Agile Components

Scaling XP

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How do you scale agile methods?

- How do you make a big piece of software?
- Build it out of big pieces

Alan Cameron Wills

- Mentor and presenter in software development process
  - Joint author of *Objects, Components and Frameworks – the Catalysis approach*
  - Clients in many fields, both sides of the Atlantic
- Technical Director of **Trireme International Ltd**
  - Source of **process and architecture mentoring** in UK, Europe, …
  - http://www.trireme.com
- Director of **FastnLoose Ltd**
  - **Software development** using agile methods and components
  - http://www.fastnloose.com

Effective improvements in productivity

- Agile Development
  - Customer involvement, incremental development, rigorous testing
  - Convergence on real requirement
- Component based development
  - Building from pre-existing parts
  - Rapid assembly of candidate solutions

Agile Development

- Principles
  - Emphasis on helping people work together, rather than tools
  - Incremental delivery, iterative development, strong testing
- Benefits
  - Convergence on real current requirement
    - cf what they thought was required, at time of signing
  - Early delivery of a working solution
- Examples in this space:
  - eXtreme Programming (www.xpdeveloper.com)
  - Crystal (www.crystalmethodologies.com)
  - DSDM (www.dsdm.org)

Moving Requirements

take aim ...

no steering

moving target

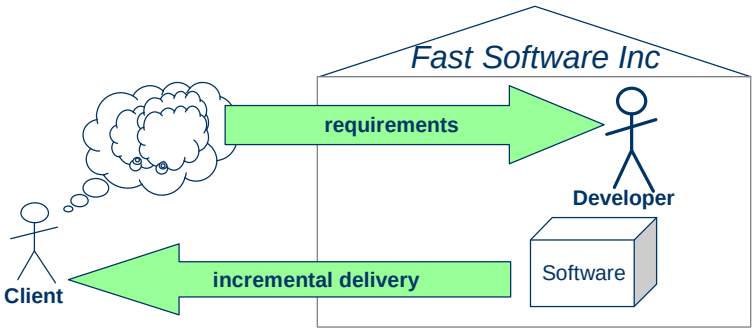
control

guided: continual course corrections

moving target

Incremental development

- Emphasis on customer feedback during development



- Features tested & demonstrated as soon as developed

  Minimal investment in travelling in the wrong direction

Agenda

Agile development

Component Based Development
- pluggability
- software product lines
- model driven architecture

Incremental CBD

"Component Based Development"

CBD has (at least) two meanings:

- .Net, J2EE/EJB, …

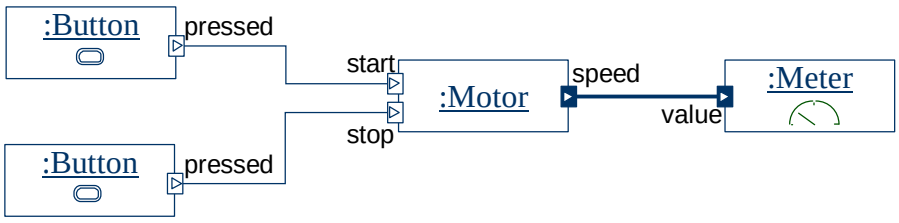
  Separation of business logic from container ?

- Product Line Architectures ?

  Family of end-products from a kit of pluggable components

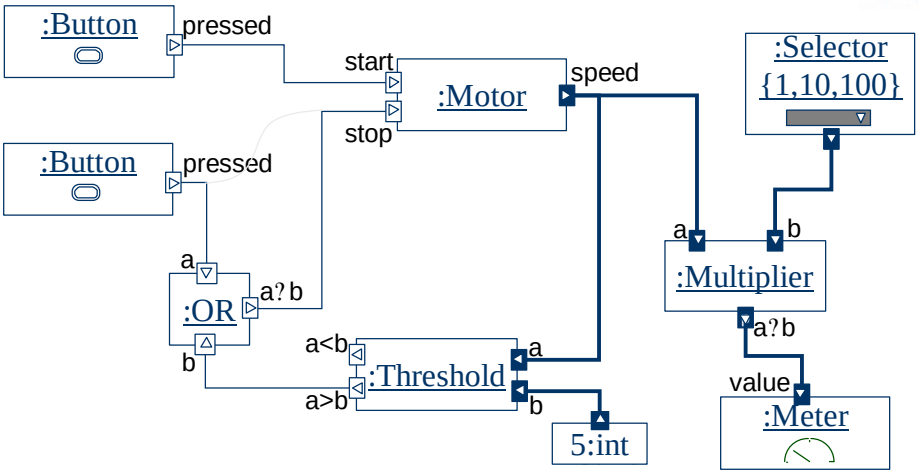
Kit of pluggable components

- Java Beans [-like] example:



Plug in more bits from the kit...

