

Reasons for software failures

By Andrew Short

Overview

- Introduction
- What is failure
- Failure rates
- Failure factors
- Success factors
- Case studies



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Introduction

Does any one know the failure rate for IT
projects?

Introduction

- Information system projects frequently fail. Some failure rates of large projects are reported as being between ~40% to 80%.

“This is a catastrophe. As an industry we are failing at our jobs.”

Dr. Paul Dorsey

- Much of the research in the field is performed by the Standish Group in their CHAOS report, and Top 10 Reasons Why Systems Projects Fail by Paul Dorsey.

Introduction

- Information system projects frequently **fail**. Some failure rates of **large projects** are reported as being between **~40% to 80%**.

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Fail



Definition of failure



Cost



Quality



Time

Definition of failure



Expectations



Cost



Quality



Time

Requirements

Blah
Blah Blah Blah **Cheap** Blah Blah Blah Blah Blah **Good**
Blah
Blah **Fast** Blah Blah Blah Blah Blah Blah Blah Blah
Blah Blah Blah Blah Blah Blah Blah Blah Blah Blah
Blah Blah Blah Blah Blah Blah Blah Blah Blah Blah
Blah Blah Blah

Requirements

Cheap

Good

Fast

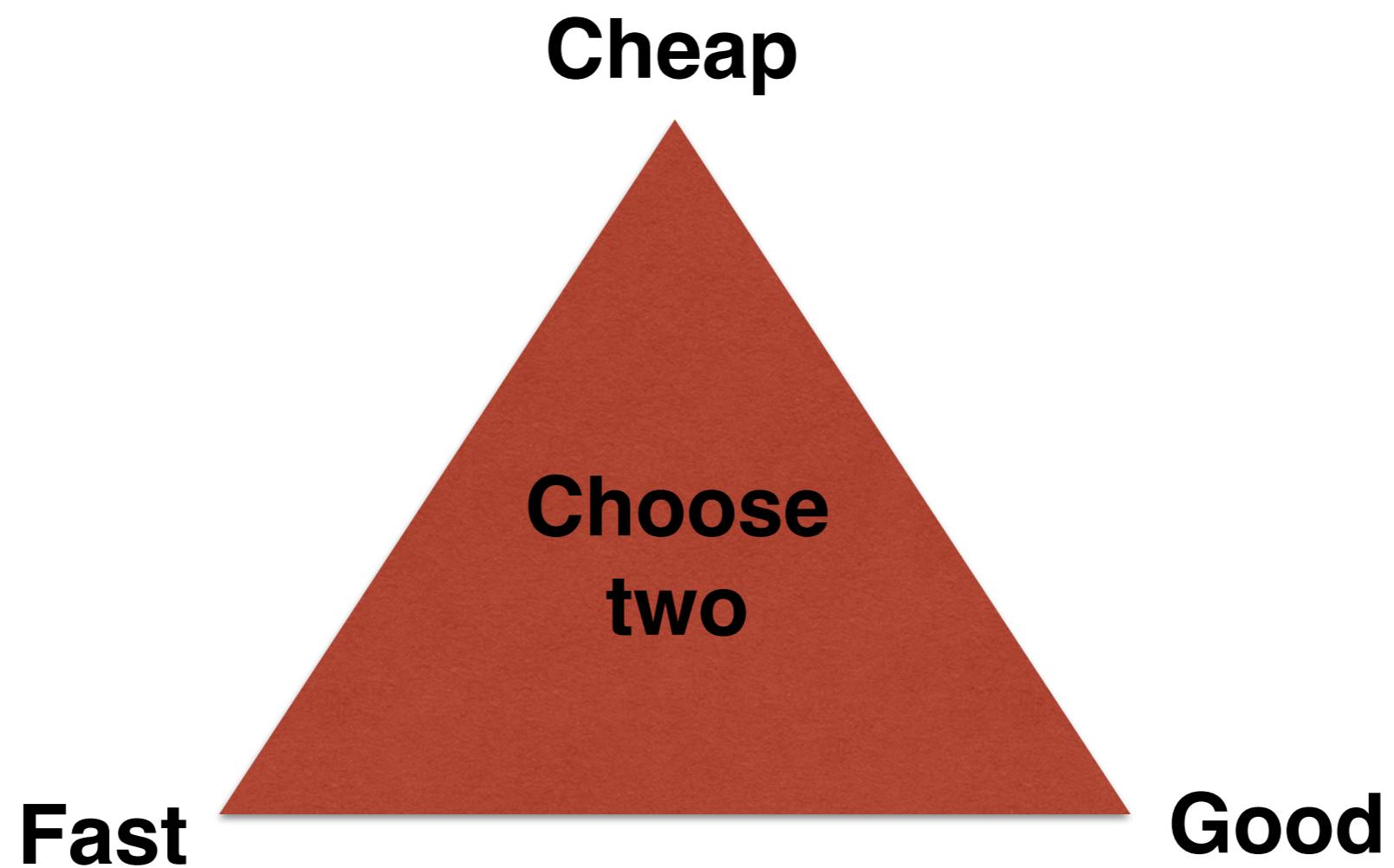
Requirements

Cheap

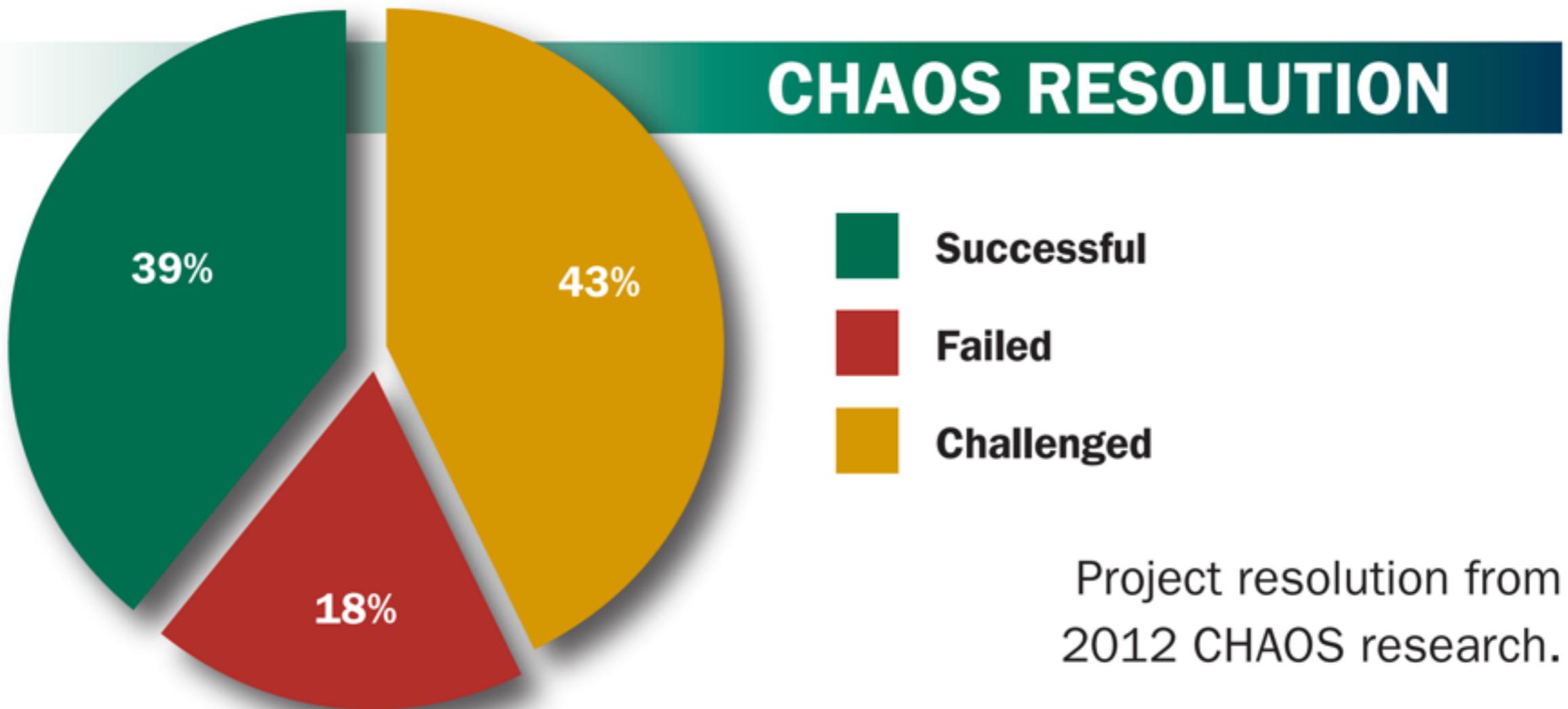
Good

Fast

Requirements



Project failure rates



Project failure rates

39% succeeded

Delivered on time, on budget, with required features and functions.

