

# INFO303

## *Enterprise Information Systems Infrastructure*

Semester 1, 2020

### Lecture 1

- Paper overview
- Introduction to Enterprise IS Infrastructure

Lecturer: Stephen Cranefield

# Course description

Large, modern organisations have complex information and communication needs. These enterprises need the support of an appropriate software and information infrastructure in order to meet their business goals.

INFO303 explores how enterprises integrate and use information from a diverse range of sources, with a particular focus on integration middleware, big data, and analytics. INFO303 equips graduates with the knowledge to manage and use appropriate tools in a dynamic and evolving information environment.

(continued)

Students will gain practical experience in developing distributed applications using Java, web services, the ActiveMQ message broker and the Apache Camel service integration framework, and in the design of data warehouses.

# Learning Outcomes

Upon successful completion of this paper, you should:

- understand the concept of middleware and the architecture, design, and creation of web services;
- appreciate issues relating to cloud computing and virtualisation, and be familiar with associated technologies;
- understand technologies used to manage and process voluminous and semi-structured data sources (e.g. NoSQL, Hadoop, Apache Spark, Star Schemas);
- Understand data warehousing concepts
- Understand the concept of enterprise architecture and the role of an enterprise architect.

and be able to:

- reflect on the suitability of infrastructure options for a given context (an organisational setting), including consideration of security implications;
- apply a middleware infrastructure (in an organisational context); and
- use tools to implement business processes.

# Teaching Staff

- Stephen Cranefield (course coordinator)  
[stephen.cranefield@otago.ac.nz](mailto:stephen.cranefield@otago.ac.nz), Room 7.17 (Commerce)
- Nigel Stanger  
[nigel.stanger@otago.ac.nz](mailto:nigel.stanger@otago.ac.nz), Room 7.04 (Commerce)
- Mark George  
[mark.george@otago.ac.nz](mailto:mark.george@otago.ac.nz), Room 9.09 (Commerce)

## Lectures

- Wednesday 12 noon, SDAVF: Seminar room F, 1<sup>st</sup> floor, St. David lecture theatre complex
- Friday 11am, SDAVE: Seminar room E, 1<sup>st</sup> floor, St. David lecture theatre complex

# Labs

- You are each streamed for one two-hour lab., held every week in the OBS327 lab (Commerce)
- There is a **terms requirement** to **participate in at least 7 out of the 11 labs in weeks 2 to 12 of the paper** (there are also labs in weeks 1 and 13 that aren't counted for this requirement)

Otherwise you won't be allowed to sit the exam

- See Mark George for lab-related issues

## Extra help

- Please let us know if you need extra help. We want to help you!

# Assessment

- Exam-style questions: 10%
  - 2% per week, five selected weeks (see Schedule)
- Data warehouse design assignment: 10%
- Web services integration project: 30%
  - Phase 1: 15%
  - Phase 2: 15%
- Final exam: 50%

# Academic Integrity

- Academic integrity means being honest in your studying and assessments.
- Academic misconduct, such as plagiarism or cheating, is a breach of academic integrity and is taken very seriously by the University. Types of misconduct include plagiarism, copying, unauthorised collaboration, taking unauthorised material into a test or exam, impersonation, and assisting someone else's misconduct.

**WE WILL BE USING PLAGIARISM DETECTION SYSTEMS for practical and written work**



# Course Standards

- Your project code must compile without errors or it won't be marked
- There will be a minimum level of functionality specified for the project—your program must perform to this level to gain any marks
- We want you to be *precise* in your use of terminology in written work, and avoid vague statements that don't show your understanding, e.g. technology X helps reduce programming time (but how?). Clearly explained answers will gain more marks than vague and imprecise ones. Start practising now while you have plenty of time before the exam!

