Engineering SOA

Service-Oriented Architecture

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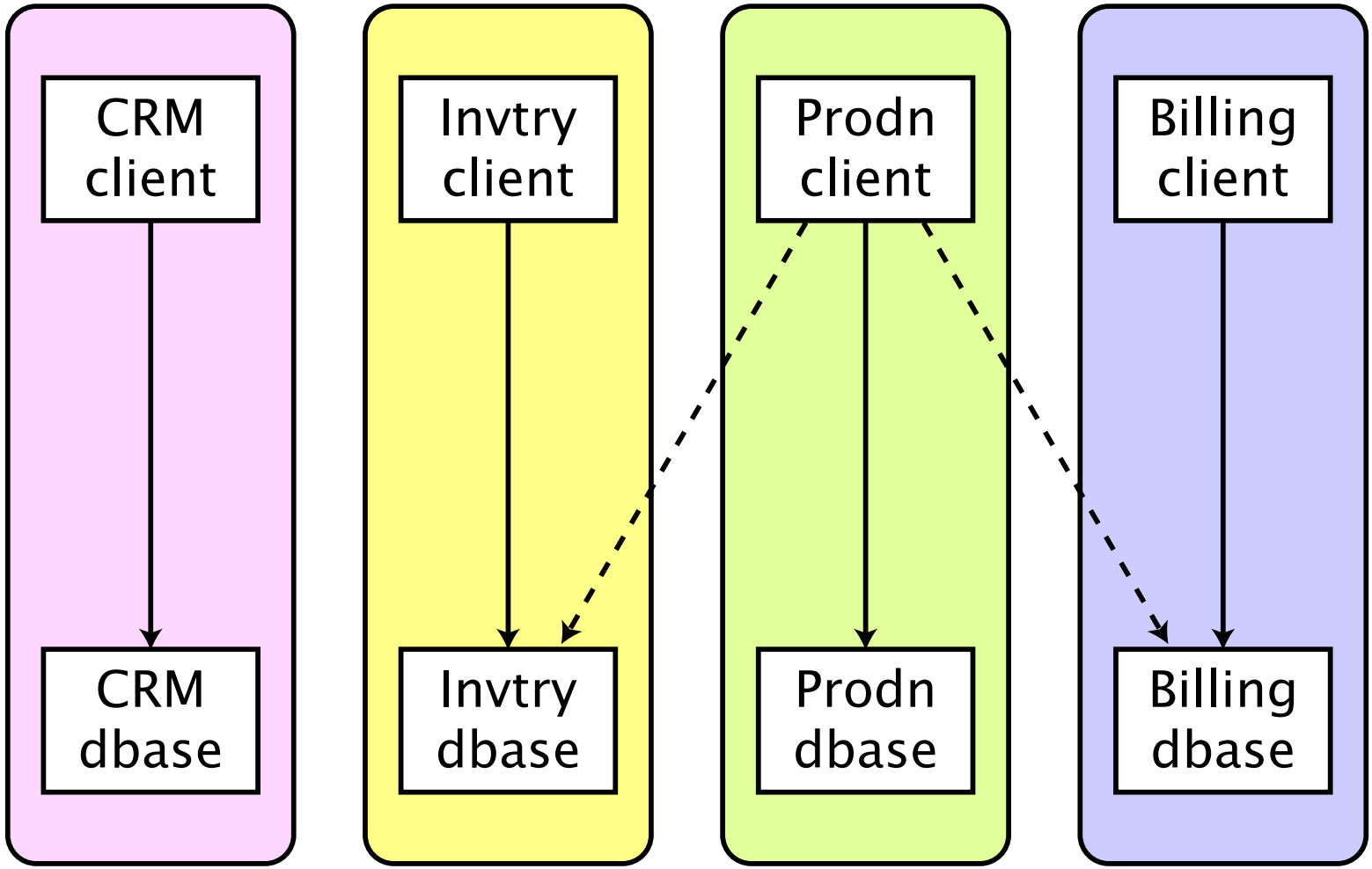
1 Organization

- SOA is not just a technical development
- successful adoption has organizational consequences too