43% challenged

Late and/or over budget, and/or with less than the required features.

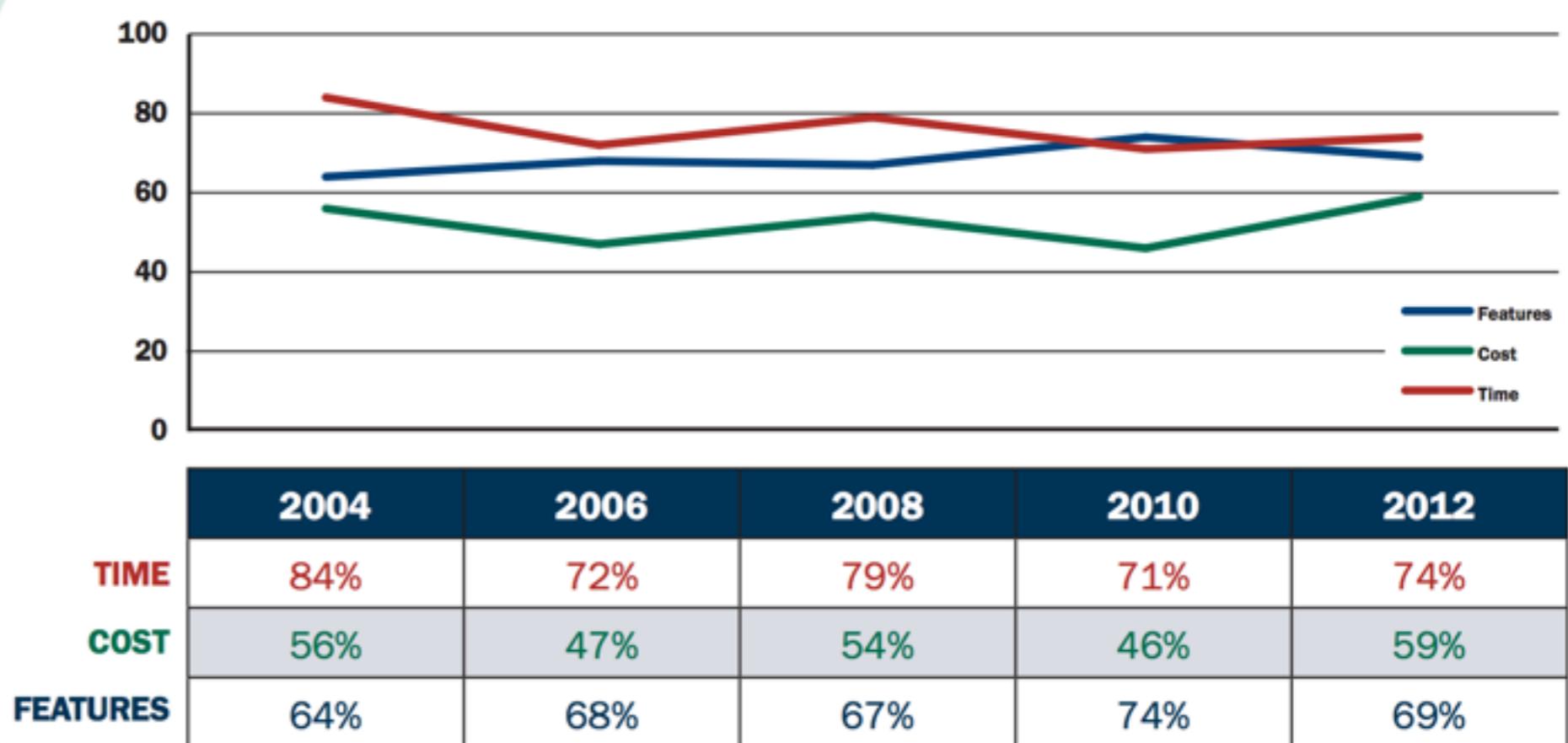
18% failed

Cancelled prior to completion or delivered and never used.

Reasons for failure

OVERRUNS AND FEATURES

Time and cost overruns, plus percentage of features delivered from CHAOS research for the years 2004 to 2012.



Reasons for failure

	2004	2006	2008	2010	2012
TIME	84%	72%	79%	71%	74%
COST	56%	47%	54%	46%	59%
FEATURES	64%	68%	67%	74%	69%

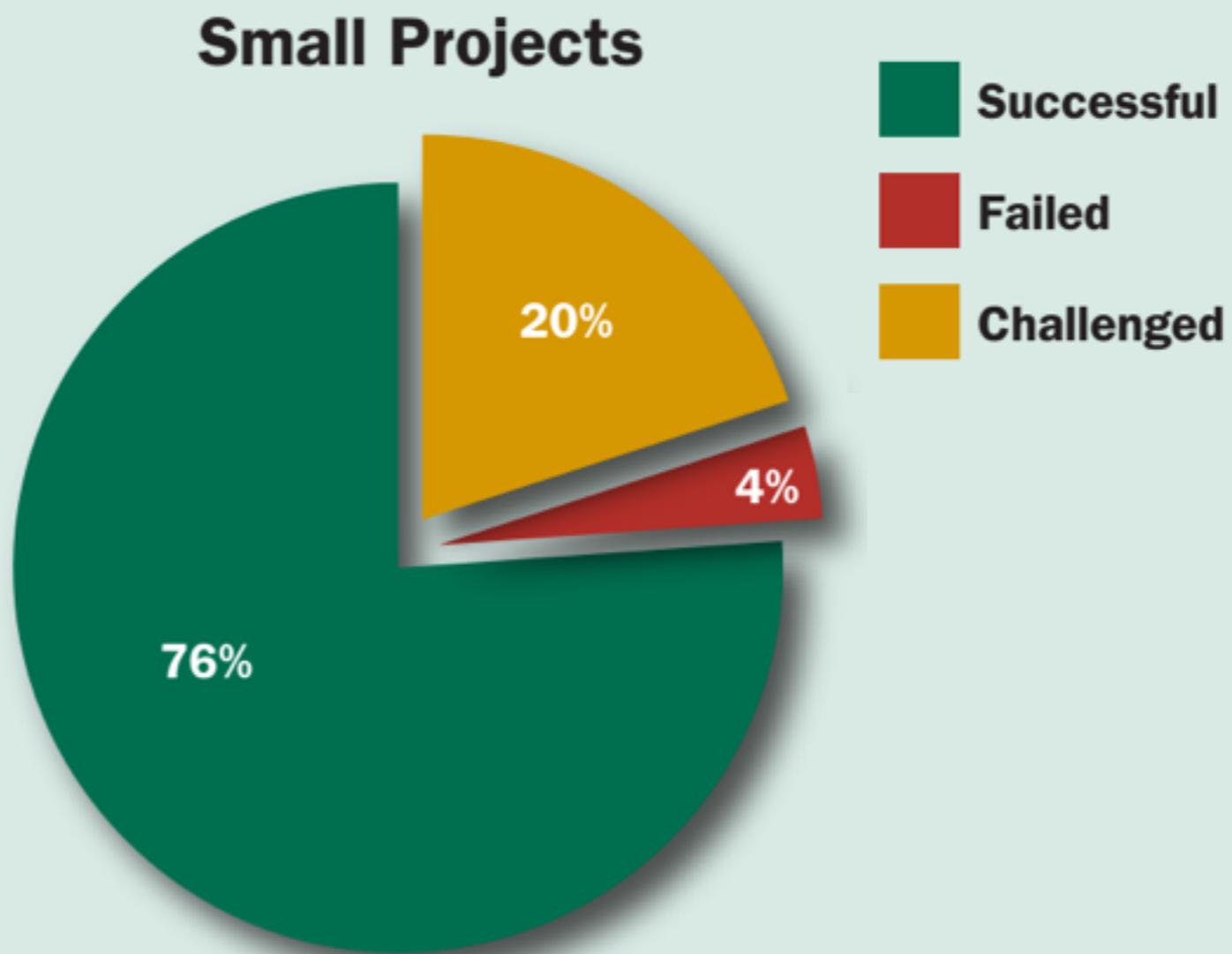
- About 10% in fluctuation in failure rates
- 20% of features are frequently used
- 50% of features are hardly ever or never used
- Reduction (74%-69%) in features seen as a good thing (focusing)

Failure rates by project size

Your turn to be asked questions....

Does any one know the failure rate for **SMALL**
IT projects?

