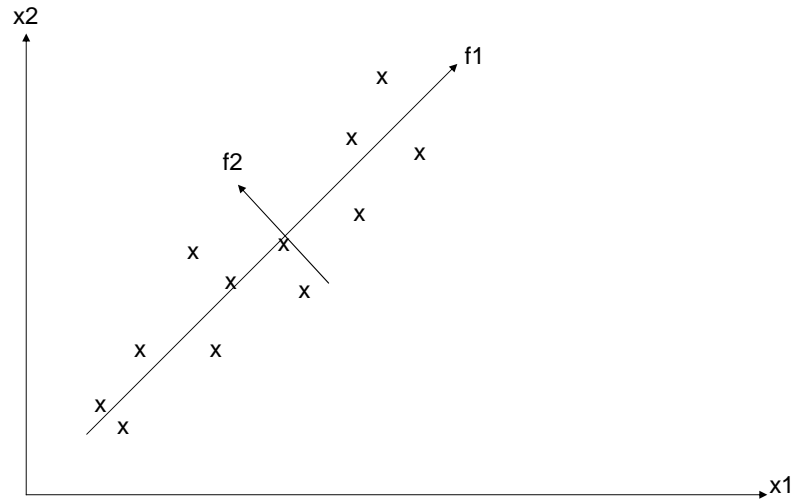
2.1.4. New members to the project could quickly gain access to all the project data: 1 2 3 4 5 6 7



Results – Questionnaire Responses

	Q1.1.1	Q1.1.2	Q...	Q4.3.2	Q4.3.3
Company 1	2	3	6	5	5
Company 2	2	1	2	4	3
Company 3	1	4	4	4	2
Company 4	5	6	2	5	6
Company 5	5	5	2	3	5
Company 6	3	3	4	4	4
...	2	3	5	5	2
...	2	1	6	6	1
Company 19	3	4	6	5	1

Results – PCA



Results – Principal Components

Principal Component	Eigenvalue	% of variance	Cumulative %
Component 1	13.395	33.487	33.487
Component 2	6.906	17.264	50.752
Component 3	6.108	15.270	66.022
Component 4	3.893	9.733	75.755
Component 5	2.581	6.454	82.209
Component 6	1.772	4.430	86.639
Component 7	1.565	3.913	90.552
Component 8	1.265	3.162	93.713
Component 9	1.006	2.515	96.228

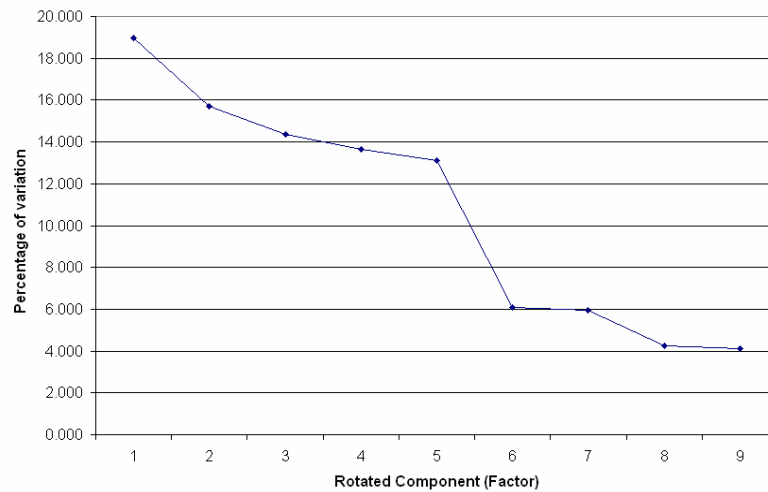
Results – Components Matrix

	Component				Component				
	1	2	3	4	5	6	7	8	9
Terminology is agreed on by the whole project team	.884								
All team members use the terminology agreed on for the project	.836	.411							
Document formats are agreed on at the beginning of the project	.786								
Document Formats are agreed on by the whole team	.743	.514							
New members to the project would easily understand how to use the system	.735								
We always adhere to International Standards for designs	.703		-.415		.400				
Everybody in the project knows who is coordinating the project	.692		-.548						
We have a procedure to follow when a change we make affects others	.683		-.469						
There is a standard method for sharing project data within the team	.667	.465	.417						

Results – Rotated Components

	Component				Component				
	1	2	3	4	5	6	7	8	9
Measurement units are agreed on by the whole project team	.954								
Measurement units are agreed at the beginning of the project	.929								
All team members use the measurement units agreed on for the project	.906								
There is a meeting between companies/divisions at the start of the project	.895								
Everybody in the project knows who they should report delays to	.877								
The response to unexpected events is recorded	.748					.450			
Team members never use different terminology to those agreed on	-.696								
The cause of unexpected events that require a response is recorded	.652	.427				.450			
The meeting is attended by a representative from each company/division	.639		.467			.448			

Results – Components Scree Plot

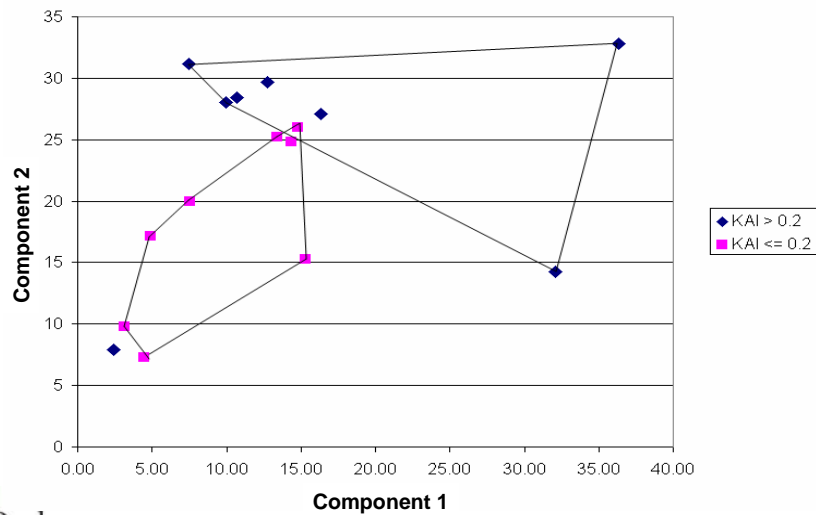


Results – Key Agility Index

$$\overline{KAI} = \sum \frac{T_C}{T_S}$$

KAI – Key Agility Index
T_c = Time spent on change related tasks
T_s = Total time spent on project
n = no of respondents

Results – Analysis



Results – Analysis

Factor:	1	2	3	4	5
KAI <= 0.2	9.77	19.27	13.89	16.49	8.95
KAI > 0.2	17.1	25.4	14.9	18.0	10.1

- Factor 1 – Project Setup & Measurement Units
- Factor 2 – Reaction to and Planning for UEEs
- Factor 3 – Terminology and Design for Manufacture/Assembly
- Factor 4 – Document Formats & International Standards
- Factor 5 – Data Sharing

Conclusions

- Project Setup
- Core Tools
- Electronic Data Sharing is not significant

Future Work

- Lab-based Experiment
 - Objective – does meta-design work?
 - 2 ‘dummy’ collaborative design projects
 - Participants from industry
 - Lab-based for one day
- Industrial Trial
 - Apply the meta-design stage in industry
 - Can we show a real benefit?

Thank you – any questions?