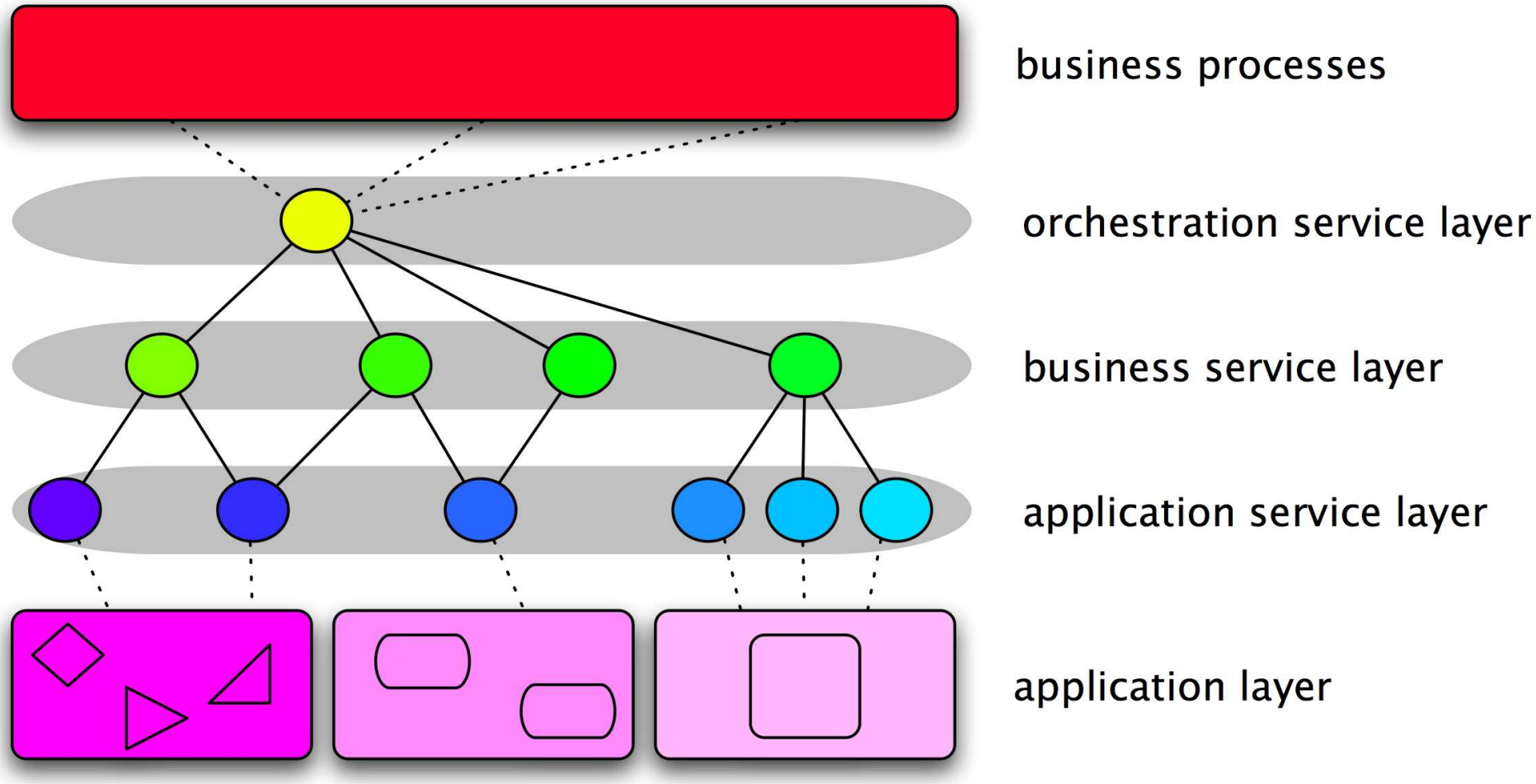
- arguments from Josuttis, *SOA in Practice*

1.1 Before SOA: silos



Separate fiefdoms, controlling independent systems.

1.2 With SOA: services



1.3 Organizational structure

- refactoring of fiefdoms:
  - backend departments
  - cross-domain departments
  - frontend departments
  - “solutions managers”
- requires collaboration and trust

1.4 Conway's law

> Any organization that designs a system will inevitably produce a design whose structure is a copy of the organization's communication structure.
>
> (Melvin Conway, *How Do Committees Invent?*, Datamation Apr 1968, http://www.melconway.com/law/)