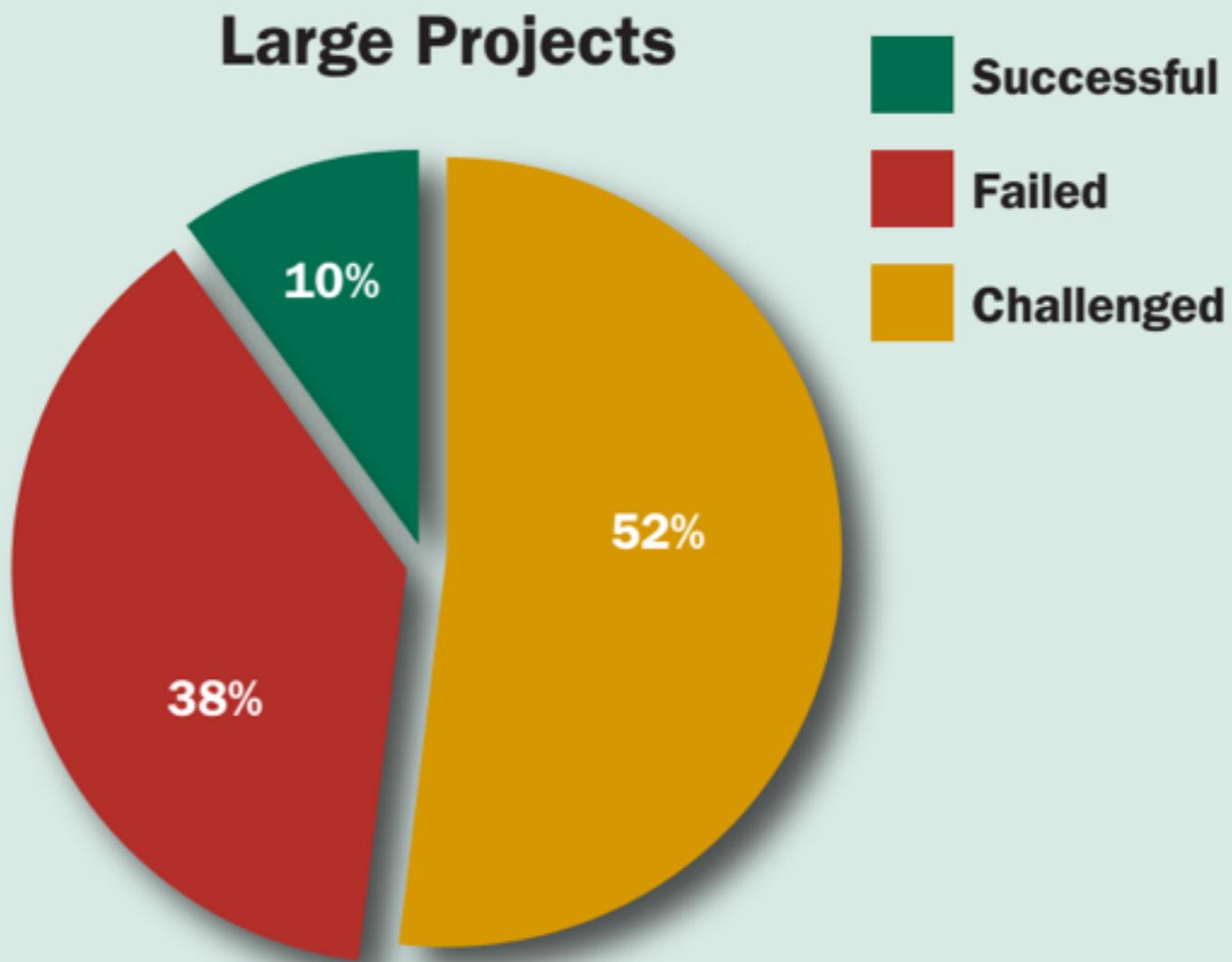
Failure rates by project size



Failure rates by project size

Does any one know the failure rate for **LARGE**
IT projects?

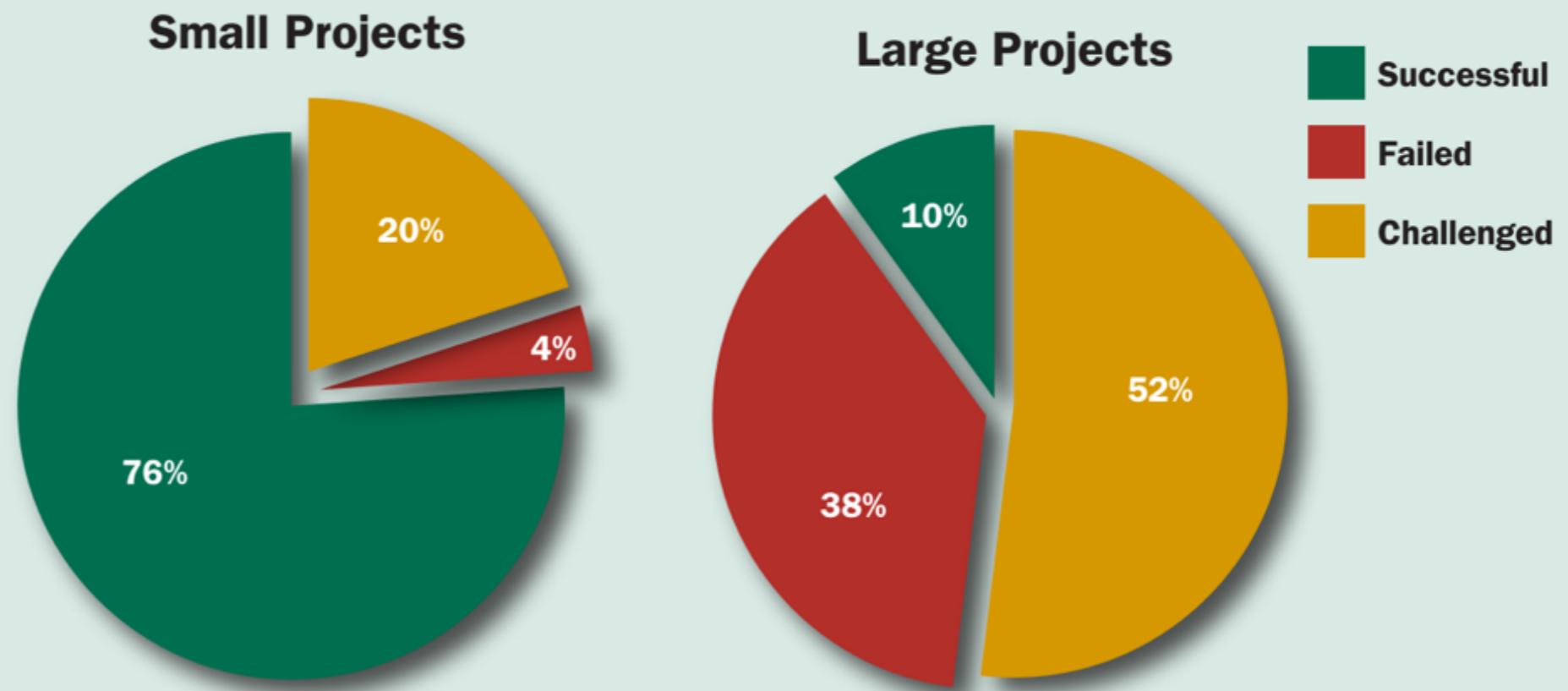
Failure rates by project size



Failure rates by project size

CHAOS RESOLUTION BY LARGE AND SMALL PROJECTS

Project resolution for the calendar year 2012 in the new CHAOS database. Small projects are defined as projects with less than \$1 million in labor content and large projects are considered projects with more than \$10 million in labor content.



