System Design: Comp1209

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Your Lecturers…

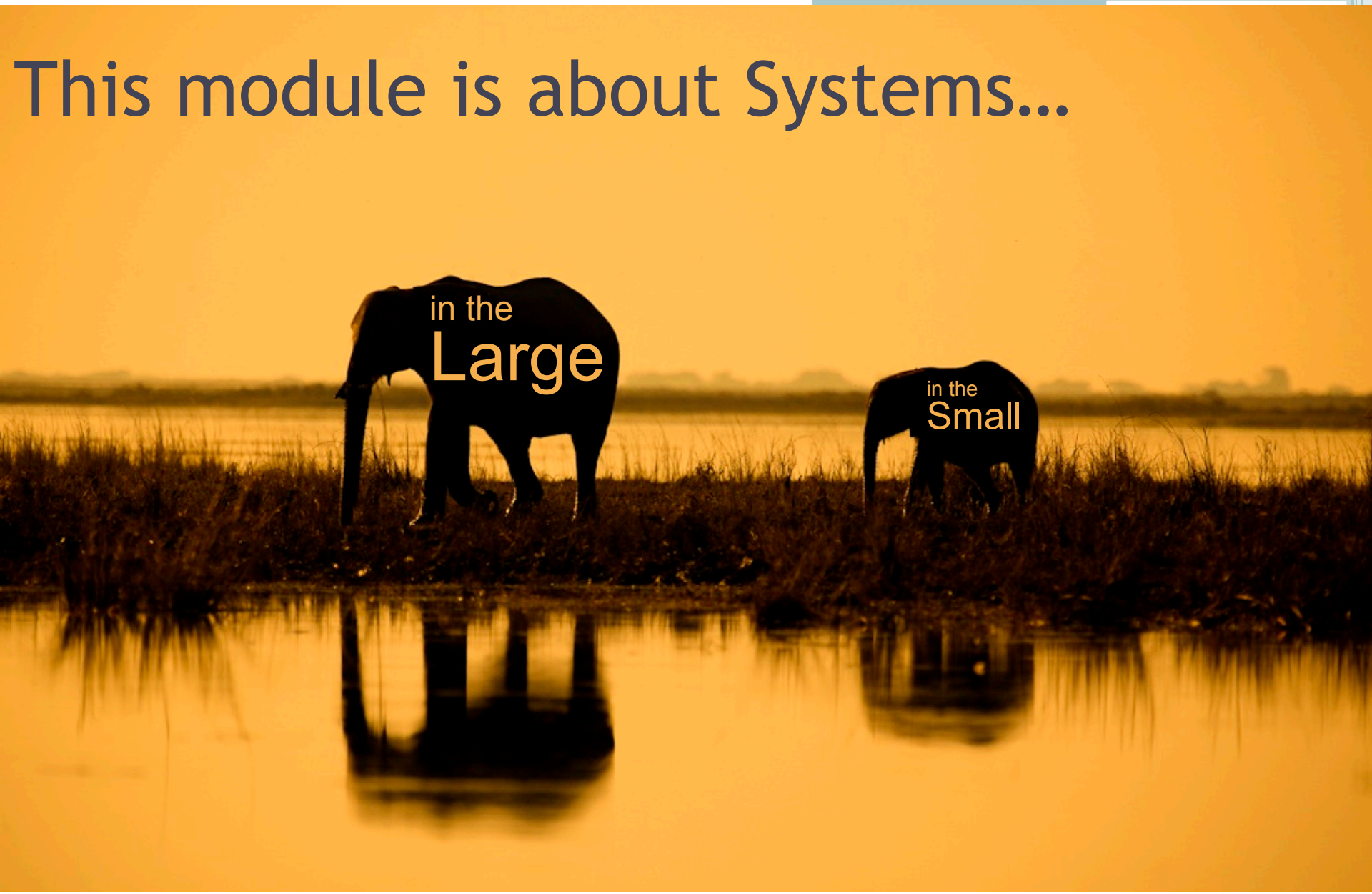
David Millard

UML Modeling
Group Project

Yvonne Howard