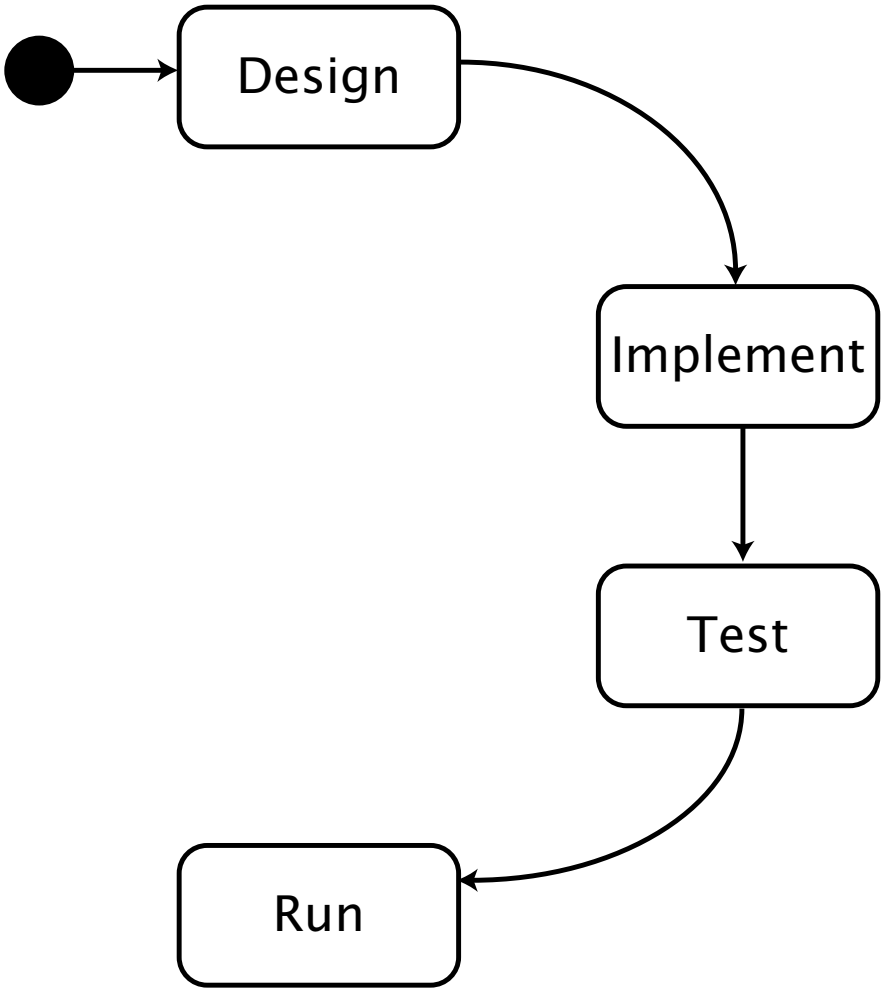
Popularized and named by Fred Brooks in *The Mythical Man-Month*: "If you have four groups working on a compiler, you'll get a 4-pass compiler."

Conversely...

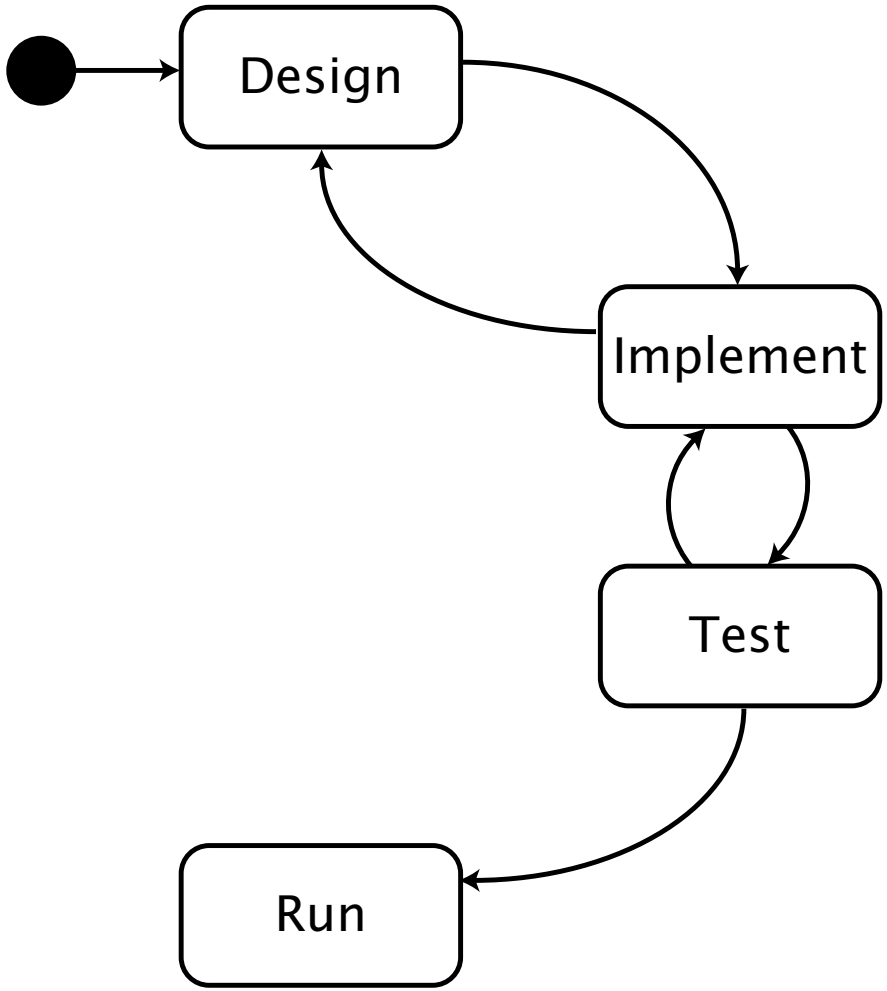
2 Lifecycle

- services are software
- standard software lifecycle practices
- but services also part of larger organizational processes
- therefore some differences