\$1 million = ~€730,000

\$10 million = ~€7.3 million

Think big, act small

- Big projects usually fail - Only 10% succeed.
- Break down into smaller parts
- Prioritise features
- Set and enforce limits

Failure factors

Project Plan



Project Plan

You need a project plan, but one of the reasons for failure is working backwards from a set finish date

“If you fail to plan you plan to fail”

My lecturer at university

Project Plan

You need a project plan, but one of the reasons for failure is working backwards from a set finish date

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Benjamin Franklin

Project Plan

Key areas of failed project plans

- Failure to perform careful analysis
- Failure to take data migration into account
- Failure to accurately assess the political climate of the organization
- Failure to enlist approval at all levels of the user community

Migrate data too late

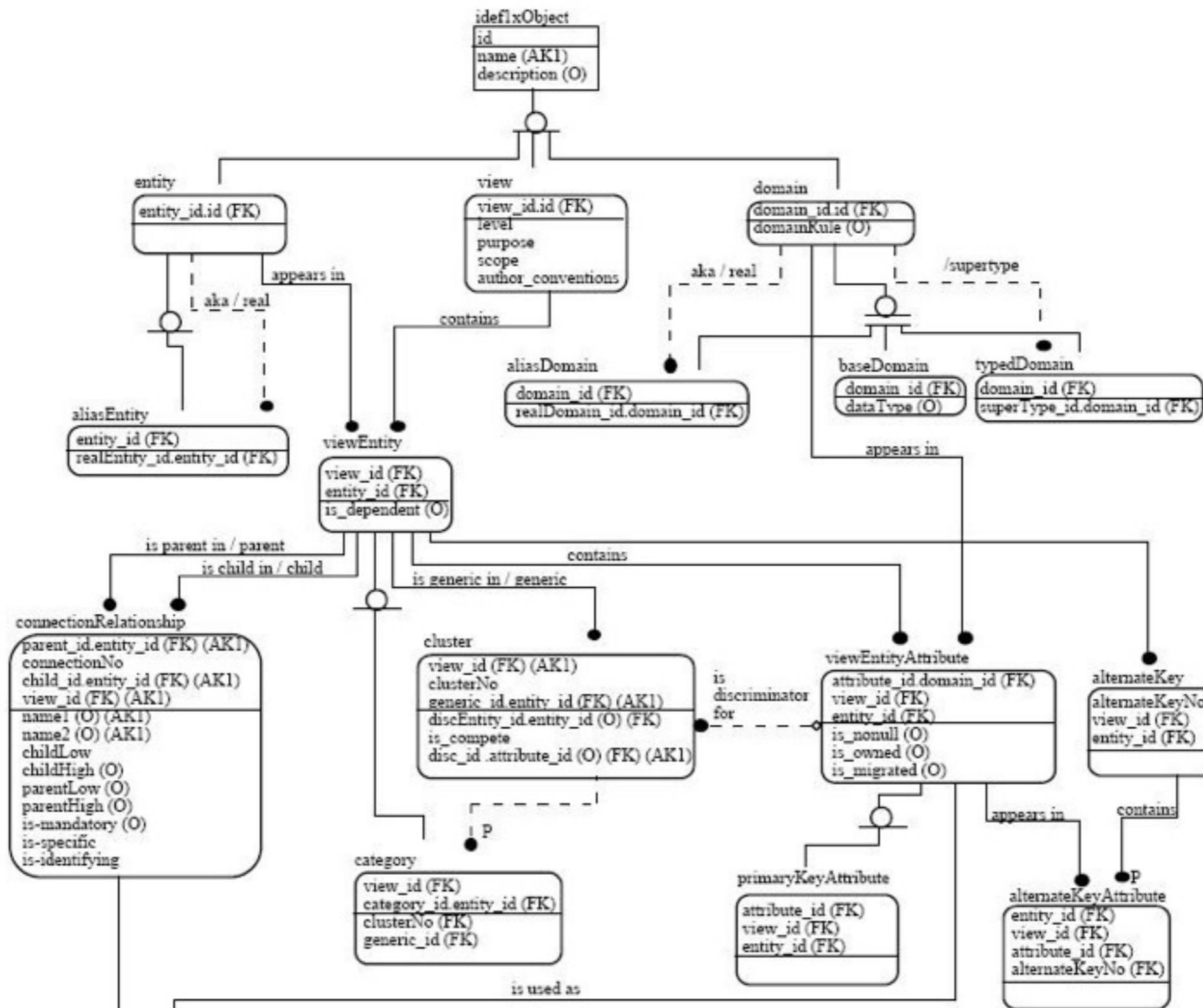


Migrate data too late

“The data migration phase of a project can consume up to 30% of the total project resources.”

Dr. Paul Dorsey

Data Models



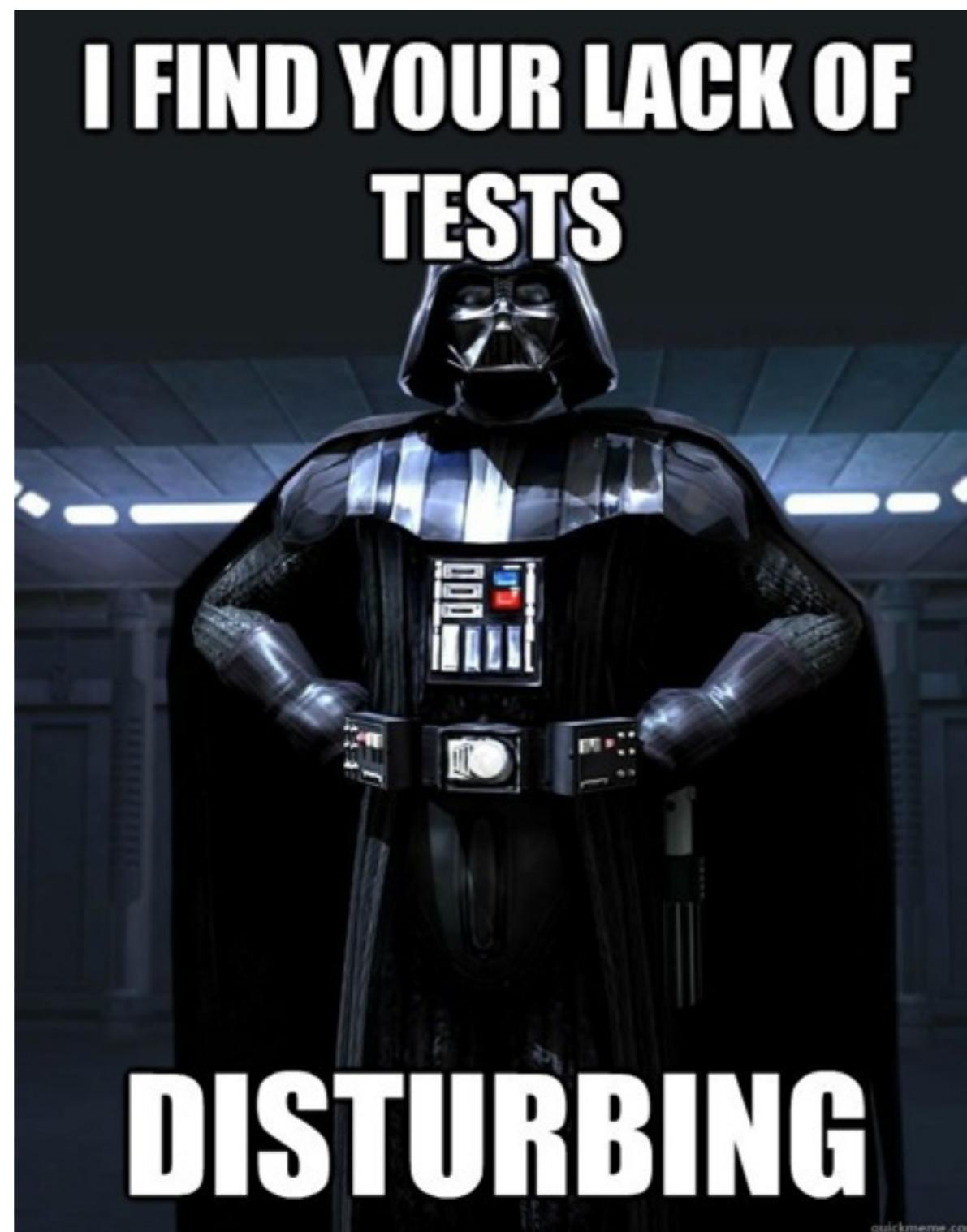
Data Models

We saw the data warehouse presentation the importance of planning your data structure

It's the core of the system which everything depends on.

Check your data models with an external source

Skip testing



Skip testing

- Not like testing a car in crash tests
- No system was ever created completely bug free
- Testing now saves time in the future
- We can only show the presence of bugs, not the absence

Buy and customise...
A lot



Buy and customise... A lot

“The only successful way for a commercial off-the-shelf (COTS) implementation to be successful is to decide at the outset that you are going to reengineer your business to fit the limitations of the COTS business to fit the limitations of the COTS business to fit the limitations of the COTS package.”

Dr. Paul Dorsey

Other factors

- Hiring more developers to get the project done faster
- Hiring cheaper developers as expensive developers cost too much.
- Using tools and languages no one in the team is familiar with
- Not following a development methodology
- And many more!