Soft Systems Modeling
Software Engineering
Visual Paradigm Labs

This module is about Systems…



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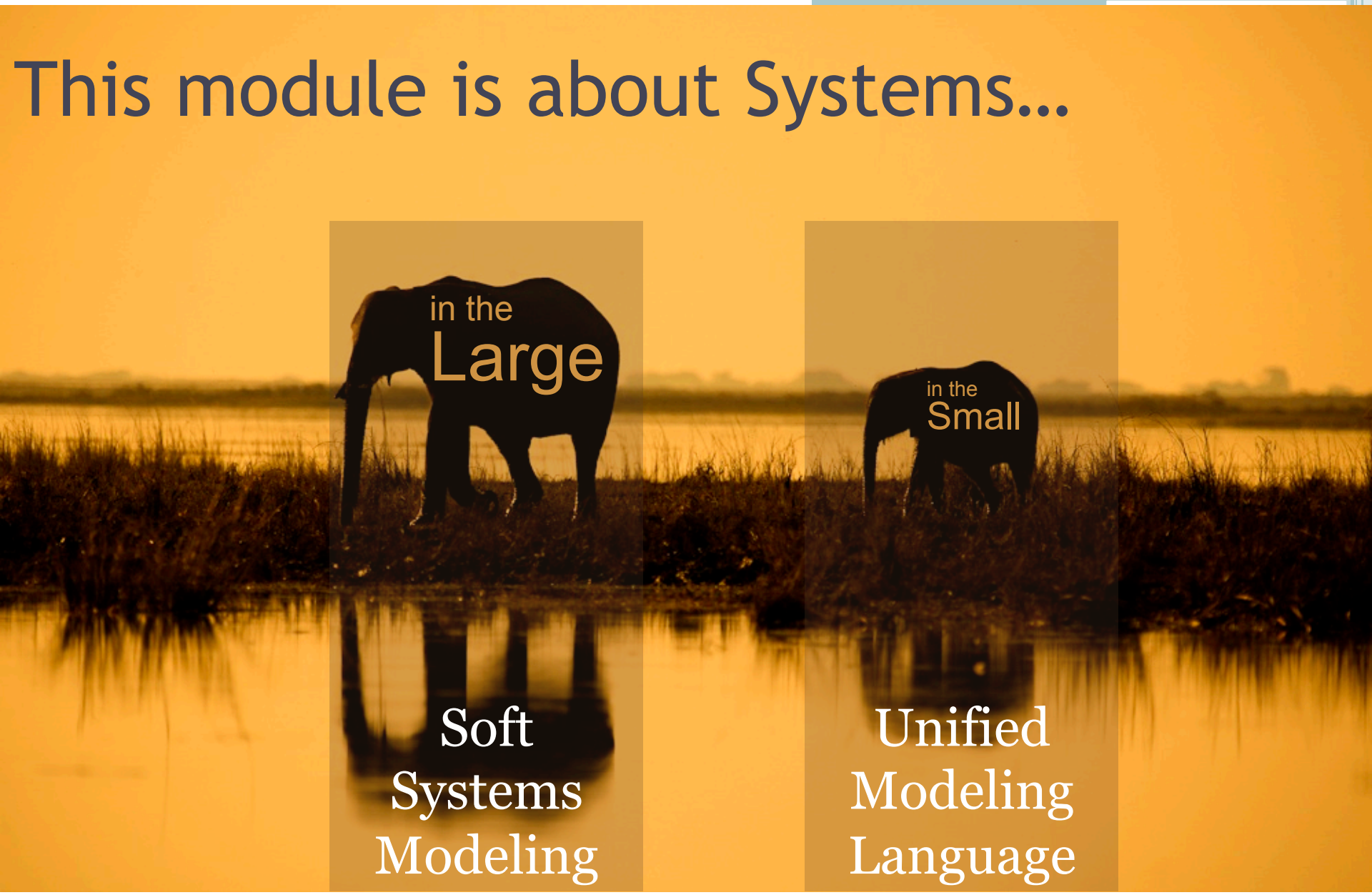

