WHAT IS SOFTWARE?

Software includes the computer programs, data structures, interfaces, system function calls, documentation, etc.

The product that software professionals build and then support over the long term.

WHY IS IT IMPORTANT?

- More and more systems are software controlled (transportation, medical, telecommunications, military, industrial, entertainment, etc.)

WHAT ARE THE ESSENTIAL ATTRIBUTES OF GOOD SOFTWARE?

- Maintainability, dependability and security, efficiency and acceptability

WHAT ARE THE TWO FUNDAMENTAL TYPES OF SOFTWARE PRODUCT?

- Generic products that are designed to meet the needs of many different customers.
- Customized products designed to meet the specific needs of a single customer.

WHAT IS SOFTWARE ENGINEERING?

- An engineering discipline concerned with all aspects of software production from specification to system maintenance. It is concerned with theories, methods and tools for professional software development.

SOFTWARE IS ENGINEERED!

- Software is developed or engineered, not manufactured in the traditional sense which has many different problems.

- Software doesn't "wear out." but it deteriorates (due to change).

SOFTWARE IS ENGINEERED!

Engineers
- Evaluate and select options at decision points
- Choose most appropriate in current context
- Perform Cost/benefit analysis
- Measure things (What things?)
- Calibrate and validate
- Use approximations
- Experience and empirical data
- Use tools to apply process systematically
- Reuse designs and design artifacts

WHAT ARE THE FUNDAMENTAL ACTIVITIES IN SOFTWARE ENGINEERING?

- Software specification, software development, software validation and software evolution.

WHAT SOFTWARE ENGINEERING FUNDAMENTALS APPLY TO ALL TYPES OF SOFTWARE SYSTEMS?

a. Systems should be developed using a managed and understood development process.

b. Dependability and performance are key system characteristics

c. Understanding and managing the software specification and requirements are important.

d. Effective use should be made of available resources.

WHAT IS THE RELATIONSHIP BETWEEN COMPUTER SCIENCE AND SOFTWARE ENGINEERING?

- Computer science is concerned with theories and methods related to all aspects of computers including software systems; however,

- Software engineering is concerned with the practice of software production.

WHAT ARE THE GENERAL ISSUES THAT AFFECT MANY DIFFERENT TYPES OF SOFTWARE?

- Heterogeneity, Software may have to execute on several different types of system.

- Business and social change, which drives requirements for software change.

- Security and trust, our software systems have to be secure against external and internal threats so that we can trust those systems.

EXAMPLES OF DIFFERENT TYPES OF SOFTWARE

- Stand-alone products, interactive transaction-based systems, embedded control systems, batch processing systems, entertainment systems, systems for modeling and simulation, data collection systems, systems of systems.

WHAT ARE THE KEY CHARACTERISTICS OF THE ENGINEERING OF WEB-BASED SOFTWARE ENGINEERING?

- Software reuse is the principal approach for constructing web-based systems, requirements for those systems cannot be completely specified in advance, User interfaces are constrained by the capabilities of web browsers.

WHAT IS A SOFTWARE ENGINEERING CODE OF ETHICS? WHY IS IT IMPORTANT?

- A set of principles that set out, in a general way, standards of expected behavior for professional software engineers.

HOW ABOUT COST?

- Development cost vs. maintenance cost
- Find list of 3 very costly software systems over the years?

WHAT ARE THE ATTRIBUTES OF A SUCCESSFUL SOFTWARE ?