# Professionalism

- We expect you to use the *git* version control system to manage changes to your code, along with our local *gitbucket* server (more on this in labs)
- Project submissions will be done using the gitbucket server, and **there must be a record in gitbucket of incremental development**
- For practical work, code style (meaningful variable names, good formatting, and useful comments) may be part of the marking schedule

# BB Discussion groups / Otago Capture Q&A?

- Would you like (and use) Blackboard discussion groups or the Q&A feature in Otago Capture?
- Let me know

**INFO303 Course Schedule, 2020**  
Version of 21/2/20. Subject to change.

Week of	Lab (Mon. or Tues.)	Lec. Num.	Lecture Topic (Wednesday or Friday)	Lecturer	Assessment deadlines
24 Feb	Introduction	1	Enterprise computing (EC) overview	S	
		2	Microservices and APIs	S	
2 Mar	Web services 1	3	REST web services 1	S	ESQ 1 (midnight Friday)
		4	REST web services 2	S	
9 Mar	Web services 2	5	Data infrastructure landscape	N	ESQ 2 (midnight Friday)
		6	Data warehousing: what and why?	N	
16 Mar	Data warehousing 1	7	Data warehousing: design and implementation	N	
		8	Online analytical processing (OLAP)	N	
23 Mar	Data warehousing 2	9	REST vs. GraphQL	S	Project phase 1 (noon Monday)
		10	Workflow and business process modelling	S	
30 Mar	GraphQL	11	Asynchronous message passing and message brokers	S	Data warehouse design
		12	Enterprise integration patterns	S	
6 Apr	Message brokers	13	Enterprise service buses / Apache Camel	S	
		Good Friday - No Lecture			
13 Apr	Mid-semester break				
20 Apr	Service integration 1	15	Service provisioning and deployment	M	ESQ 3 (9am Monday)
		16	Service orchestration	Guest	
27 Apr	Serv. Int. 2 Mon. labs moved	17	Containers and Project Phase 2	M	
		18	NoSQL	N	
4 May	MongoDB	19	Replication and partitioning	N	ESQ 4 (midnight Friday)
		20	Server-initiated communication	M	
11 May	Deployment via containers	21	Authentication and authorisation for web services	M	Project phase 2 (5pm Friday)
		22	Hadoop and related technologies	S	
18 May	Apache Spark / Project marking	23	The role of an enterprise architect	Guest	ESQ 5 (midnight Friday)
		24	Modern web client technologies	M	
25 May	Project marking continued	25	Ethics and sustainability in enterprise computing	S	
		26	Review and exam preparation	S	

Lecturers: S = Stephen Cranefield, N = Nigel Stanger, M = Mark George





Are You:

## WANTED CLASS REPS

- ☐ Proactive, friendly and keen to contribute to your learning environment?
- ☐ A great communicator who can represent your peers?

What's in it for you?

- ☐ Kudos & Karma
- ☐ Great friendships
- ☐ Access to FREE professional training opportunities and support
- ☐ A feed (or three)
- ☐ A reference letter from OUSA for your CV
- ☐ Invitations to Class Reps social events throughout the year

**Talk to your lecturer or email:**

[classrep@ousa.org.nz](mailto:classrep@ousa.org.nz)

**ousa**

# Enterprise Computing

“Enterprise computing involves the development, deployment and maintenance of the information systems required for survival and success in today’s business climate.”

Yen-Ping Shan & Ralph H. Earle, Enterprise Computing with Objects, Addison-Wesley, 1998.