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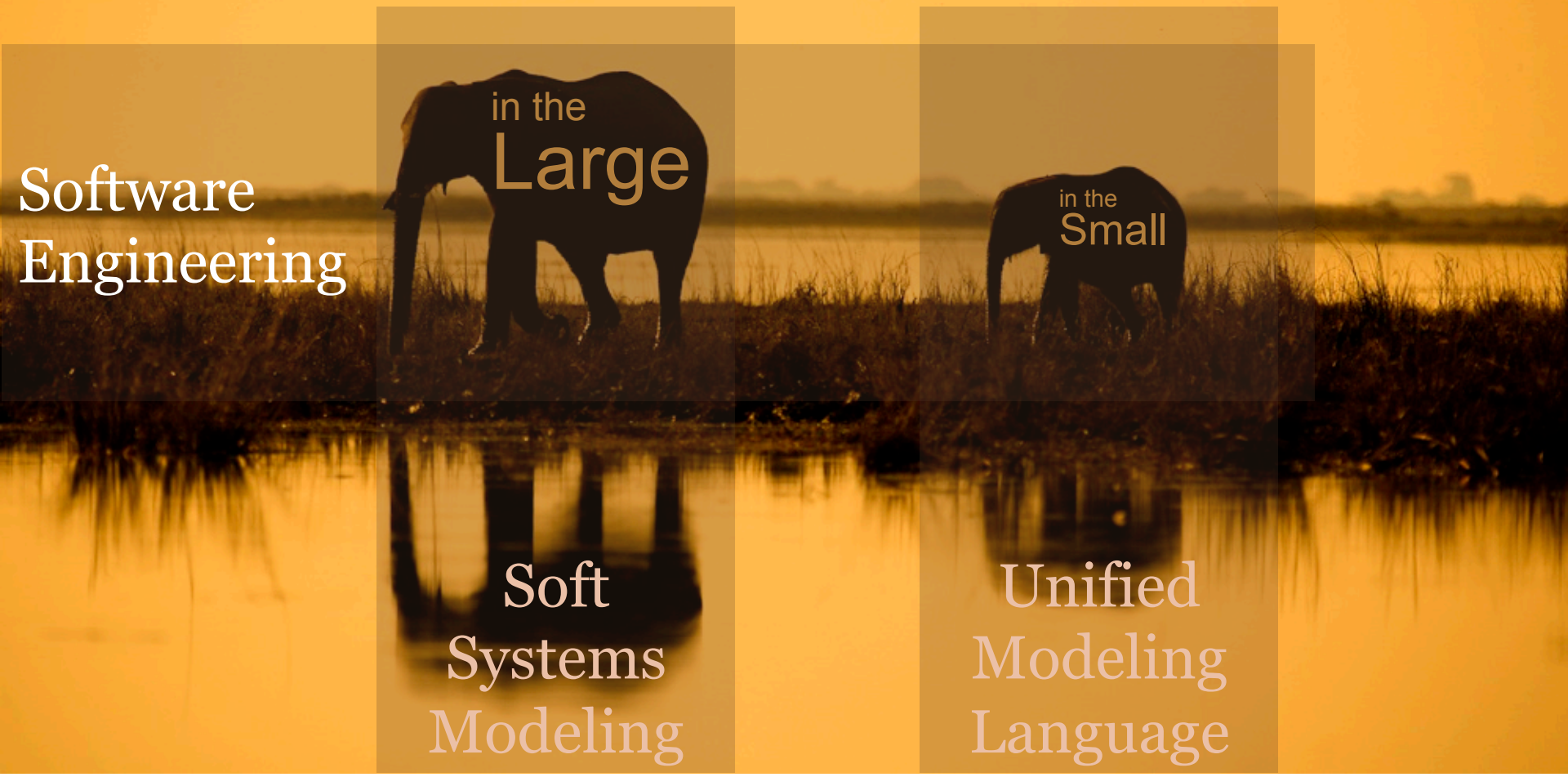

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This module provides the foundation for:

- Programming modules
- Software engineering modules
- Pretty much any project work

Sessions

- 12 double lectures:
  - Mondays 1100-1300 (with a sanity break in-between)
  - 11 before Christmas
  - 1 after: to present your group work
- 2 Visual Paradigm Lab sessions
  - Weeks 4 and 5
  - 1000-1200 on Friday mornings
- Locations
  - Lectures
    - Normally in 58/1025
    - Week 2 we are in 13/3017
  - Labs
    - Computer Labs 58/1043

Group Work?

- The group activity is a major part of the course
- You will need to prepare a case study on a business (or business unit) or your own choosing
  - And select a key challenge faced by that business
- You will then produce:
  - A brief document that describes the business and key challenge
  - A soft systems model of that business (weeks 2-3)
  - Three UML models of the key challenge (weeks 4-6)
  - A presentation (10 min) to be given in week 12

Group Work?