2.1 Core phases

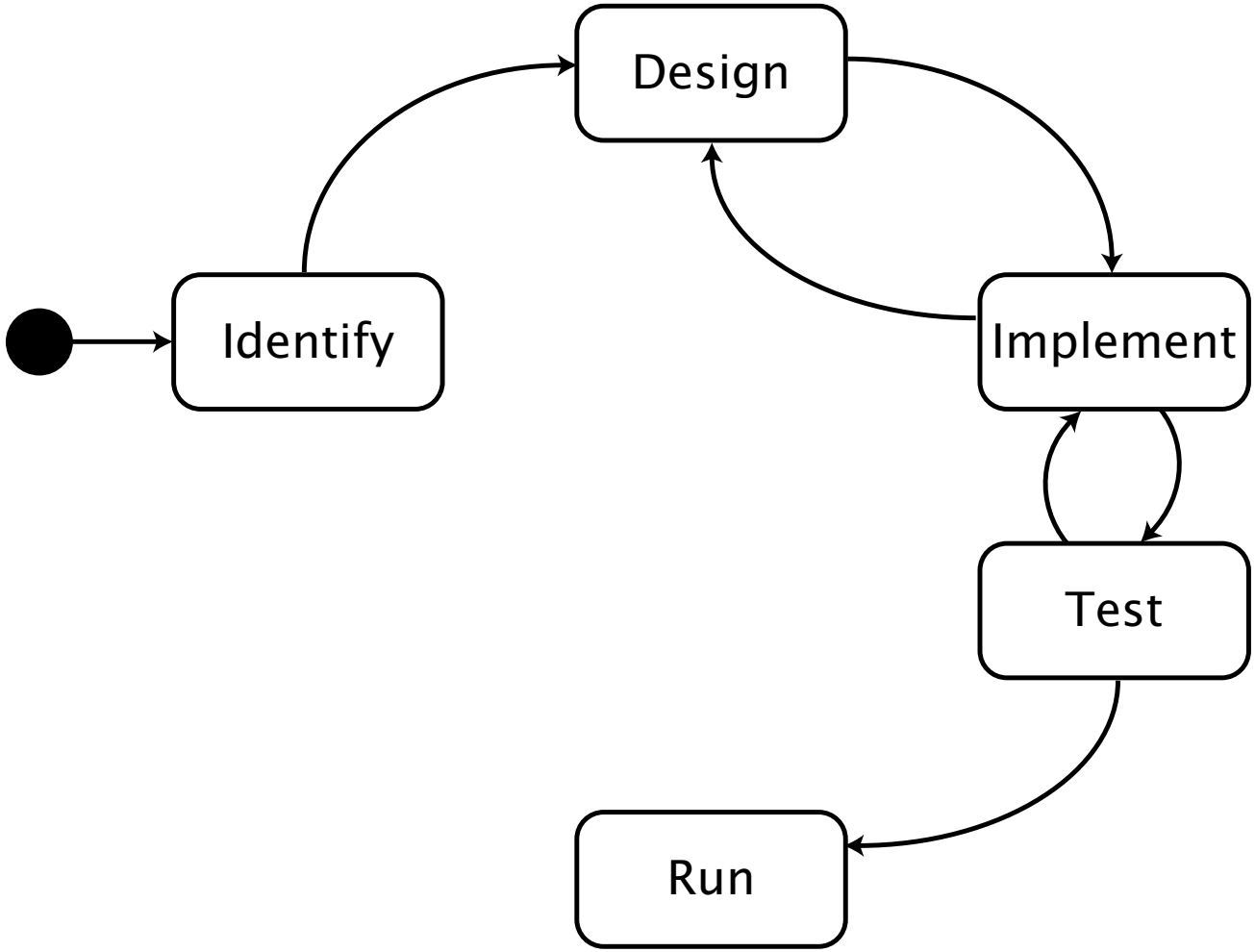


2.2 Iterative development in context