Success factors

1. Management support



1. Management support

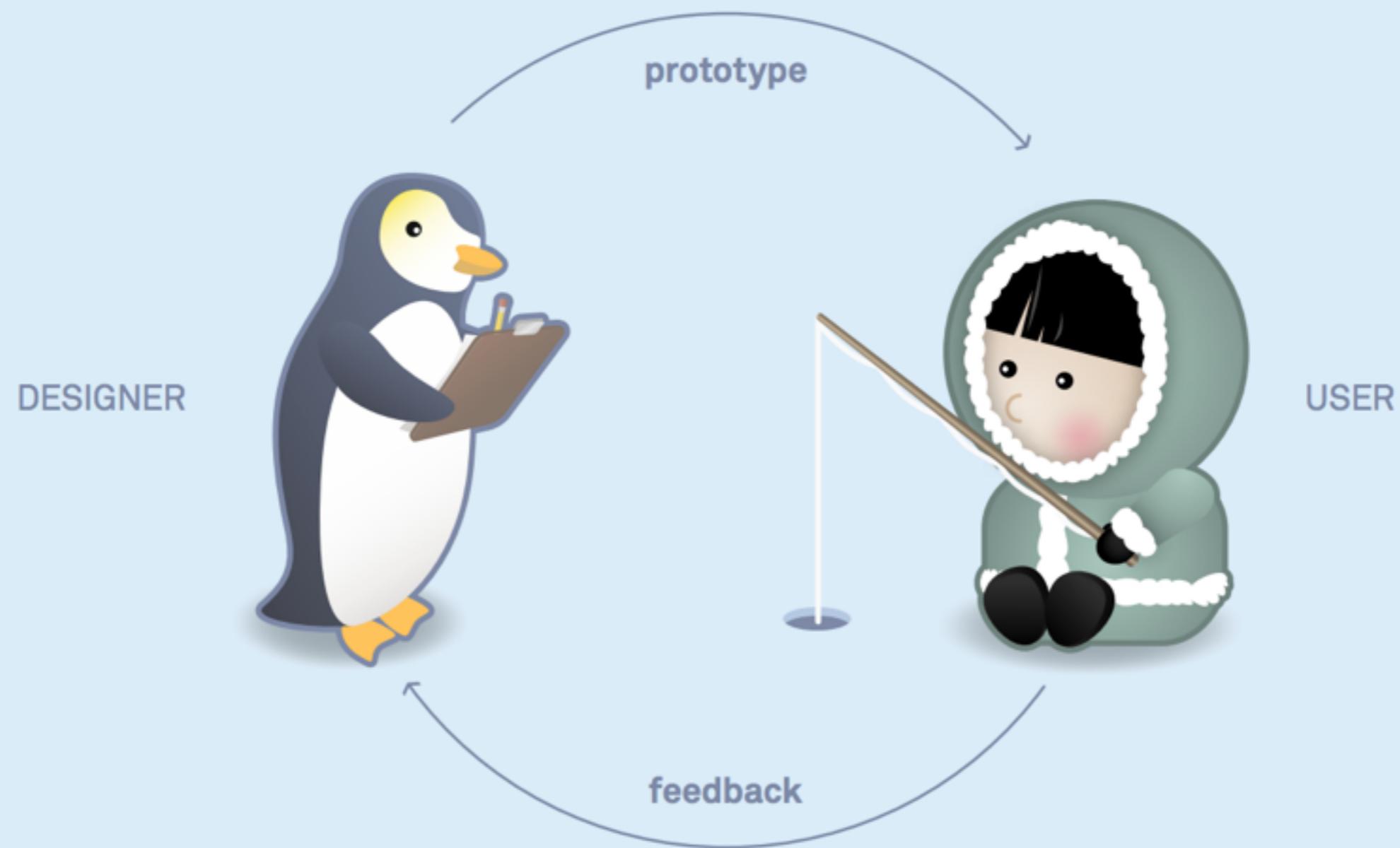
- Simple vision (stakeholders visions)
- Commitment (from executives)
- **Blink** (make decisions)
- Velocity (stepping stones / milestones)
- Education (project understanding)
- Kill switch (triggers)
- Celebrate (success)

1. Management support

Blink

- The larger the project, the more decisions that have to be made.
- A general rule is 1.5 decisions for every \$1,000 in labor cost.
- A million-dollar project will have 1,500 decisions, while a \$10 million project will have 15,000.
- The executive sponsor will be required to participate in about 20% of these decisions.
- The difference is 300 decisions versus 3,000 decisions.

2. User involvement



2. User involvement

- **Identification** (key users)
- **Rapport** (user relationship)
- **Soapbox** (communication channels)
- **Outcomes** (stepping stones / milestones)
- **Schooling** (teaching)

2. User involvement

Schooling

- Schooling is the teaching, learning, and transfer of information to and from the project team and to and from the users.
- The reason small projects have greater success is because the road is shorter with fewer exit ramps.
- Generally, in small projects there are fewer things to transfer to fewer people, yet it allows for greater creativity and breakthrough solutions.

3. Optimisation



3. Optimisation

- Scope (Prioritise tasks)
- Accurate Estimates (Estimate tasks)
- Expectations (managing)
- **Butterfly Effect** (big impact)
- Optimal Team (SEAL - Specialised, Exceptional, Assortment, Love)

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3. Optimisation

Butterfly Effect

- Small projects make a big impact.
- Small projects also pave the way for more small projects
- Success creates an environment that breeds further success.
- The challenge is to make sure that the organisation does not get over confident