Also, see slides at

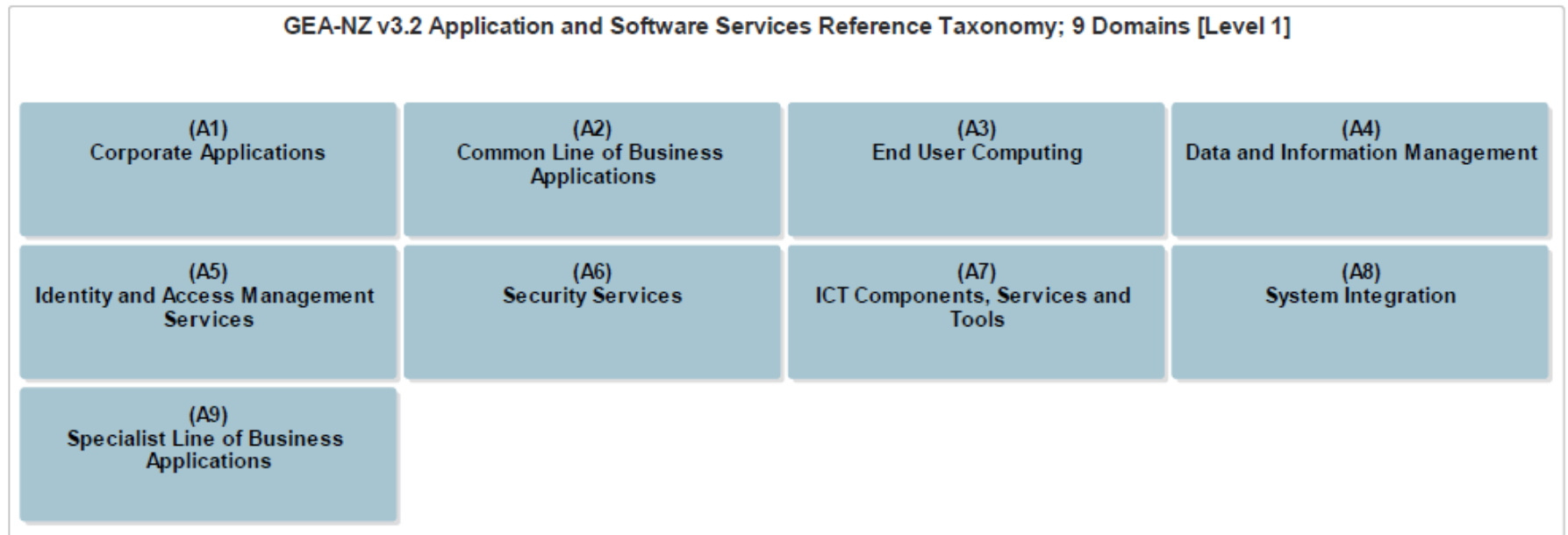
[http://faculty.washington.edu/jtenenbg/courses/455/s02/sessions/ec\\_overview.ppt](http://faculty.washington.edu/jtenenbg/courses/455/s02/sessions/ec_overview.ppt)

(especially slides 8 and 11)

# The Government Enterprise Architecture of New Zealand, v3.2: Application and Software Services Reference Taxonomy

<https://www.ict.govt.nz/assets/Architecture/GEA-NZ-Framework/GEA-NZ-v3.2-Application-and-Software-Services-Reference-Taxonomy-2018-March.pdf> [URL no longer valid]

- Defines a standard classification system for the wide range of software applications and services that might be found in an enterprise