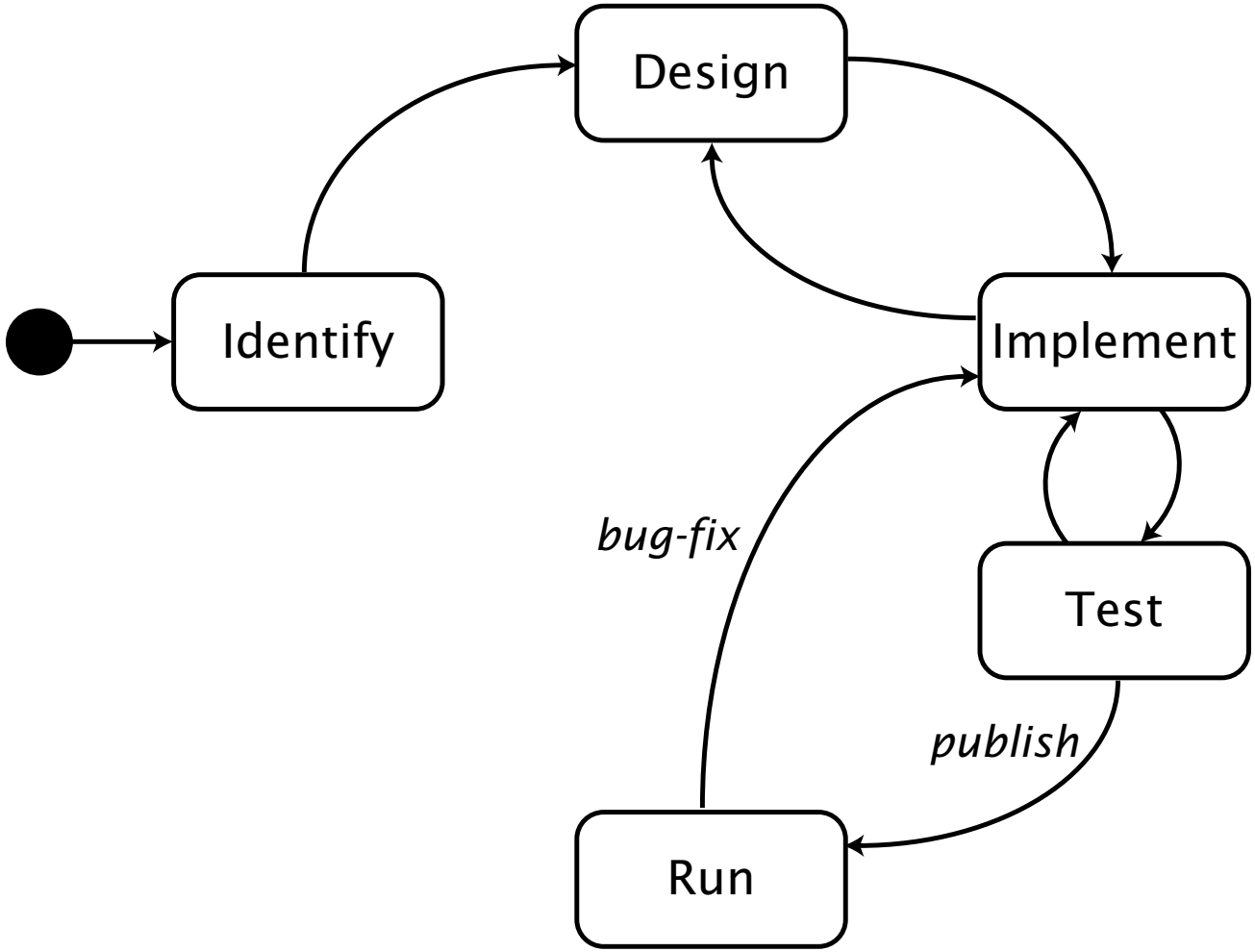
Some decisions will need revisiting.