They say
- the development should be within time and budget
- Maintenance is easy
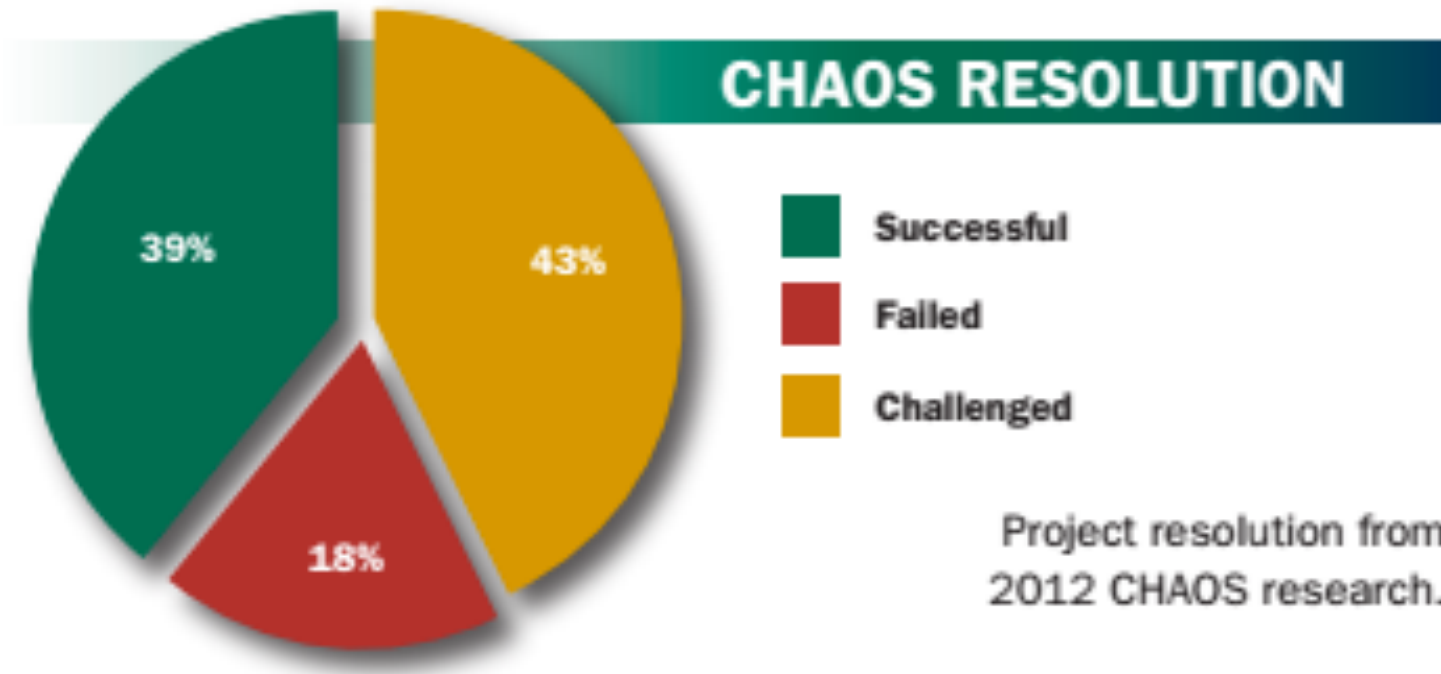- Well-documented
- High usability by the customers
- … what else?