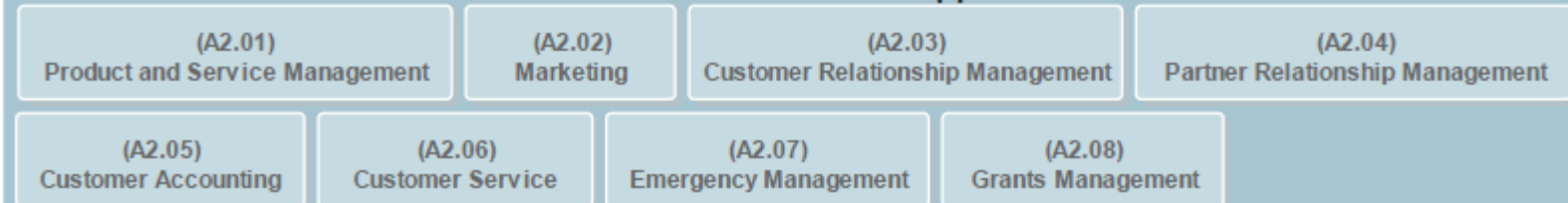




(A1)  
Corporate Applications

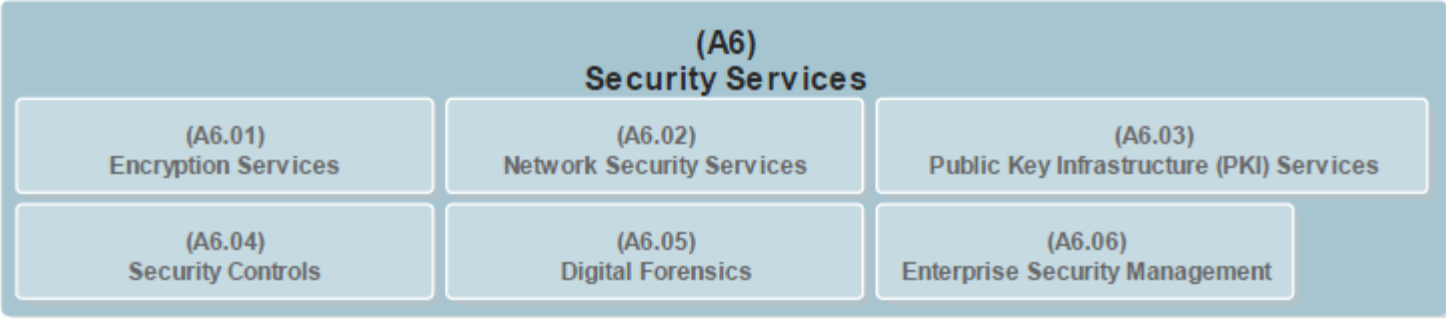
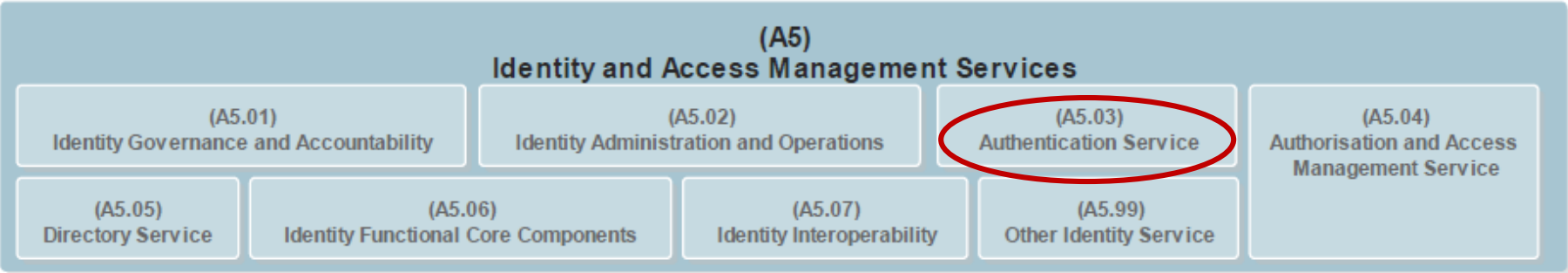
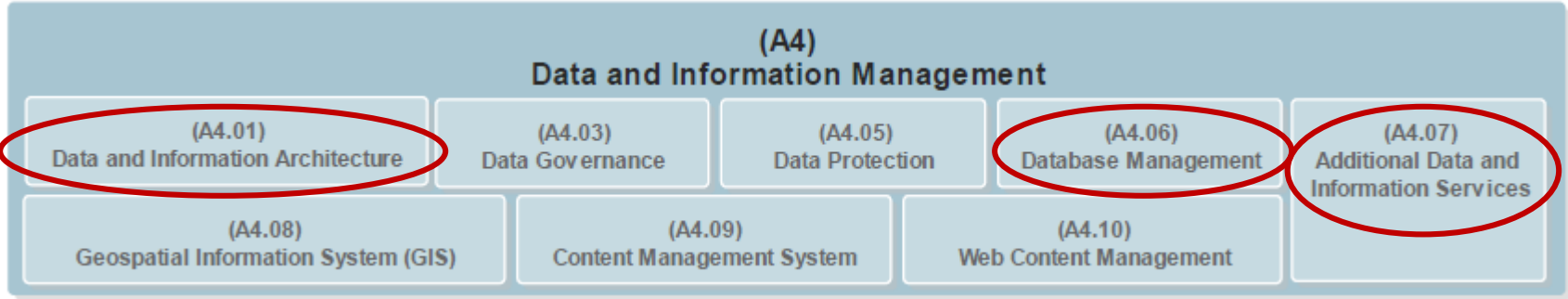


