# Web Engineering

LECTURE 3

Some Lectures Notes Belongs to Dr. Federico M. Facca

# Agenda

1. What is Web Engineering?
2. Defining Web Applications.
3. The Case for Web Engineering.
4. Categories of Web Applications.
5. Characteristics of Web Apps.
6. Key Knowledge Areas

# 1- What is Web Engineering?

A science that Extends *Software Engineering* to Web applications, but with Web-centric approaches.

# 1- What is Web Engineering?

A science that brings to Web-based system development:

- Control
- Risk minimization
- Enhanced maintainability and quality

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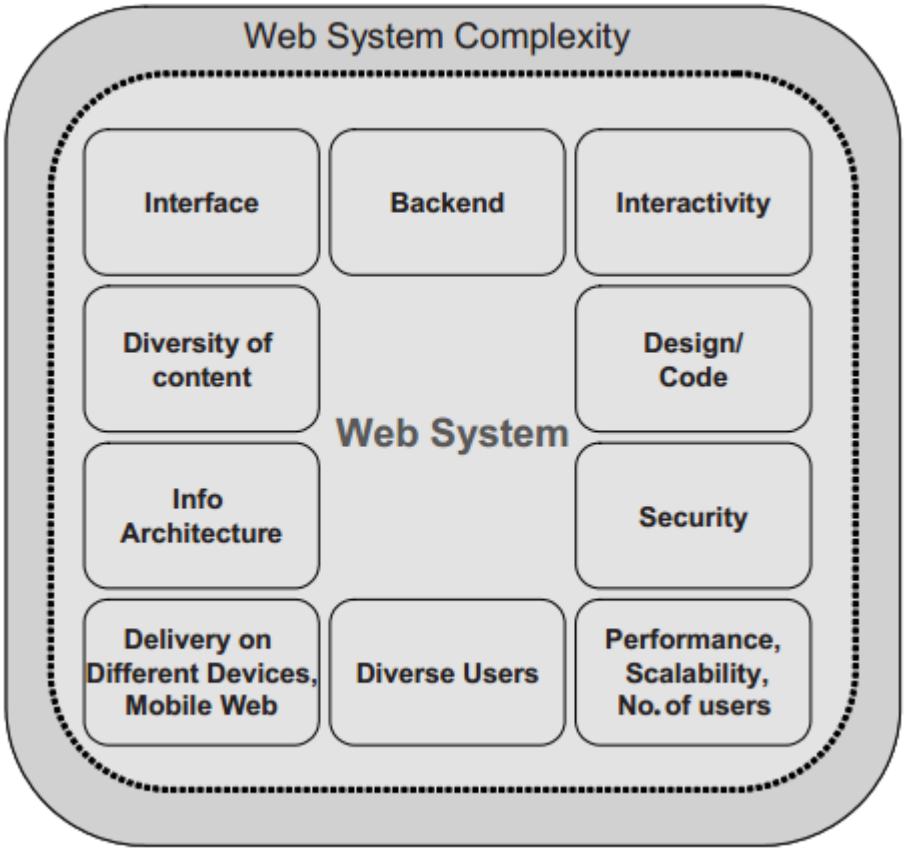
# 2- Defining Web Applications

Unlike traditional software, the Web serves as both *development* & *user* platform.

A *Web application* is a system that utilizes standards & technologies to deliver Web-specific resources to clients (typically) *through a browser.*

# 2- Defining Web Applications



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# 3- The Case for Web Engineering

Web-based system is a living system—it grows, evolves, and changes.

An appropriate infrastructure is necessary to support the growth of a Web based system in a flexible and controlled manner

# 3- The Case for Web Engineering

Application development on the Web remains largely *ad hoc*.

- Individual experience
- Little or no documentation for code/design

Short-term savings lead to long-term problems in operation, maintenance, usability, etc.

# 3- The Case for Web Engineering

Why Now ?

- Most projects are now Web-based
- More “mission-critical” apps moving to the Web

# 3- The Case for Web Engineering

Top Web project pitfalls

- not meeting functionality and the users' needs
- poor usability
- poor performance
- security breaches
- not functioning properly, including errors and crashes
- poor maintainability
- poor scalability
- schedule and cost over-runs
- abandoned projects—poor project management