- We will allocate groups, but they will be self-managed
  - We will only intervene if needed!
- You are responsible for finding a suitable business
  - But we will help you in the selection
- You will be marked as a group
  - The exam (worth 50%) will form the individual element of assessment
- **Workshop next week** to kick start the activity
  - Tue Oct 9, 1000-1100, 07/3023
  - Keep this slot clear, we may use it in future weeks too

Participation

- You are required to attend lectures
  - We do not check, but you will benefit by attending and lose out by not attending
- You are required to contribute to your group
  - Your contribution is worthwhile to you and your fellow students
  - We **will** intervene if there are problems
- You are required to attend lab sessions
  - These are hands-on sessions where you will develop your modelling skills

Assessment

- The module is worth 15 credits
  - 1/8 of your first year marks
- The marks distribution is as follows
  - UML Labs (unmarked, but needed for group work)
  - Case study (40%)
  - Presentation (10%)
  - Exam (50%)

How to Succeed (and Avoid Failure)!

- Come to the lectures
- Join in the group work
  - Enjoy the chance to discuss problems and solutions with people who think like you
  - Put in enough time (self study)
- Be a bit business like
  - Know when and where the lectures are
  - Understand what is required of you
  - Plan for coursework
  - Do your coursework and hand it in on time
  - Prepare for your exam