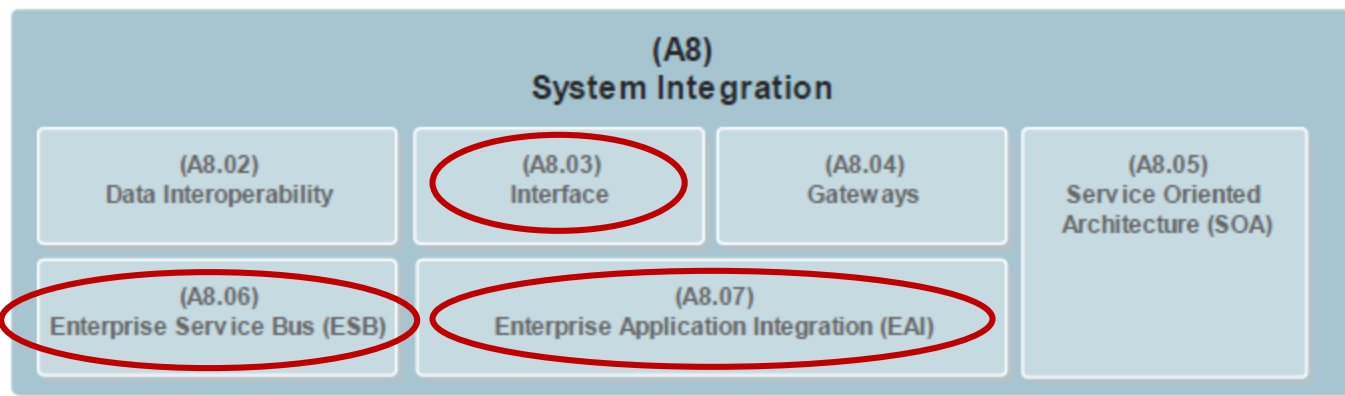
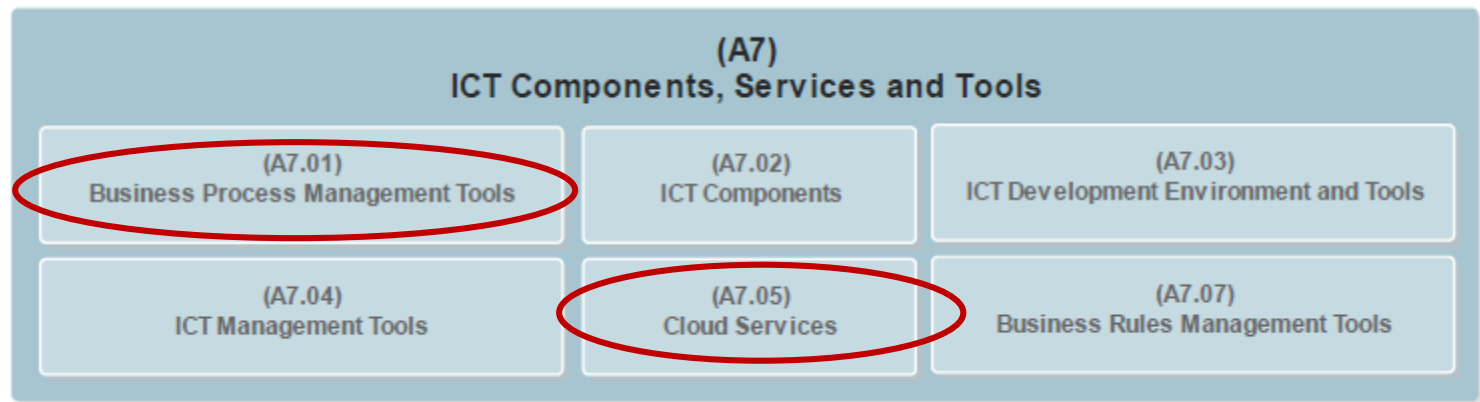
(A2)  
Common Line of Business Applications