2.3 Identifying services



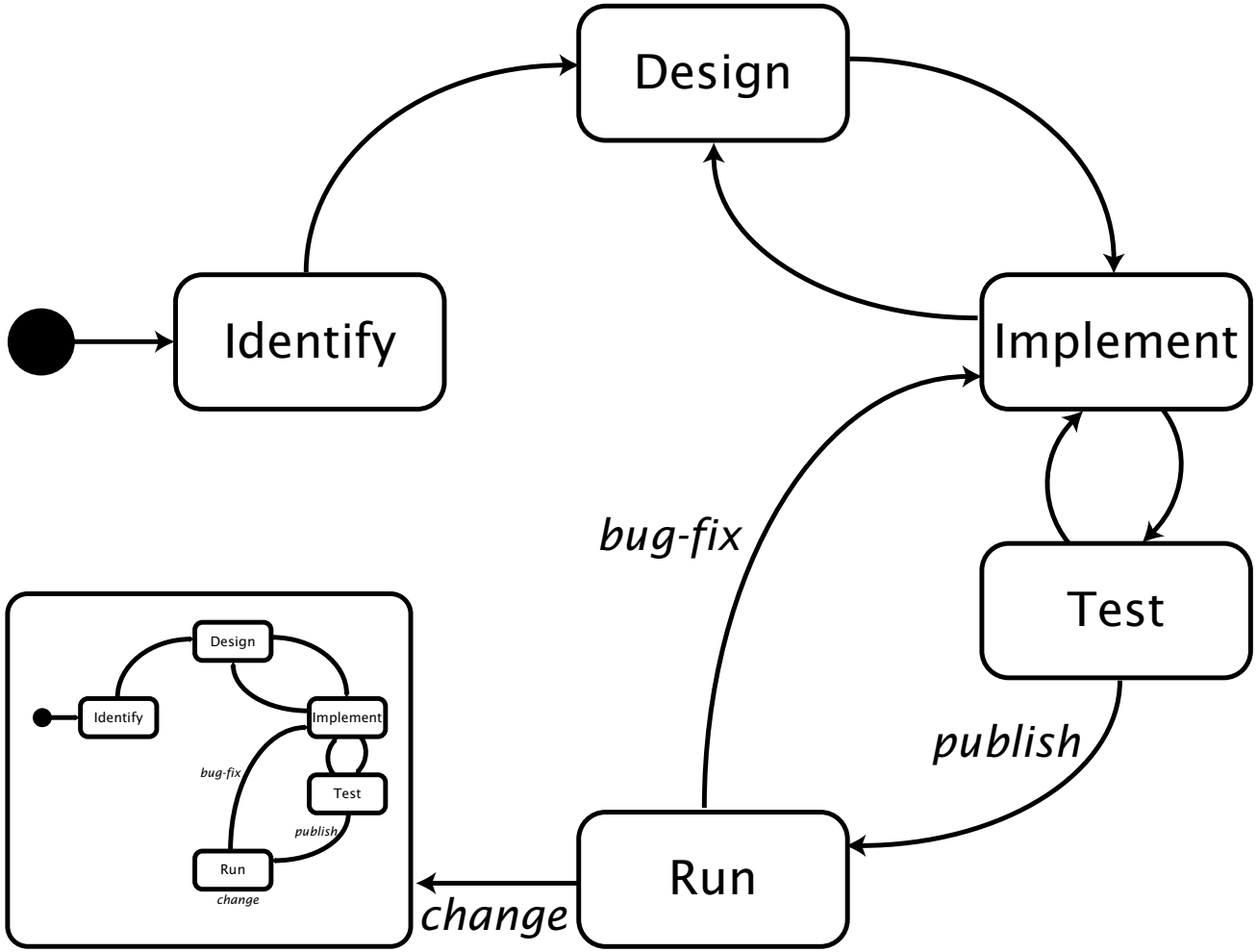
Requirements, analysis, portfolio management...