- Components unchanged, but rewired:

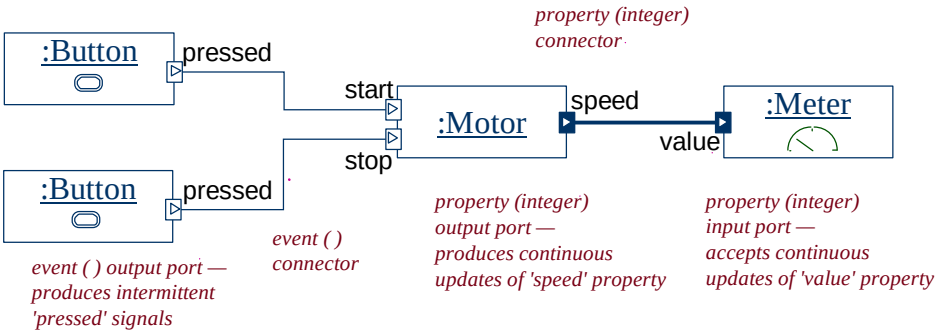


- Few connector types compared to number of components

Connector specifications

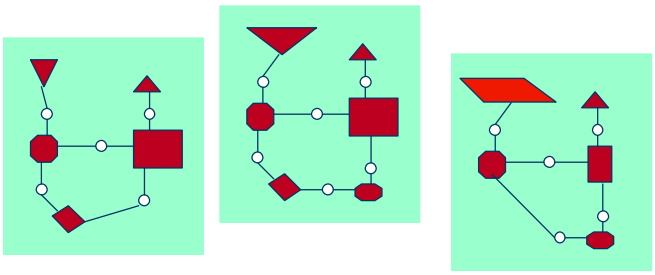
- Connector definitions are fundamental to pluggability

whether the connectors are pure interface standards,
or have an implementation as a software framework



Software Product Lines

- **Families of products**
  made from **kits of components**

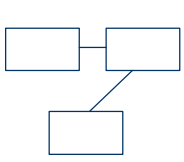


- **Product Line Architecture = definition of connectors**

Component connectors

- Connector definition can include:
  - interface mechanisms – e.g. CORBA, RMT, TCP/IP, …
  - basic syntax – e.g. XML
  - * Platform Independent Model

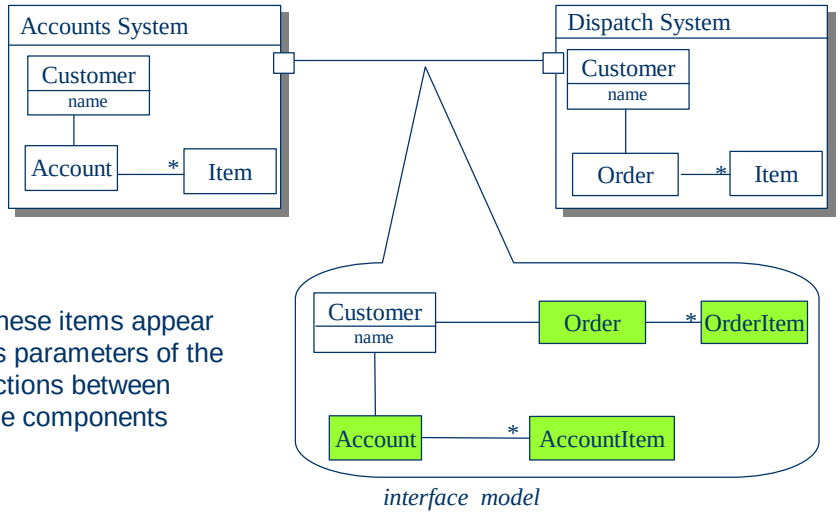
**** = required***



- classes of objects communicated on the connector
- what you can do with them
- business rules applying to them