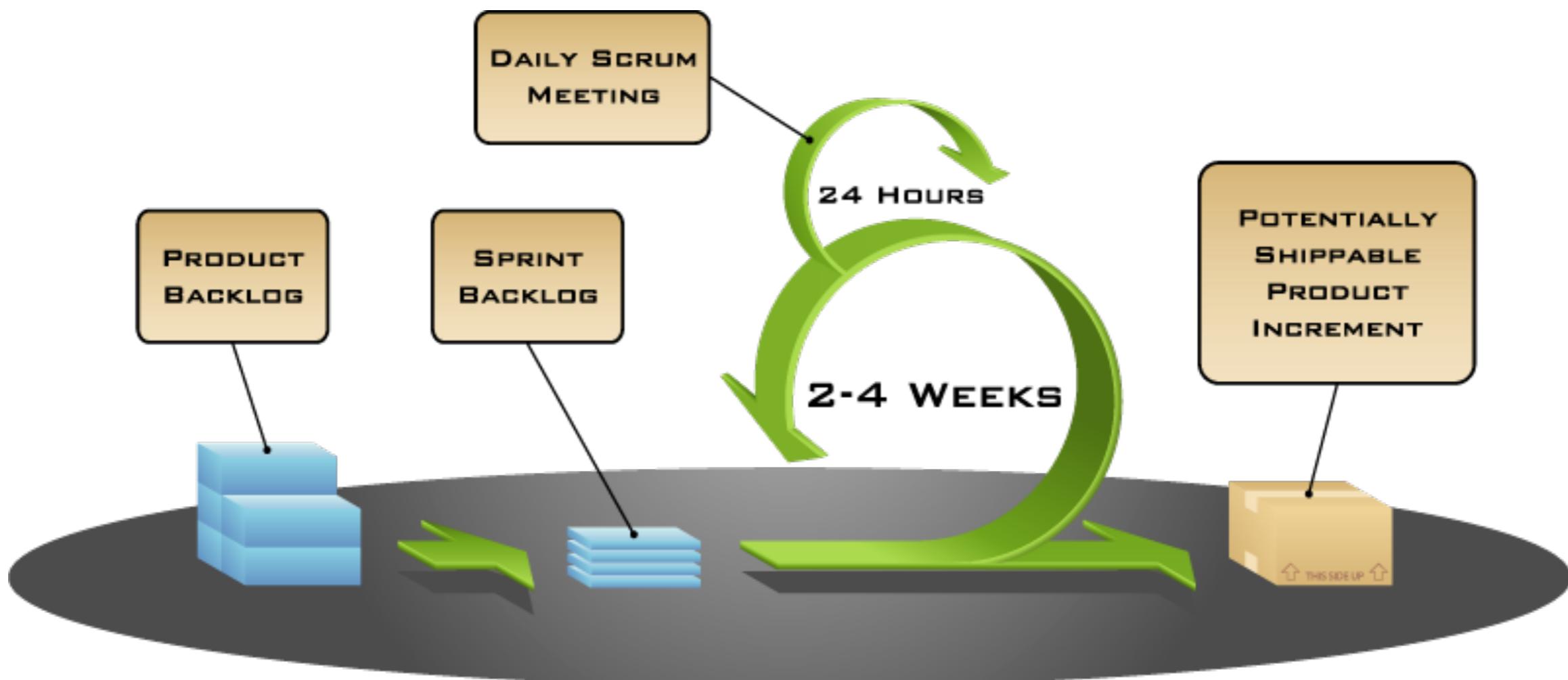
4. Skilled resources



5. Project management expertise



6. Agile process



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7. Clear objectives



8. Emotional maturity

The Emotions of Chuck Norris



Guilt



Suffering



Pleasure



Remorse



Anger



Kindness



Surprise



Desire

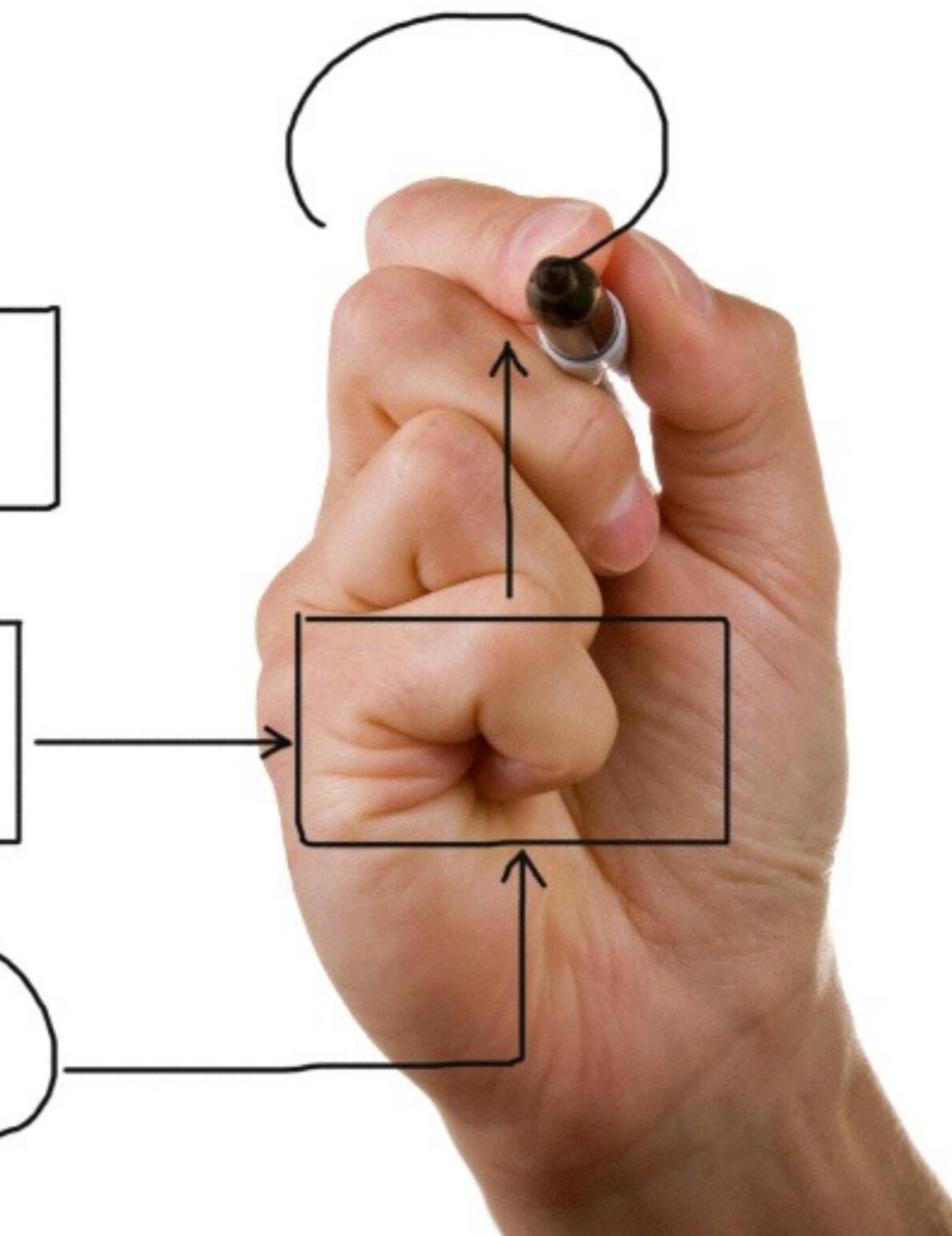
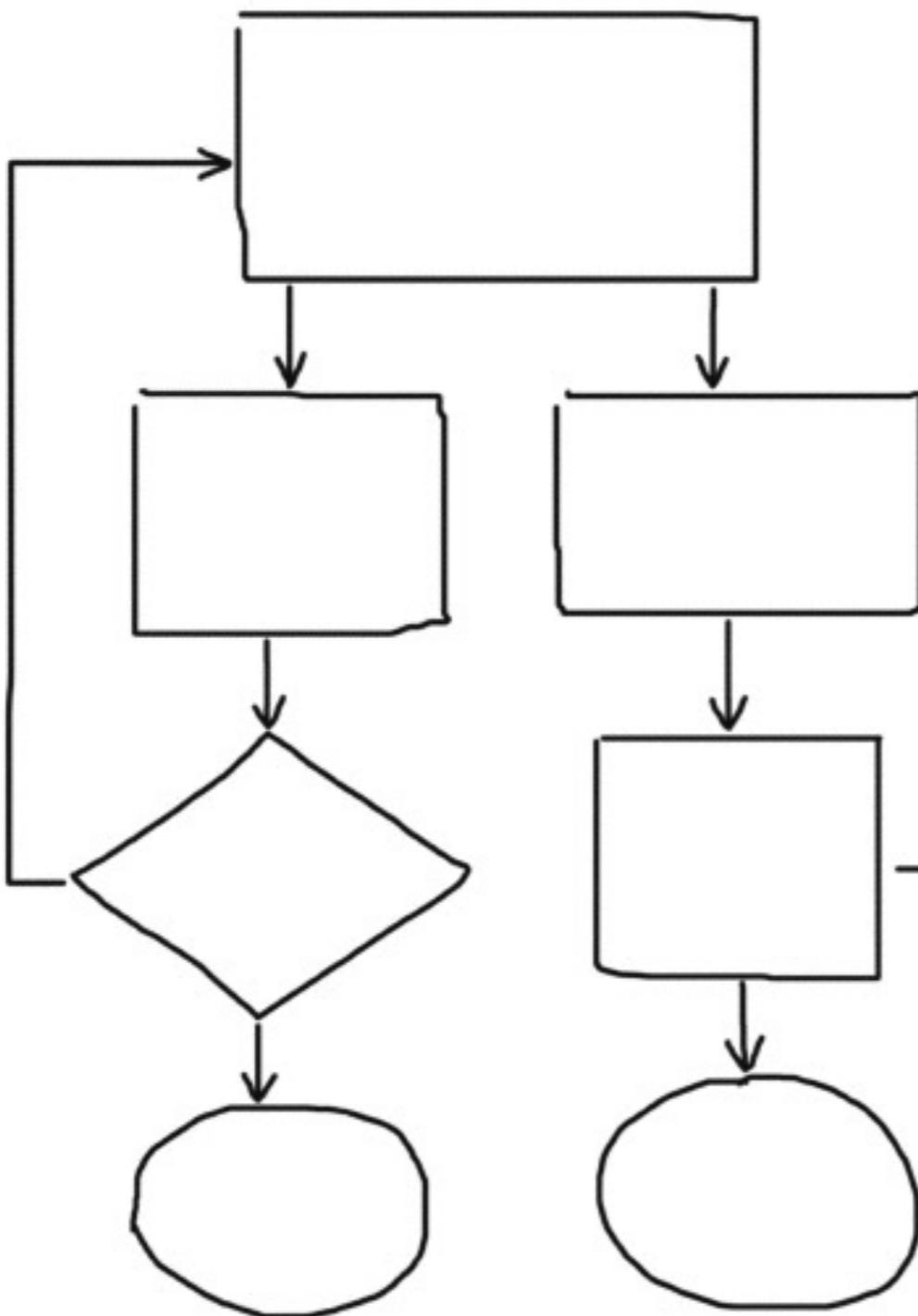


Love



Despair

9. Execution



10. Tools and infrastructure

Screenshot of a Jira project board titled "EDH". The board has columns for "To Do", "Next", "In Progress", "Review", "To Test", and "Done".