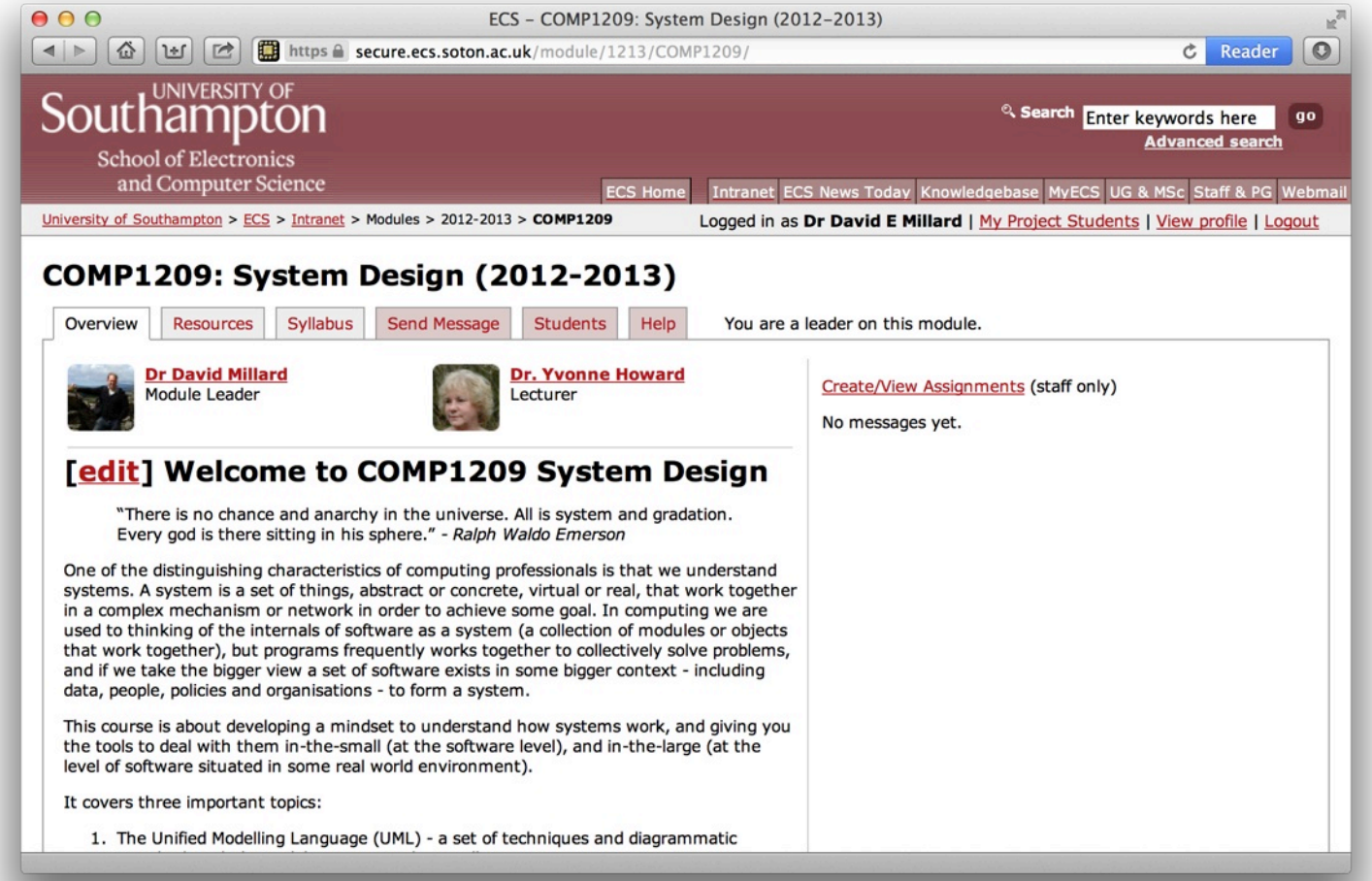
Self Study

A normal working week is 36 hours

You do 4 modules; 9 hours per module

There are less than 3 hours of lectures so: about 6 hours per week of reading and working through directed tasks

Resources



Everything is on the website:
https://secure.ecs.soton.ac.uk/module/COMP1209/

Introduction to Systems

Definitions

"A system is a set of interacting or interdependent components forming an integrated whole"

- *Wikipedia*

"a regularly interacting or interdependent group of items forming a unified whole"

- *Merriam Webster*

"A set or assemblage of things connected, associated, or interdependent, so as to form a complex unity; a whole composed of parts in orderly arrangement according to some scheme or plan"

- Oxford English Dictionary

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System Science

- Systems Theory
  - The study of systems in general
  - Searching for common laws, rules or patterns
- Systems Engineering
  - Processes to enable the development and organization of complex systems
- System Dynamics
  - Approaches for understanding the behavior of complex systems over time

Systems Design

- The application of systems theories to the design, development and deployment of software
- Tackling the problem of creating a software system (software, hardware, etc) in order to solve a set of requirements
- Elements of analysis and engineering

Systems Analysis: Bloodhound SSC

Intel Video of Bloodhound to Play Here

Systems Analysis: Bloodhound SSC

"A system is a set of interacting or interdependent components forming an integrated whole" - *Wikipedia*

Systems Analysis: Bloodhound SSC

Video of Clearing the Pan to Play Here

Systems Analysis: Bloodhound SSC

Are these part of the system?