2.4 Fixing services



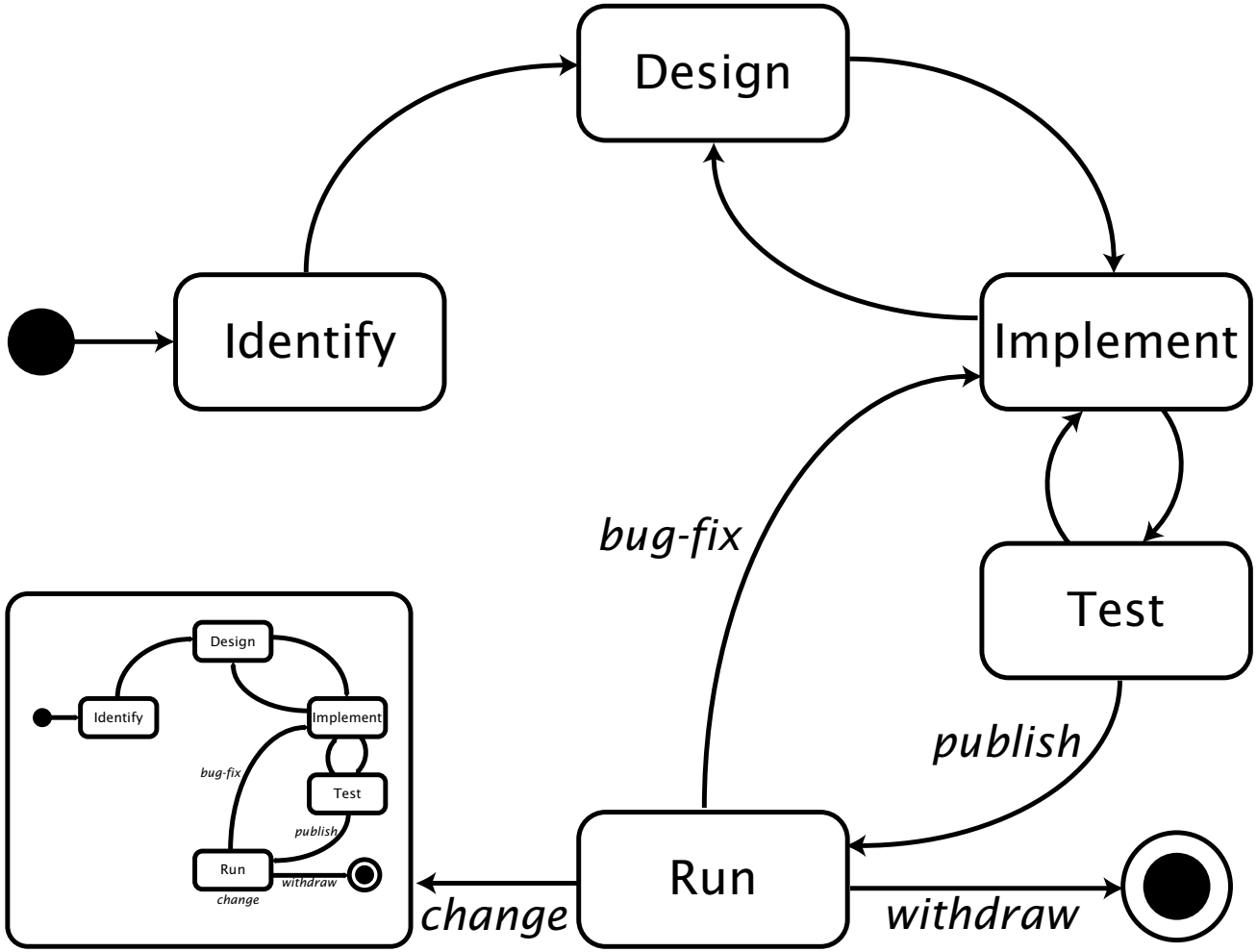
If it's just a bug-fix, fix it in-place.

2.5 Modifying services



If it's in any way significant, make a new service.

2.6 Withdrawing services



deprecate → monitor → persuade → delete

3 Versioning

- waterfall principles giving way to agile
- SOA is designed for flexibility
- especially for large systems, cannot fix requirements
- *but still* people want interfaces to be stable
- contracts and projects depend on it
- not feasible to refactor large systems
- so stability is also very important

3.1 Simple domain-driven versioning

- there are complex approaches to versioning, with automatic updates
- simpler approach often suffices:

  every published modification yields a new service

- make version number part of the service identifier:
  *GetCustomerData*1, *GetCustomerData*2
- (or version number might be a parameter, or contextual)