SOFTWARE PROJECT FAILURE STATS STANDISH CHAOS REPORT 2009

- Only 32% of software projects are successful
- 24% are failures
- 44% are challenged
- Canceled projects cost $55B annually
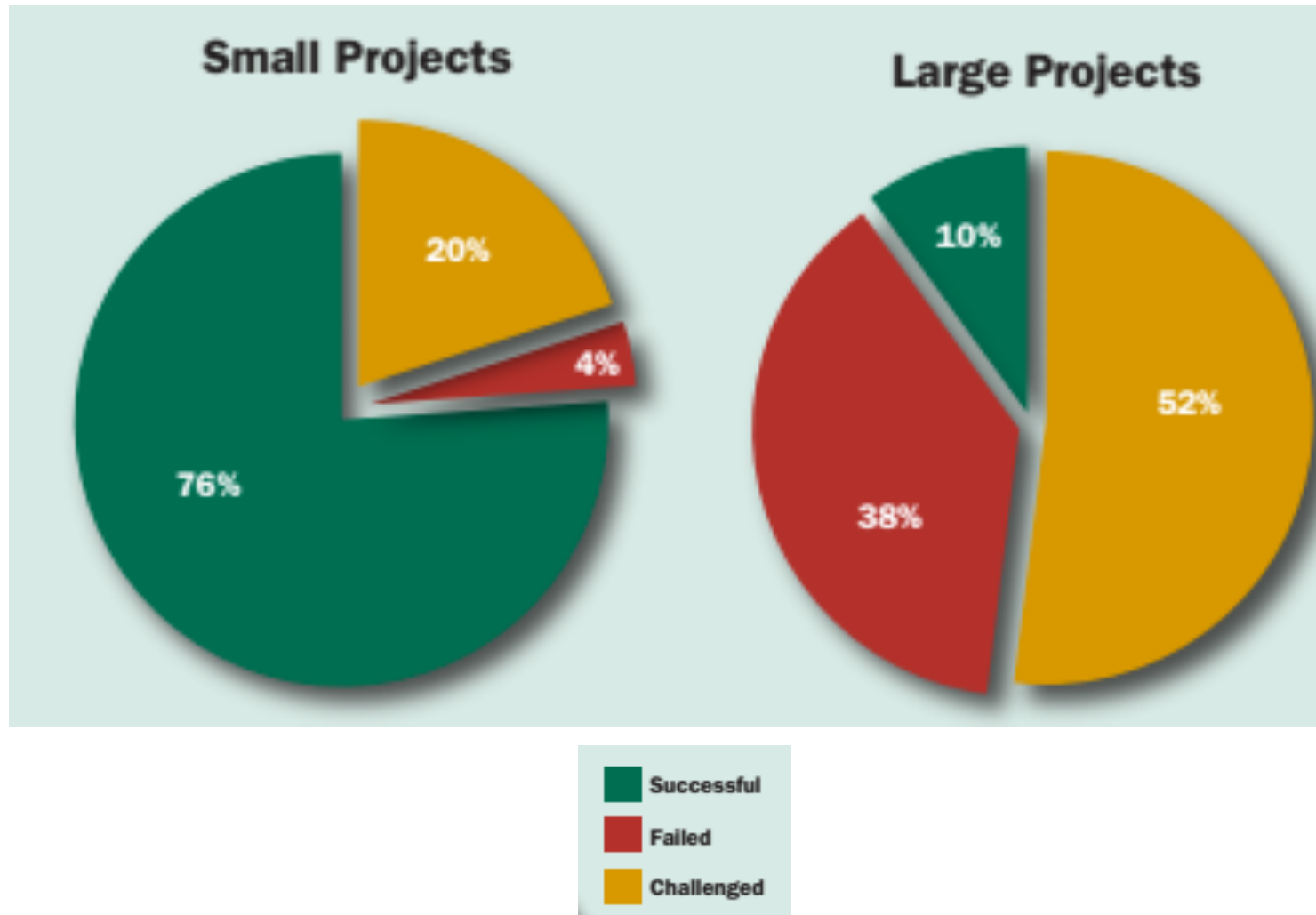
PROJECT SUCCESS RATE

- 2012 THE CHAOS MANIFESTO:

CHAOS RESOLUTION

- Successful
- Failed
- Challenged

39%

43%

18%

Project resolution from 2012 CHAOS research.

PROJECT RESOLUTION RESULTS

From 2004-2012 Chaos Research

	2004	2006	2008	2010	2012
Successful	29%	35%	32%	37%	39%
Failed	18%	19%	24%	21%	18%
Challenged	53%	46%	44%	42%	43%

CHAOS RESOLUTION BY LARGE AND SMALL PROJECTS

RECOMMENDATIONS

- It is critical to break down large projects into a sequence of smaller ones,

- prioritized on direct business value, and install stable, full-time, cross-functional teams that execute these projects

- following a disciplined agile and optimization approach.

RESULTS

- Organizations that have adopted this approach have seen major project improvement and their project investments have increased.

- Source: http://www.versionone.com/assets/img/files/ChaosManifesto2013.pdf