Model what the components talk about

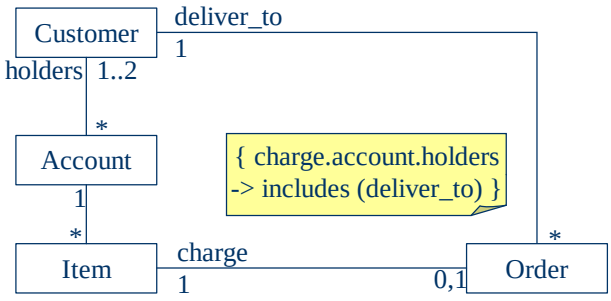
- Different components may have different internal models, but must speak a common language



- These items appear as parameters of the actions between the components

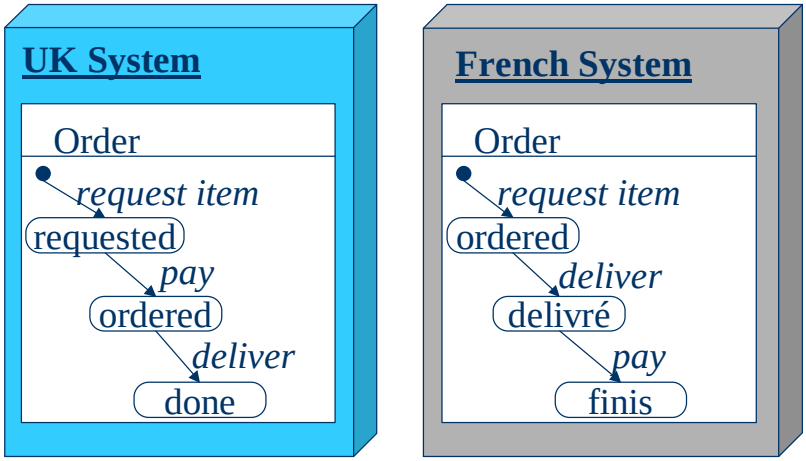
Business rules

- Each component should observe the rules about what's allowed
  - at least when communicating with other components
- Static constraints --- written informally or in OCL/C++/...
  - e.g. *an Order shall be charged to an Account of the same Customer to whom it is to be delivered*



Dynamic rules

- Rules about the allowed transitions

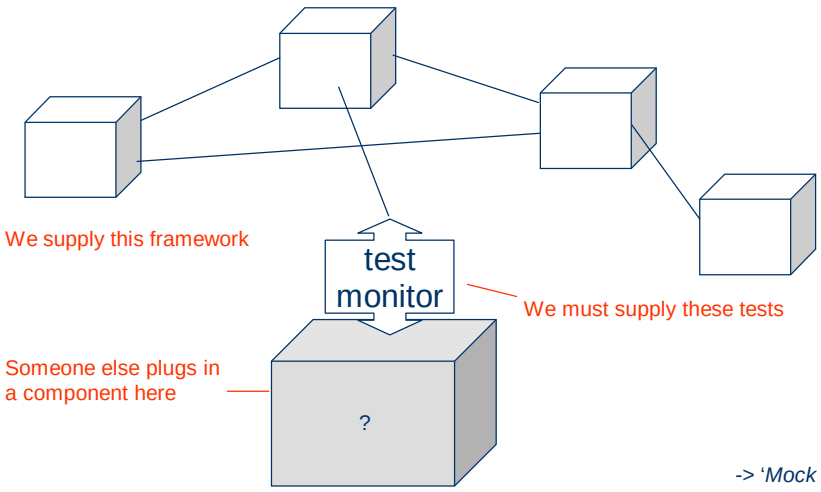


what happens if these systems pass orders to each other to fulfil?