QUICK FILTERS: Activiti Migration, Support calls, Snow, Only My Issues, Andrew, Andrey, Daniil, Dmitry, Guillaume, Joao, Nicolas, Pavel

Issues:

- To Do:** ED...-5135, ED...-5556, ED...-5566, ED...-5597, ED...-5599, ED...-5611
- Next:** ED...-5577, ED...-5603
- In Progress:** ED...-5256, ED...-5643, ED...-5649, ED...-5655, ED...-5661, ED...-5676
- Review:** ED...-5672, ED...-5692
- To Test:** ED...-5674
- Done:** EDH-5540, ED...-5697, ED...-5698, ED...-5700, ED...-5701, ED...-5702, ED...-5703

10. Tools and infrastructure

SUMMARY

Issues | Road Map | Agile | Administration | Create Issue

Electronic Document Handling

Summary

Description

URL: <http://edh.cern.ch>

Lead: Ben Couturier

Key: EDH

Issues: Due

- [EDH-2222](#) Leave Request for ENTC shouldn't follow signature process but should only send information mail Due Date: Last Friday
- [EDH-2421](#) Modify the Check Sheet overview to search by service concerned
- [EDH-508](#) Signal when beneficiary has no CERNID

Issues: 30 Day Summary

Issues: 101 created and 85 resolved

Versions: Due

- Support Calls
- ToCheck
- Future

Reports | Filters

Activity Stream

October 15 - 9:00 AM

- Kirill Golikov updated 2 fields of [EDH-2375](#) (NG Framework - validation: add support for custom validation rules)
- Kirill Golikov changed the status to Blocked of [EDH-2409](#) (TPP: "Conference" flag + should appear in short description)
- Kirill Golikov commented on [EDH-2419](#) (TPP: "Conference" flag + should appear in short description) saying: Waiting for help from Sandrine Rascle / Magali Poret

October 14 - 6:00 PM

- Ivan Zapevalov closed [EDH-2343](#) (Allow not-yet-approved Training Requests to be linked from Travel Request) saying: fixed

October 14 - 5:00 PM

- Ivan Zapevalov closed [EDH-2410](#) (Re-establish supervisor objectives in the MARS form) saying: fixed
- Ivan Zapevalov updated 2 fields of [EDH-2410](#) (Re-establish supervisor objectives in the MARS form)
- Ivan Zapevalov changed the status to Under Review of [EDH-2410](#) (Re-establish supervisor objectives in the MARS form)
- Ivan Zapevalov updated 2 fields of [EDH-2410](#) (Re-establish supervisor objectives in the MARS form)

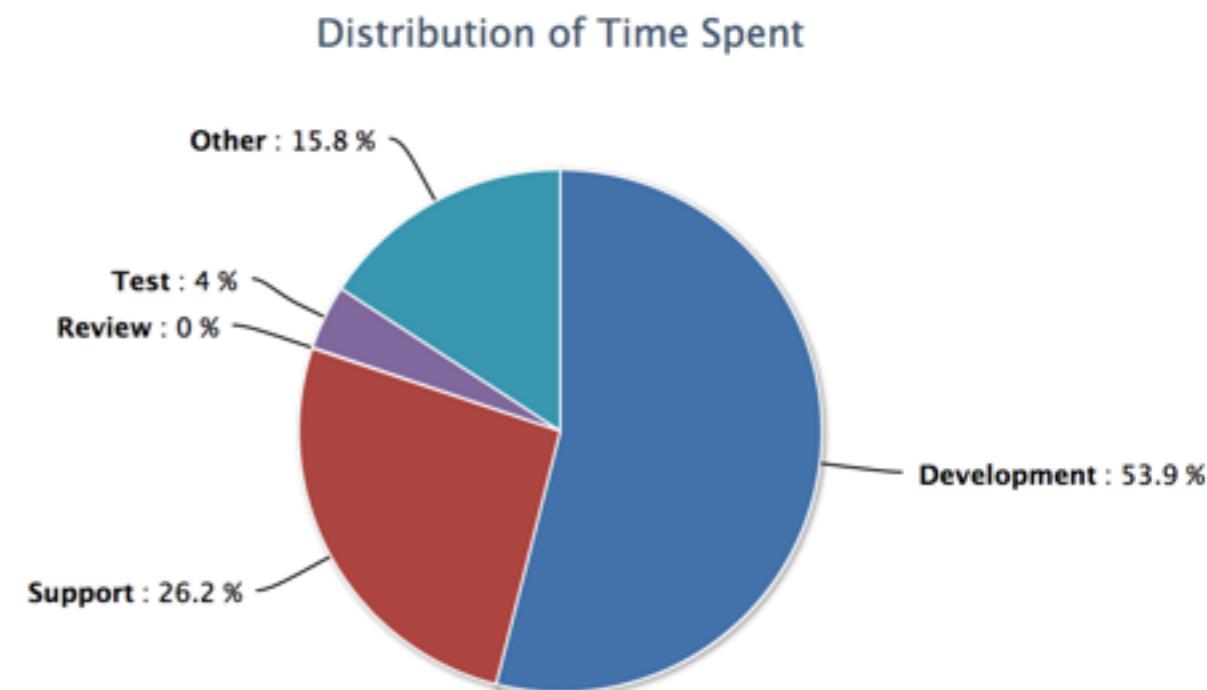
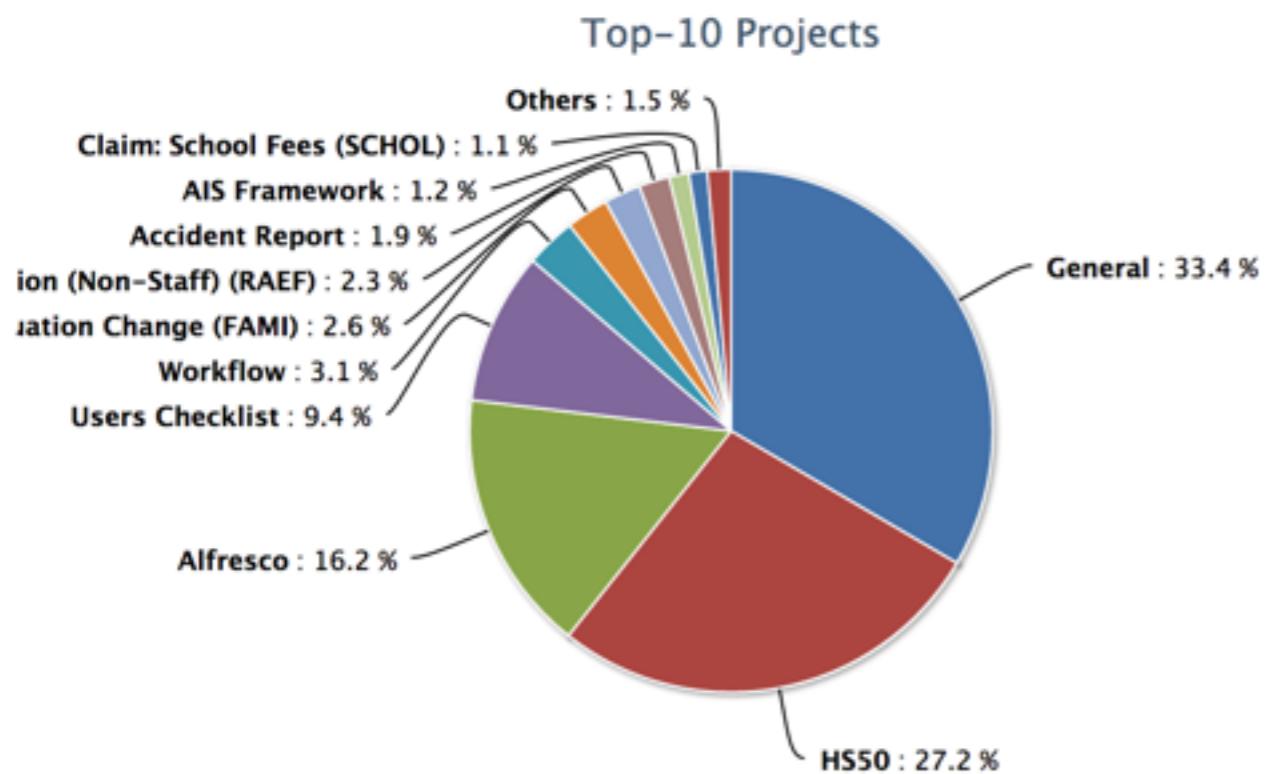
10. Tools and infrastructure

Screenshot of the Jira interface showing the GS-AIS-EB Dashboard.

The dashboard includes:

- Time Sheet:** A summary for Andrew Short and filter for EDH. It shows work hours from April 7 to April 13, 2014, across various tasks. Total hours: 40h.
- Issues in progress:** A list of issues assigned to EPW-194, EDH-5676, and EDH-5687.
- Assigned to Me:** A list of issues assigned to EPW-17, EPW-18, EPW-65, EPW-92, EPW-140, EDH-4304, and EDH-4312.
- Time Sheet:** A summary for group eb-developers and filter for EDH. It shows work hours for Andrey Avtomonov, Alistools Internal app links, Andrew Short, Daniil Meshkov, Dmitry Potapov, and Guillaume Ame.

10. Tools and infrastructure



10. Tools and infrastructure

The screenshot shows the Crucible code review interface. At the top, there's a navigation bar with links for Dashboard, Source, Projects, People, and Reviews. The Reviews tab is active. On the right side of the header, there are buttons for Reopen and Tools.

The main area displays a pull request titled "EDH-2385: Visually highlight periods of hotel unavailability in case reservation for the whole...". The status is "Closed on 08 Oct". Below the title, there are sections for "Author & Moderator" and "Reviewers", each with a small icon.