(A3)  
End User Computing







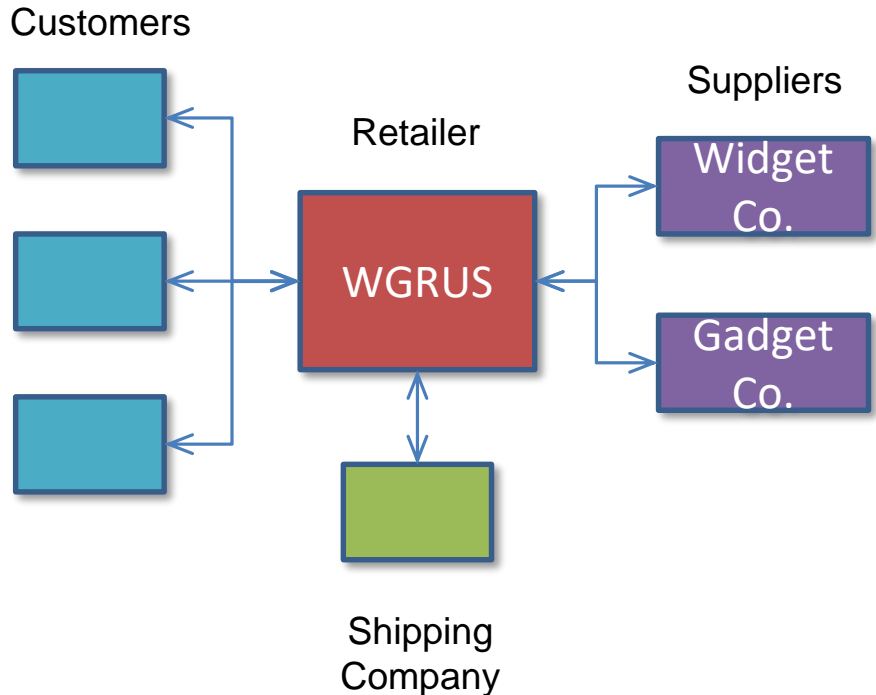
# Large scale & high complexity

- “Enterprises are typically comprised of hundreds, if not thousands, of applications that are custom built, acquired from a third party, part of a legacy system, or a combination thereof. It is not uncommon to find an enterprise that has 30 different Web sites, three instances of SAP, and countless departmental solutions.”

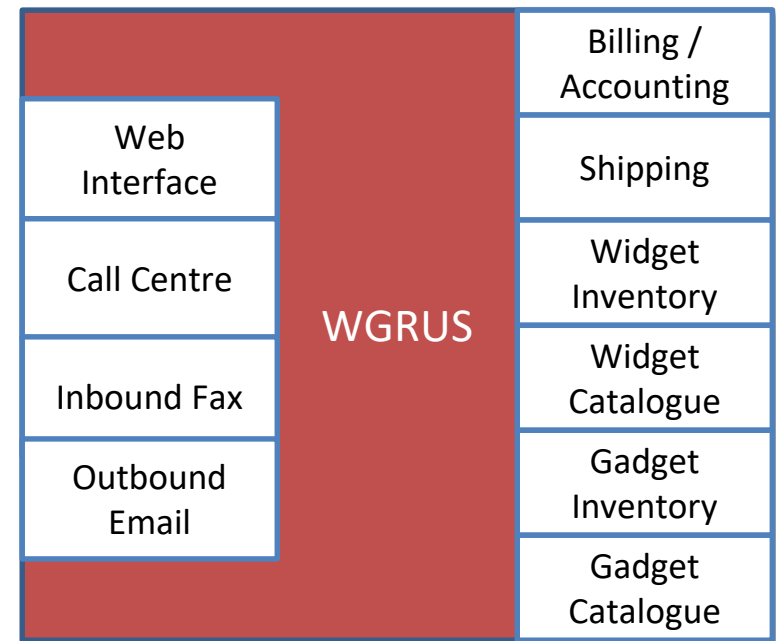
G. Hohpe & B. Woolf, Enterprise Integration Patterns, Addison-Wesley Professional, 2003  
(*“EIP book” in future slides*)

# Smaller-scale fictional example: Widgets & Gadgets 'R Us (WGRUS)

An online retailer that buys widgets and gadgets from manufacturers and resells them to customers. Formed from two retailers that merged (EIP book, p. 17)