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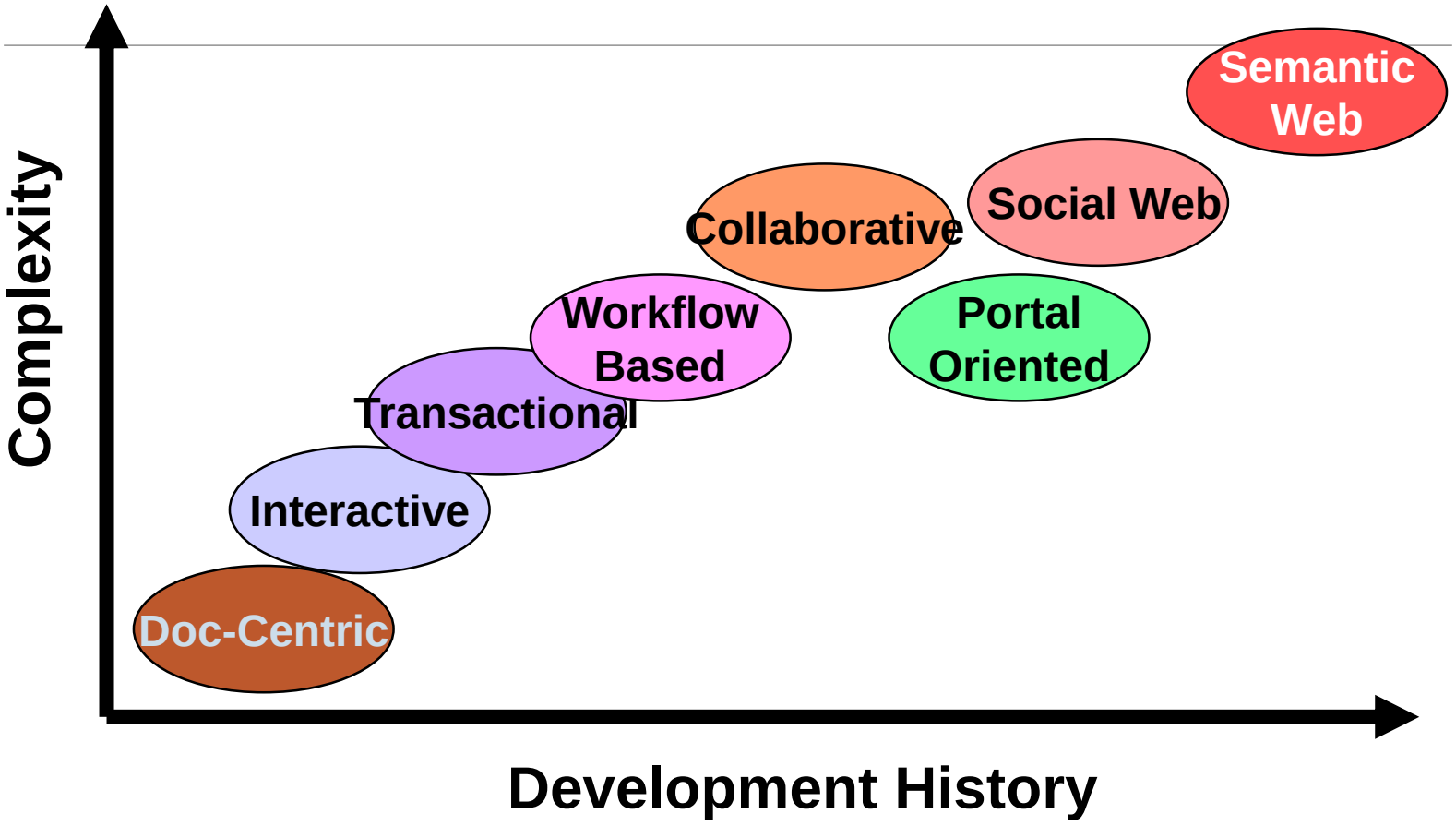
# 4- Categories of Web Applications



# 4.1Portal-Oriented

Single points-of-entry to heterogeneous information

- Yahoo!, AOL.com, my.pitt.edu

Specialized portals

- Business portals (e.g., employee intranet)
- Marketplace portals (horizontal & vertical)
- Community portals (targeted groups)

# 4.2 Semantic Web

Berners-Lee: Information on the Web should be readable to machines, as well as humans.

Using metadata and ontologies to facilitate knowledge management across the WWW.

Content syndication (RSS, Atom) promotes re-use of knowledge

Is the Semantic Web even possible?

Authors devote a chapter to the Semantic Web, but we will not focus on it in this course.

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# 5- Characteristics of Web Apps

How do Web applications differ from traditional applications?

Or, another way, what Software Engineering methods & techniques can be adapted to Web Engineering?

3 dimensions

- Product
- Usage
- Development

To this we can add a 4$^{th}$ dimension peculiar on the web, need for continuous and fast evolution!

# 5.1 Characteristics - Product

The “building blocks” of a Web application

**Content**

- Document character & multimedia (# of dimensions?)
- Quality demands

**Navigation Structure (Hypertext)**

- Non-linearity
- Disorientation & cognitive overload

**User interface (Presentation)**

- Aesthetics جماليات
- Self-explanation

# 5.2 Characteristics - Usage

Much greater diversity compared to traditional non-Web applications

**Social Context (Users)**

- Spontaneity
- Heterogeneous groups

**Technical Context (Network & Devices)**

- Quality-of-Service
- Multi-platform delivery

**Natural Context (Place & Time)**

- Globality
- Availability

# 5.3 Characteristics - Development

**The Development Team**

- Multidisciplinary
- Community (including Open Source)

**Technical Infrastructure**

- Lack of control on the client side
- Immaturity

**Process**

- Flexibility
- Parallelism

**Integration**

- Internal
- External

# 5.4 The 4th Dimension: Evolution

All the above previous dimension are governed by the evolution principle

- Continuous change
- Competitive pressure
- Fast pace

Software Engineering: evolution is planned in a constant number of release version

Web Engineering: **evolution is continuous**

- Nowadays this is becoming true also for SE… it's a loop, when a discipline overlaps its ancestor, the ancestor learn something back!