The Surface

Hakskeen Pan,
South Africa

The Driver

Wing
Commander
Andy Green

Refueling Rig

Refuel Jet
Replace
Rocket

Different way to look at systems…

The Bigger Picture

The context: people, rules, organisations, beliefs and values

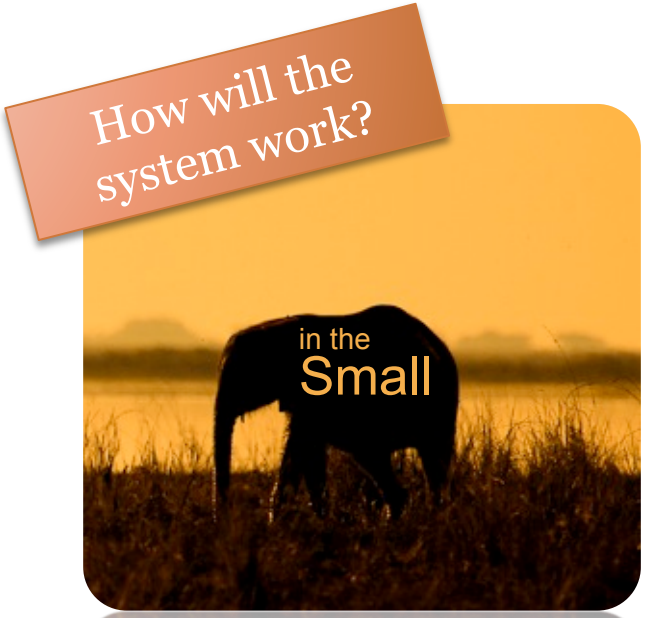
The Details

The specifics about a part of the system, what's in it, how they are related

Different way to look at systems…

The Bigger Picture

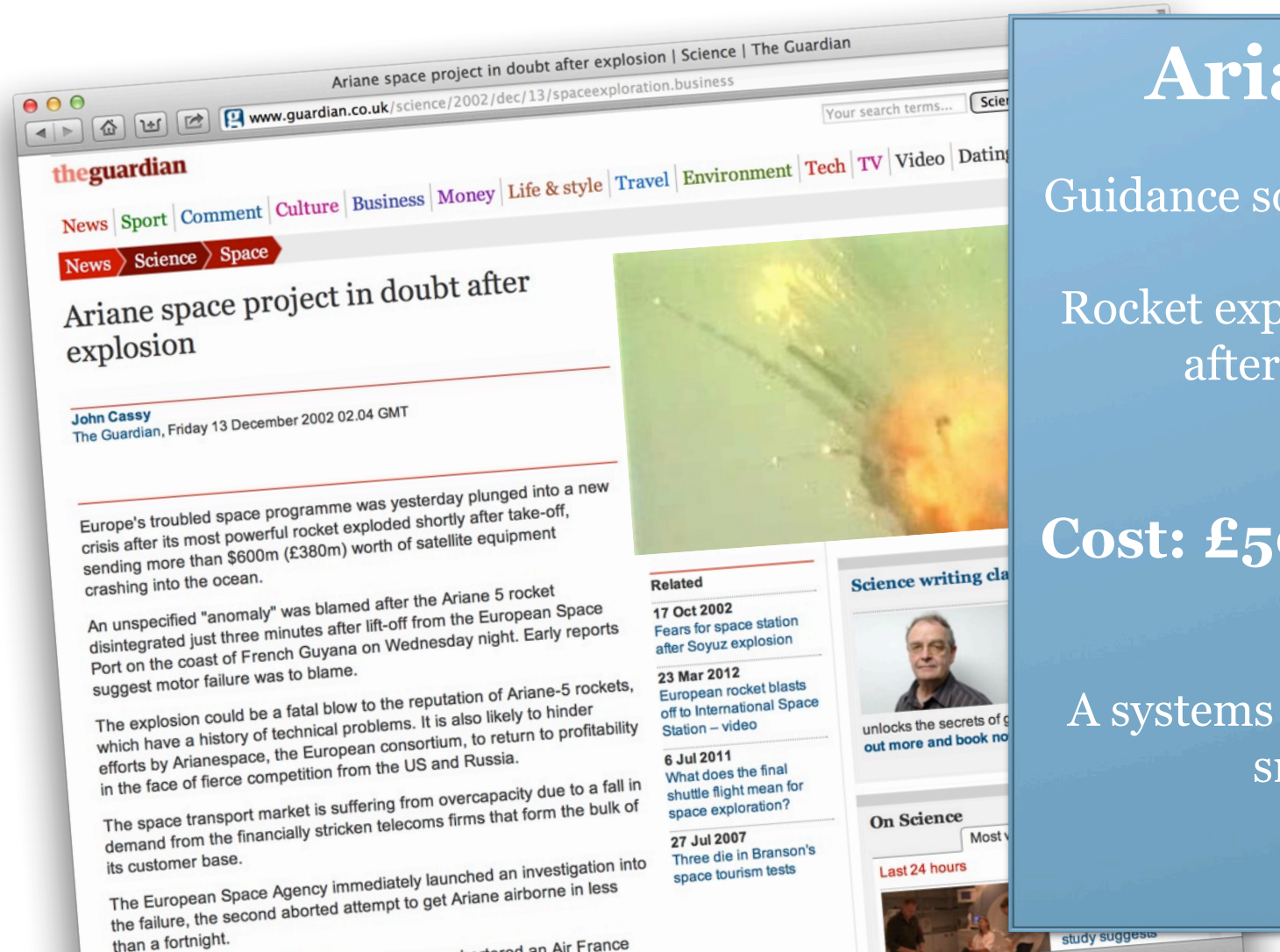
Soft Systems Modelling



The Details

Unified Modelling Language

Why Does this all Matter?



Ariane 5

Guidance software failure

Rocket exploded shortly after takeoff

Cost: £500 million

A systems failure in the small

Why Does this all Matter?

NHS IT

Nine years in

Scrapped after problems with specification and suppliers

Cost: £11 billion

A system failure in the large

And it will only get harder…

Complexity and scale

		Lines of code
1993	Windows NT 3.1	6 million
1994	Windows NT 3.5	10 million
1996	Windows NT 4.0	16 million
2000	Windows 2000	29 million
2002	Windows XP	40 million
2007	Windows Vista	~50 million
2009	Windows 7	~50-80 million *

* Microsoft is not saying, but this is a good guess

Summary

- Systems are:
  - a set of things - interacting for - a unified purpose
- Systems Design is
  - Systems theory applied to software
  - To allow us to build software to solve complex problems
- Systems can be viewed
  - In the large:
    - holistic view of context, people and many other factors (SSM)
  - In the small
    - specific descriptions of how components interact (UML)

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Next Week: We start looking at SSM
Workshop (on Tues) to kick start group work