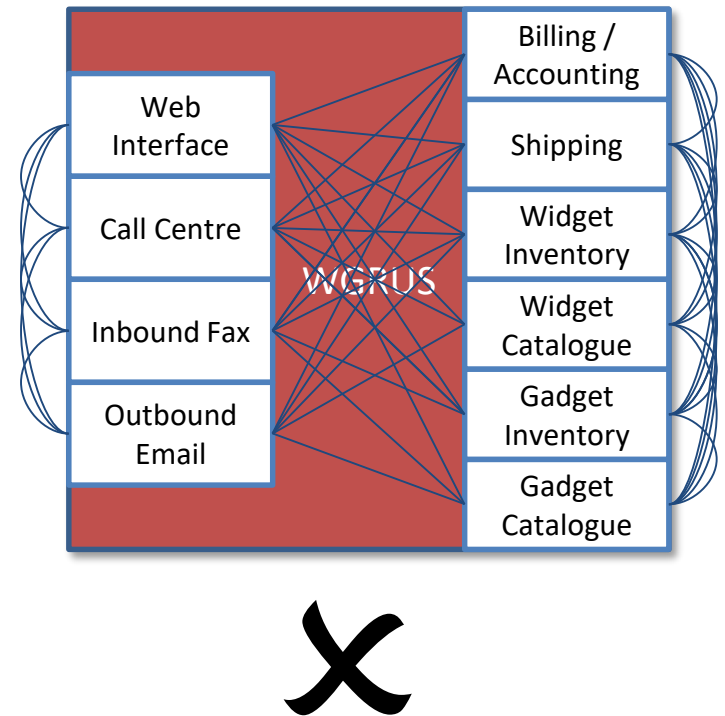
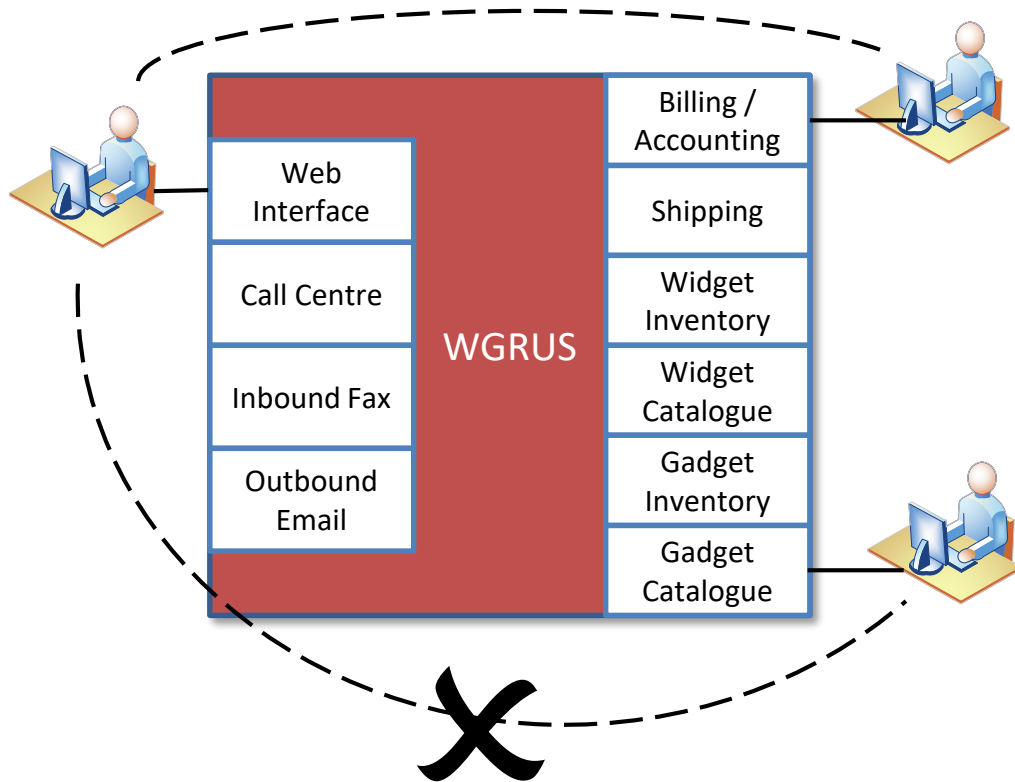
WGRUS Ecosystem  
(EIP book, p. 17)



WGRUS IT Infrastructure  
(EIP book, p. 18)