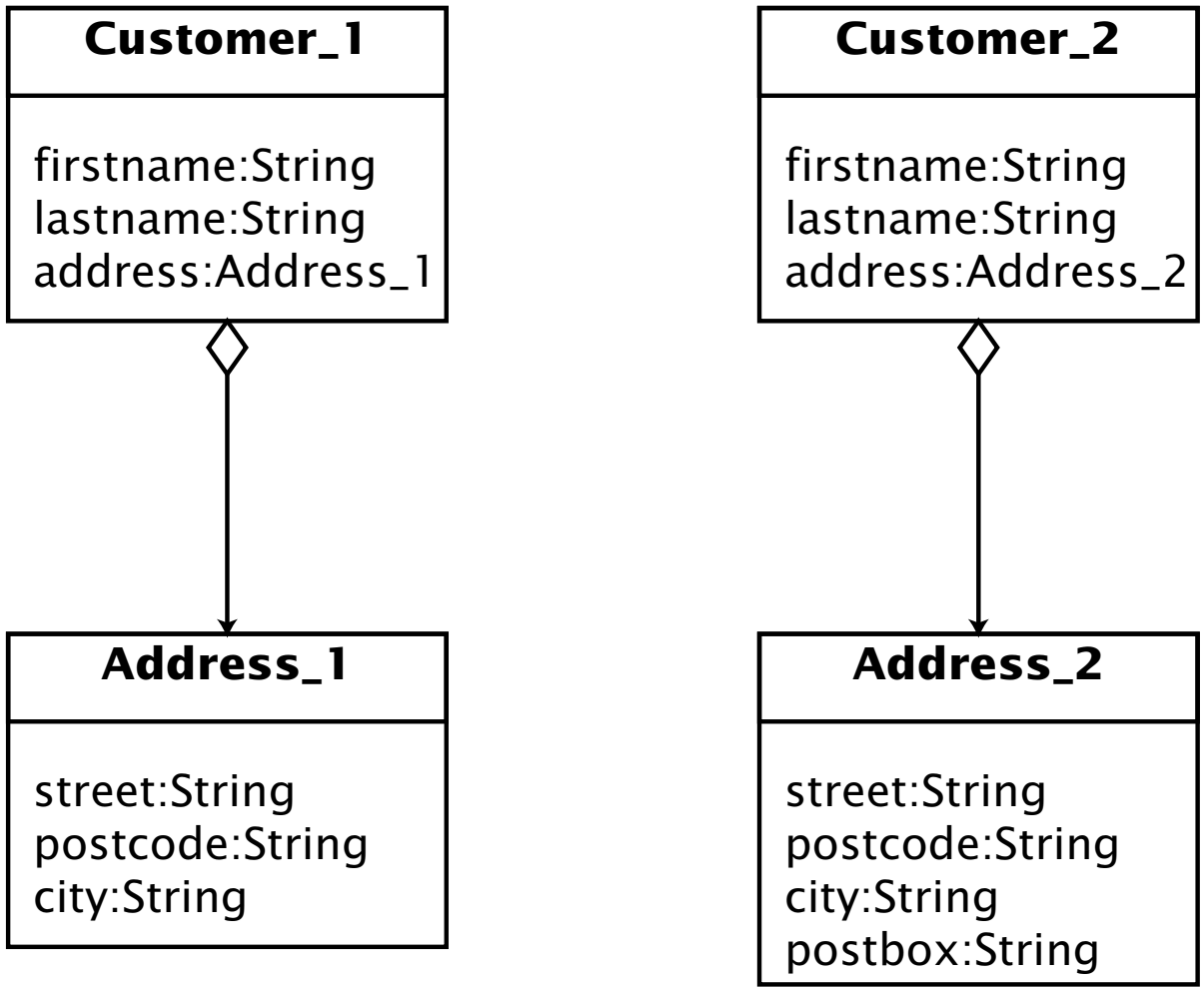
3.2 Backwards compatibility

- relax the rule for bug-fixes
- encourage compliance for “backwards-compatible” changes
  - might not be so compatible, eg if SLA changes
  - maybe changes in datatypes...
  - besides, any bug-fix entails some risk
- require compliance for incompatible changes
- actually, bug-fixes might be (even incompatible) changes

3.3 Versioning of datatypes

- modified services often require modified datatypes
- these differences propagate through aggregation
- sooner or later, consumers will have to deal with multiple versions of ‘the same’ datatype
- three approaches:
  - really use different types
  - use one common type, with optional values
  - don’t use types, make it generic

3.4 Propagation of datatype versions



4 Governance

- SOA has technical aspects
- but it isn't a product: you can't buy it
- how can you introduce it?
- how can you govern its application?

4.1 Non-technical governance issues

- *visions, objectives, business case, funding model*

  why are we doing this? how will we pay for it?

- *reference architecture*

  fundamental decisions: preferred technology, message exchange patterns, metamodel, etc

- *rules and responsibilities*

  who drives and cares about issues

- *policies, standards, formats, processes, lifecycles*

  decide and document, in standard notations

4.2 Technical governance issues

- *documentation*

  important for transparency; promotes non-technical issues

- *service management*

  repositories and registries for services and contracts

- *monitoring*

  conformance to policies, meeting SLAs, preparing for withdrawal

- *change and configuration management*

  the usual tools

4.3 SOA step-by-step

- *understand it*

  what's the benefit? do you have support?

- *carry out a pilot project*

  try it out, small but not too small; should have some value

- *second and third projects*

  determine what was specific to pilot; refactor these reference implementations

- *develop a general strategy*

  establish useful lessons and principles

Don't forget documentation and retrospective reviews, at every step.

4.4 Establishing SOA: four approaches

- *developer-driven*, grass-roots

  leads to technological experience; likely to be uncoordinated

- *business-driven*

  proof of concept helps adoption; limited benefit from early projects

- *IT-driven*

  effective for infrastructure; focus on technical aspects

- *management-driven*, top-down

  coordinated, driven by business priorities; expensive, disruptive, risky

Really need a combination of them all.

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Service-Oriented Architecture

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Components	REST	Composition	Architecture	Conclusion
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Web Services	Qualities	Objects	Semantic Web	
tea	tea	tea	tea	
Web Services	Qualities	Objects	Semantic Web	