Testing generic software

- Component designers don't know who they're talking to

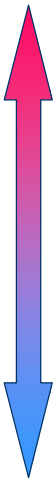
Supply components and frameworks with rigorous tests for plug-ins



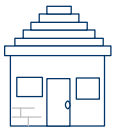
-> 'Mock Objects'

Activities in Product Line Development

Rapid Assembly

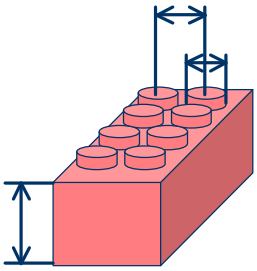


end-product construction



component construction

connector definitions



Deep Thought

Agenda

Agile development

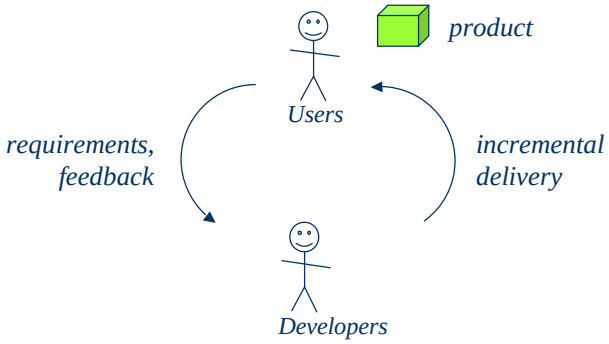
Component Based Development

Incremental CBD

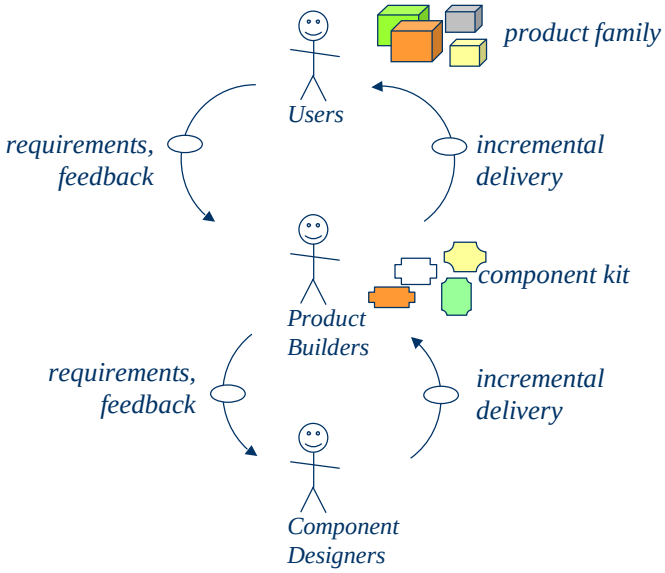
The incremental development loop

- Incremental delivery

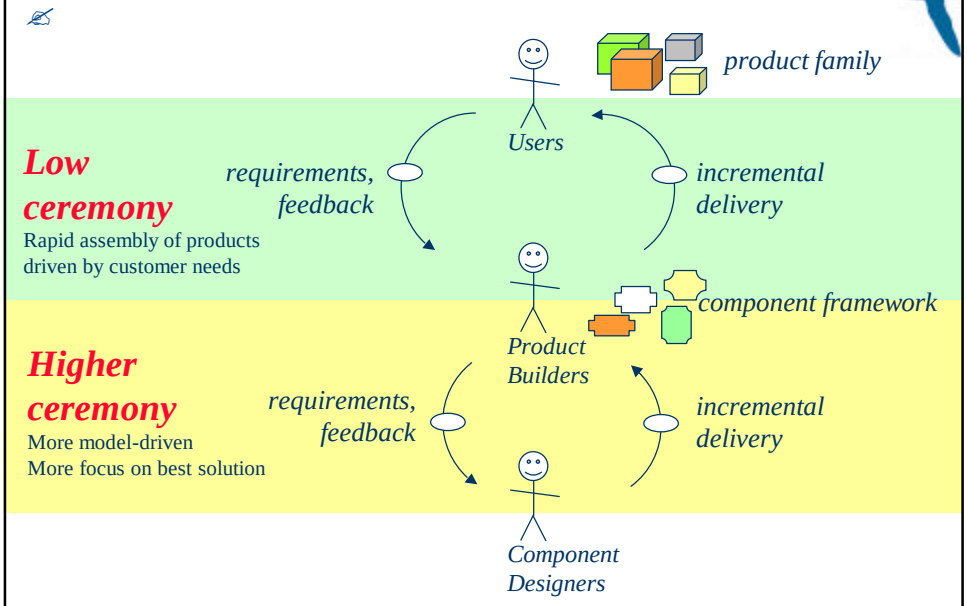
  tight loop of feedback between user and developer