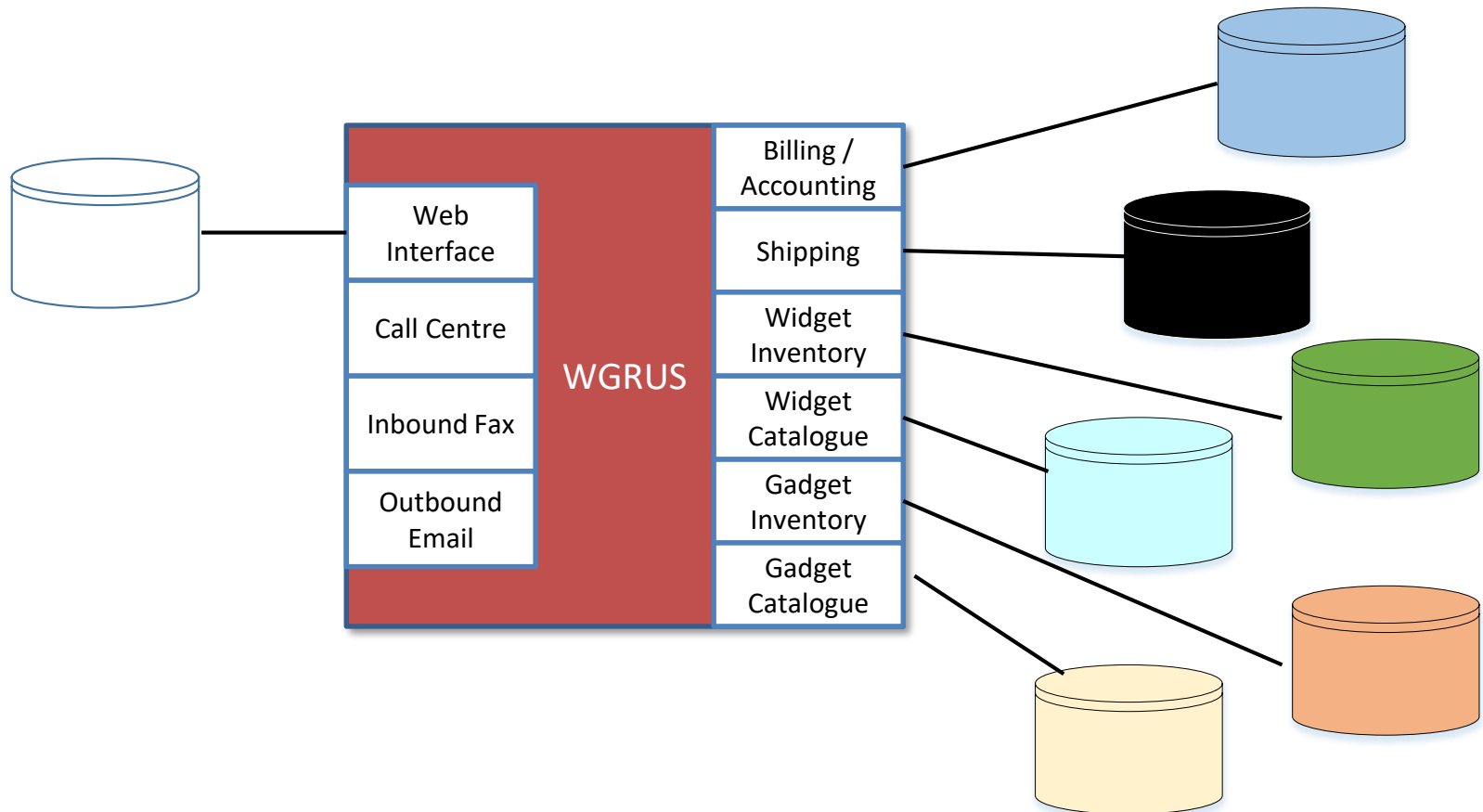
# Problem 1

- How can we automate the coordinated use of these applications to perform business processes?



## Problem 2

- How can we integrate the data from these applications to produce *business intelligence*?



INFO303 mainly addresses  
these two questions



# Finally: some HTTP revision

- <https://play.kahoot.it/v2/lobby?quizId=aca14d4f-d2fe-4b5e-bea3-e481db846b25>