Methodology for Rapid Development of C2 Planning Systems

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Introduction

• Developing Geospatial C2 Systems
• Requires more interaction
  – cannot automate solutions
• Support for Decision Makers
• Urgent Operational Requests
• Need for more flexible design methodologies
  – improved capture of user requirements
C2 System Development Issues

- Large scale projects
  - fixed price and/or time
  - long procurement time scales
- User Requirements
  - difficult to elicit and validate
  - finding the real user
  - ‘future proof’
- Inflexible methodologies
  - ‘opaque to the user’
  - over ambitious
Structured Systems Analysis & Design Methodology (SSADM)

- A British Standard, based on waterfall model:
  - coherent and widely used framework
  - high level of control
  - additional specification added to reflect some of C2 issues

- Limited adoption by C2 project organisations
  - limited, controlled user input
    - input to what not how
  - often associated with
    - systems failure, long time scales, high cost
Disadvantages of traditional methodologies

- Technical bias of formal methods
  - disengages the end user
  - neglect of human issues

- Based on assumptions
  - users can state requirements
  - cost, benefit and work could be measured in advance
  - perfect system could be produced first time

- Do not address the difficulties of
  - defining what is required
  - measuring pioneering work
Newer Methodologies

- Rapid developments in technology
  - Object Oriented (OO) design
    - code re-use
    - component software (COTS)
- Facilitates rapid
  - design
  - user feedback
  - procurement
- However...
Requirements Engineering Process

User Requirements

- Capture
- Document
- Maintain

System Requirements
Prototyping

- Technology demonstration
- New concepts/ideas
- User requirement validation
- Cost effective method for C2 development
  - new technology
  - complexity in all areas
  - data structures
- Known as Rapid Application Development (RAD) methodology

Sophisticated URs
Rapid Application Development (RAD)

- C2 Decision support is ‘different’
  - explore problem by generating scenarios
    - explore solution space (war gaming)
- Cannot be captured by standard, structured development paradigms
- Need extensive user involvement
  - best way through use of prototypes
  - further developed by us to reflect C2 decision making

*Design should be driven by the decision maker*
C2 RAD Methodology

USER

System

DESIGNER

User learning

Middle-out design

Personalised uses

Facilitates implementation

Pressure for evolution

Evolution of system functionality

QinetiQ
Urgent Operational Requirement (UOR)

- Issue with extremely short time scales
  - cannot use current methodologies

- Recent example of planning system
  - prototype developed rapidly
  - parallel system with secure communications

- Extremely rapid application prototyping
  - evolution of RAD method into PRAD
Parallel RAD (PRAD) Method

USER <-> SYSTEM

USER learning

USER request enhancements

Upgrade Emailed to User

DESIGNER <-> SYSTEM

Software upgraded and tested on parallel system
PRAD Benefits

• System lives on...
  • identifies gaps in current procurement programs
  • captures future requirements
  • spreads ideas and concepts
  • endorsement from real user - ‘feet in the mud’ validation

• Users get the system they want
  • ownership
Conclusions

• Particular issues of C2 need more flexible design methodologies

• Middle-out RAD approach based on prototypes starting to address this

• Refined method of PRAD applicable to UOR

• Processes/method still being refined but believe good basis for rapid development of C2 planning systems
Any questions?

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