Incremental CBD



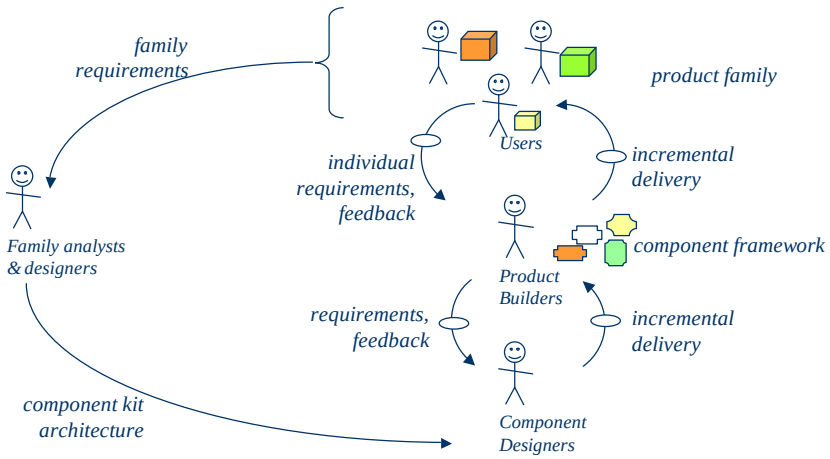
Incremental CBD



Family planning: Proactive population

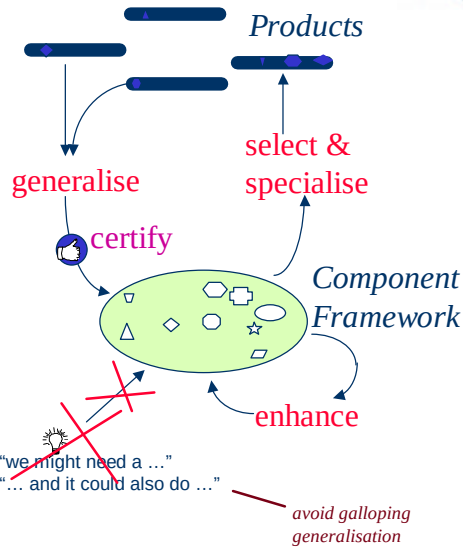
- Populate kit with components needed for product family

  => analysis of family and variations upfront



Lazy population

- Products
  - quickly-created specialised solutions
  - built from reusable Assets
- Assets
  - created by generalising from designs of known Products
  - not from bright ideas about what might be useful
- Protect & cultivate assets
  - devote resources to maintaining 'design capital'
  - Planned evolution of framework
  - Framework separately resourced from products



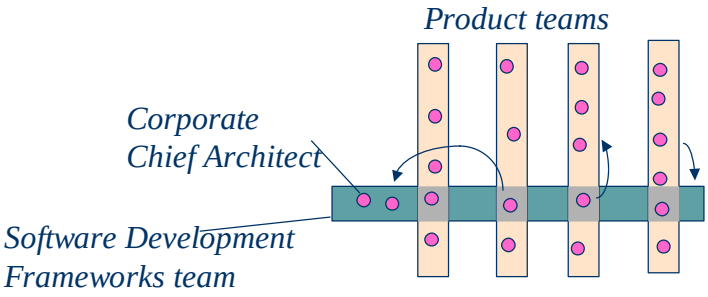
Software Development Framework

Framework

- **Process**
  - ***Management*** – how to run the project
  - ***Technical*** – what to do on the project
- **Architecture**
  - design guidelines and patterns
- **Software Components**
  - coherent structure and components that can be specialised and assembled to form project
- **Tools**
  - and platforms

SDF Team Works on Projects

- SDF material is generalised from work on Products
- Members of SDF Team work part time on Product projects
  - Provide mentoring about SDF process, architecture, components
  - Get feedback on the SDF
  - Monitor Products for ideas that can be incorporated into SDF
  - Spend time enhancing SDF after experience on products



Summary

Develop a coherent product line built from a component framework

not disparate miscellany of components

Rapid product assembly; more ceremonious component design

Generalise framework incrementally from delivered products

Rigorous regression tests: supply them with components

Treat tools, methods, and patterns as part of the component framework

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