# A well-engineered Web system

- is functionally complete and correct
- is usable
- is robust and reliable
- is maintainable
- is secure
- performs reasonably even under flash and peak loads
- is scalable
- is portable, where required (perform across different common platforms), compatible with multiple browsers
- is reusable
- is interoperable with other systems
- has universal accessibility
- is well-documented

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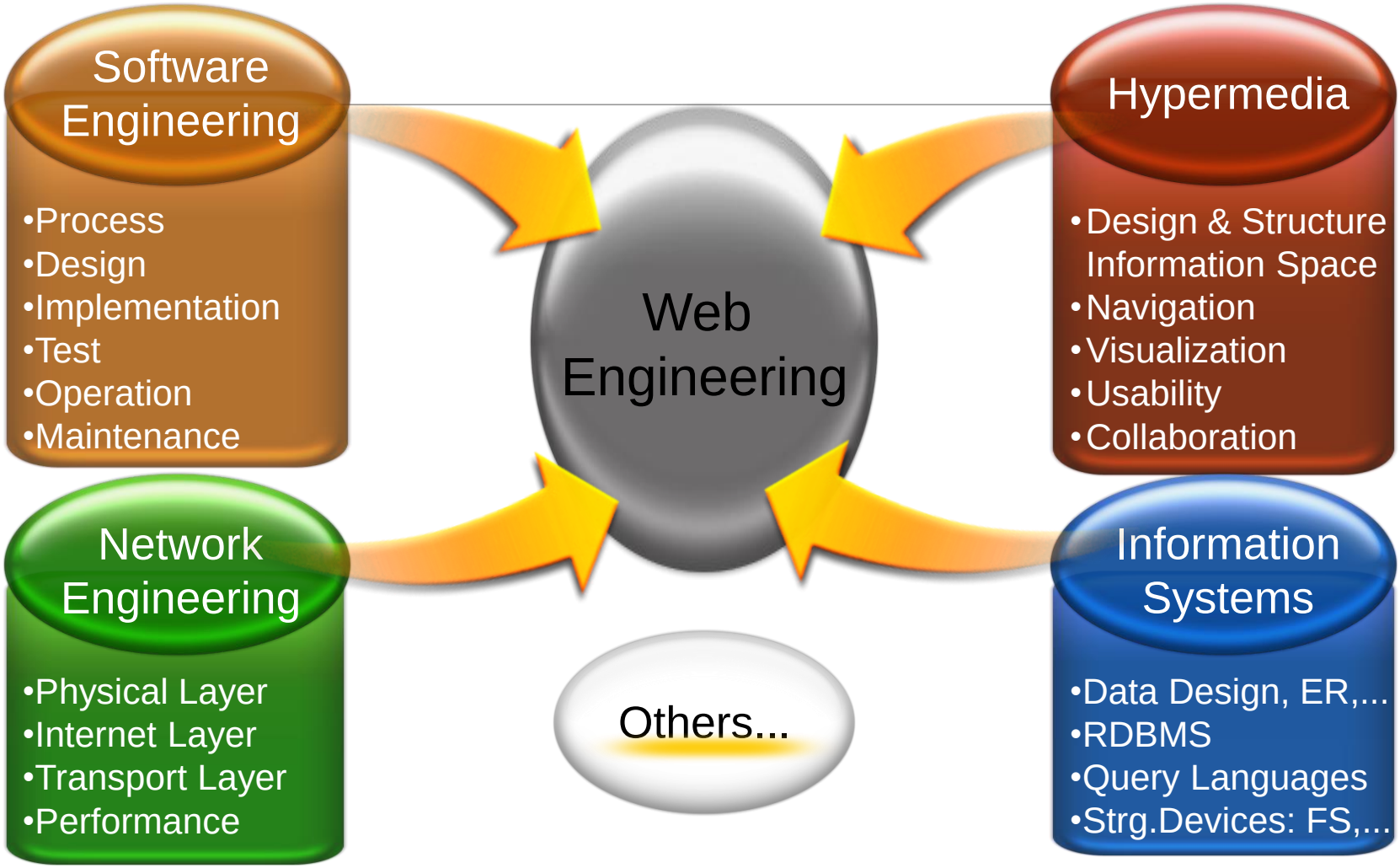
# 4 Key Knowledge Areas



# Summary

THAT'S ALMOST ALL FOR TODAY…

# Things to keep in mind

- Web Engineering **is not about HTML and JavaScript** and web technology - Like Software Engineering is not about C or Java!
- It aims at **systematic development** of Web applications according to a specific methodology
- Web Engineering ask for multidisciplinary approach.
- Standards are important in Web like in all the other Engineering fields

# Extra Resources

Suggested

- Google “Web Engineering”

# Assignment

Pick up two of the categories introduced today and provide a small essay on it

- Max 2 pages Word, Times 11pt – check plagiarism.
- Figures do not count for the space.
- Blackboard