The left sidebar shows the project structure under "CR-EDH-559":

- Details
- Objectives
- General Comments
- EDHSVN
- trunk
 - hostel-management/src/main/java/cern/hostel
 - FidelioHome.java
 - FidelioService.java 1
 - RoomAvailabilityInfo.java 2
 - hostel-management-ui/src/main
 - resources/cern/hostel
 - messages_en.properties
 - messages_fr.properties 2
 - webapp
 - CSS
 - styles.css
 - chooseRoom.jsp

The code editor shows the file `/trunk/.../hostel/RoomAvailabilityInfo.java`. A red horizontal bar highlights the line `3017 3151`, indicating a range of code changes. The code itself is:

```
20 21 private Date m_startDate;
21 24 private Date m_endDate;
22 25 private List<RoomInfo> m_availableRooms;
```

Below the code, the method `getTotalNights()` is shown:

```
76 79 /**
77 80 /**
78 81 /**
82 * Get total number of nights for this period
83 *
84 * @return The total number of nights for this period
85 */
86 public int getTotalNights()
87 {
88     if ((m_endDate == null) || (m_startDate == null))
89         return 0;
90     else
91     {
92         double totalNightsCalculation = (m_endDate.getTime() - m_startDate.getTime());
```

luker says:

Might it happen that the end date will be before the start date?

Add to Favourites

07 Oct

ditor says:

In principle no since the object is created by our own code according to our algorithm. In any case I don't want to do an additional check for it - I like the GIGO (Garbage in, garbage out) principle.

08 Oct

Factors of success

1. Executive management support
2. User involvement
3. Optimisation
4. Skilled resources
5. Project management expertise
6. Agile process
7. Clear business objectives
8. Emotional maturity
9. Execution
10. Tools and infrastructure



case study

- National Health Service (NHS) (\approx Sistema Nacional de Salud)
- UK, government run
- National Program for IT (NPfIT) 2002 - 2011
- Believed to be the largest IT healthcare system in the world
- >14 billion euros spent... 14,000,000,000!
- Designed to reform the way the NHS uses data



case study

Leadership and management changes

- Main project leader left taking valuable expertise

Staff expressed usability concerns

- Users involved too late
- When finally involved they expressed serious concerns

Skills and capacity shortages

- Left inexperienced project leaders to take over

Complexity

- Failed to split the project into smaller tasks
- Goals were not achievable



case study

- Federal Bureau of Investigation (FBI)
- US, government run
- Virtual Case File (VCF) 2000 - 2005
- Would replace several older software systems
- ~123 million euros spent... 123,000,000!
- Designed to modernise IT system



case study

Leadership and management changes and expertise

- Lack of training, experience and micromanagement
- Contributed to specification problems
- Micromanagement of software developers

Users complained system was unusable

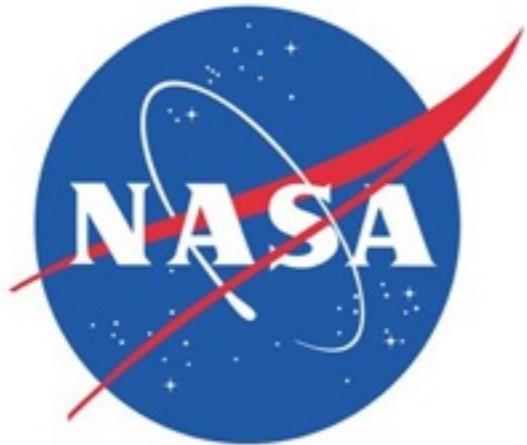
- Users involved too late

Lack of Skilled Resources

- Personnel who had little or no training
- Lack of training, experience and micromanagement

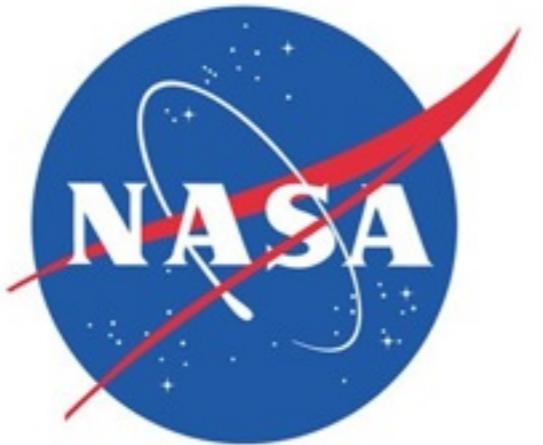
Missing clear objectives

- Requirements were continually added to the system even as it was falling behind schedule



case study

- National Aeronautics and Space Administration (NASA)
- US, government run
- Mars Climate Orbiter 1998 - 1999
- Built by Lockheed Martin
- ~238 million euros spent
- Designed to study martian climate and atmosphere



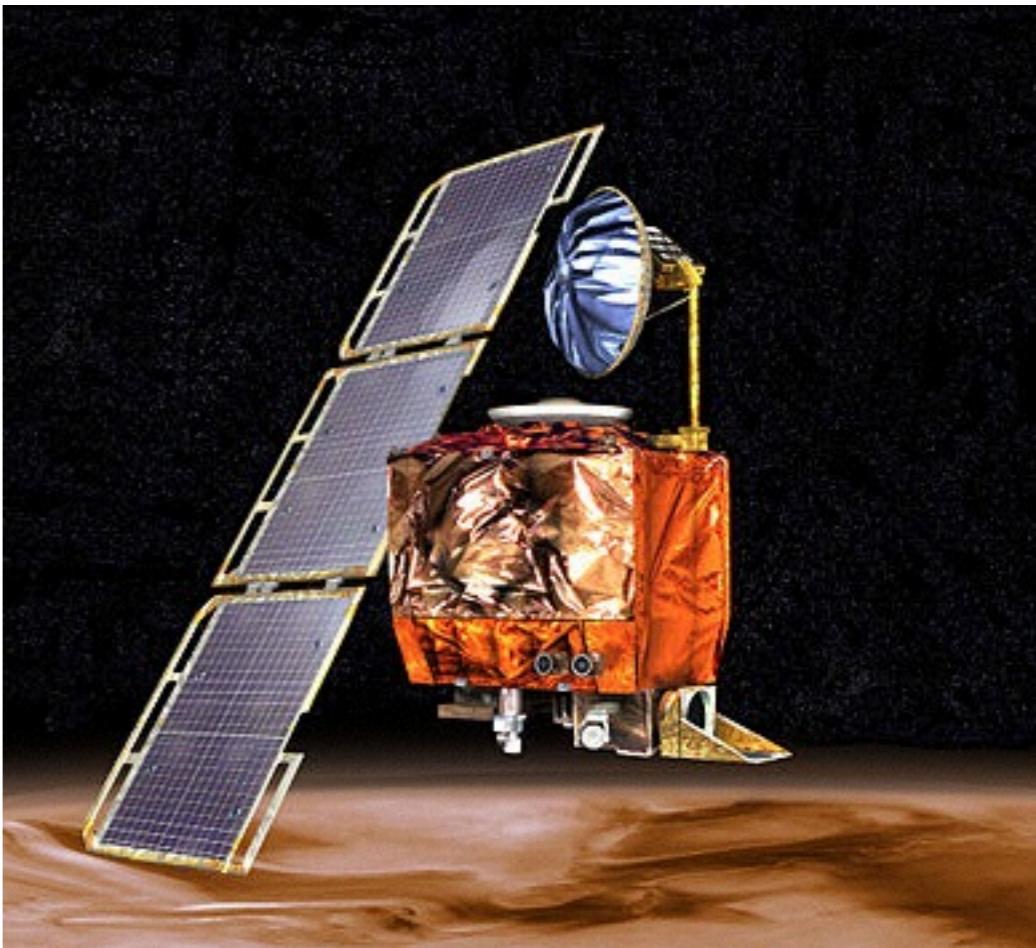
case study

Insufficient testing

- Testing missed failed to find the issue.

Lack of requirements understanding

- It was assumed that metric units would be used.



Your challenge

- Come in the top 39% of successful projects
- Don't go over time or cost restrictions.
- Deliver a high quality product and improve the reputation of the IT industry.
- Don't be next years case study!

Thank you

Speaker: Andrew Short

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Further reading

- List of failed software projects: <http://spectrum.ieee.org/computing/software/why-software-fails>
- List of failures: <http://project-management.com/top-10-main-causes-of-project-failure/>
- Failure of Corporate Websites: <http://www.nngroup.com/articles/failure-of-corporate-websites/>
- Reasons for failure: <http://info.psu.edu.sa/psu/cis/biq/SE501/a/a1/MajorCausesofSoftwareProjectFailures.pdf>

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