IMS HEALTH

Software Engineering Best Practices

Practical things we can all do

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CUSEC 2002

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About IMS Health

- In Canada from 1960
- Offices in over 100 countries (HQ in US)
- Canada's leading supplier of health information
  - Pharmaceutical consumption rates/patterns
  - Prescription estimates
  - Disease & treatment patterns

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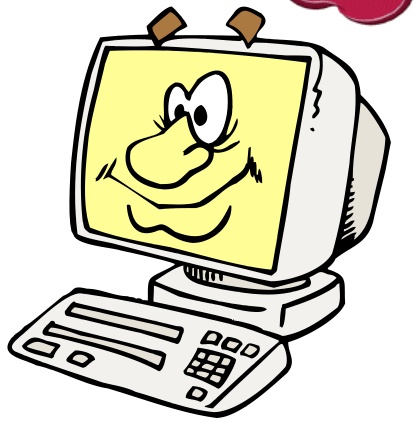
About me



- BSc, MSc McGill (Physics)
- 16+ years in software industry
- Held positions as software architect, software engineer, project manager
- Matrox, Clinidata, IMS Health
- In charge of development standards & methodology at IMS Health

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Agenda

- Introduction
- Caveats
- Best practices
- Where to get more information
- Questions and Answers

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Introduction

- What is Software Engineering?
- What is a Best Practice (BP)?
- How these BPs are chosen

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What is Software Engineering?

- "*The intelligent application of proven principles, techniques, languages, and tools to the cost-effective creation and maintenance of software that satisfies users' needs.*" [Dav95]

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What is a Best Practice (BP)?

- "*A principle, technique, or rule about Software Engineering that is applicable regardless of the development methodology, language, or application domain.*" [Dav95]

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How these BPs are chosen

- They're proven in the field
- Personal experience
- Practical, easy to implement

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Caveats

- List is not exhaustive
- Not everything has to be followed
- Not everything works all the time
- Not every BP is compatible with each other
- Not necessarily for project managers or leads only

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Best Practices

- General BPs
- BPs for Construction
- BPs for Test
- BPs for Documentation

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Quality First

- Users won't tolerate product of poor quality, no matter how quality is defined
- Quality cannot be "retrofitted"
- It's better to have poor efficiency than poor reliability
- High quality = low productivity
- Most every BP ultimately traces to ensuring Quality in software products

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Triage

- *"A system used to allocate a scarce commodity, such as food, only to those capable of deriving the greatest benefit from it."* [You97]
- Major application is in requirements management

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Triage (cont'd)

- Classify requirements using **M**o**SC**o**W** rule: "**M**ust have", "**S**hould have", "**C**ould have", "**W**ish to have" [Sta97]
- Focus only on "Must have" requirements first
- Must actively & continuously manage this with all stakeholders (Users, development, QA, Marketing, management)

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Top 10

- List of 10 most serious risks to project
- Include status, context, possible resolutions
- Update every week
- Raises awareness of project risks
- More timely solutions possible
- Improves visibility of progress

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Configuration management

- Use CM tool (SourceSafe, etc.)
- Archive all versions of all intermediate Artefacts (specifications, code, test-plans, user manuals, etc.)
- Assign name/version number
- Have a baseline as early as possible
- Control ALL changes to baseline
- Track every change

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Defect tracking

- Log of all defects found in all stages of life cycle
- Include also suggestions

- Must have version number from CM tool
- Easier post-mortem analysis
- Easier metrics gathering

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Have standards

- Promotes discipline
- Ensures uniformity of artefacts
- Use of common language
- Easier maintenance
- Availability of tools

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Don't follow standards

- Good methodology is one that makes sense to the company
- Don't have to follow every single step
- Adopting new methodology often accompanied by huge productivity drop
- Fix fundamental problems first
- Be careful when following trends

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Miniature milestones

- Milestones that are achievable in 1-2 days
- Good for crisis or project recovery
- Good for team motivation
- Increased status visibility

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Avoid Waterfall methodology

- Trying to freeze requirements, design,…
- Trying to plan details from beginning to end
- Not suitable for new, unfamiliar projects
- Not adaptable to changes
- Pushes risks to tail-end of project
- Testing way too late
- Integrating way too late
- *

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Use Iterative methodology

- Project goes through many iterations
- Each iteration includes usual 4 stages
- Each iteration refines requirements, design, build, tests, …
- Each iteration adds more and more features
- Users see value with each iteration

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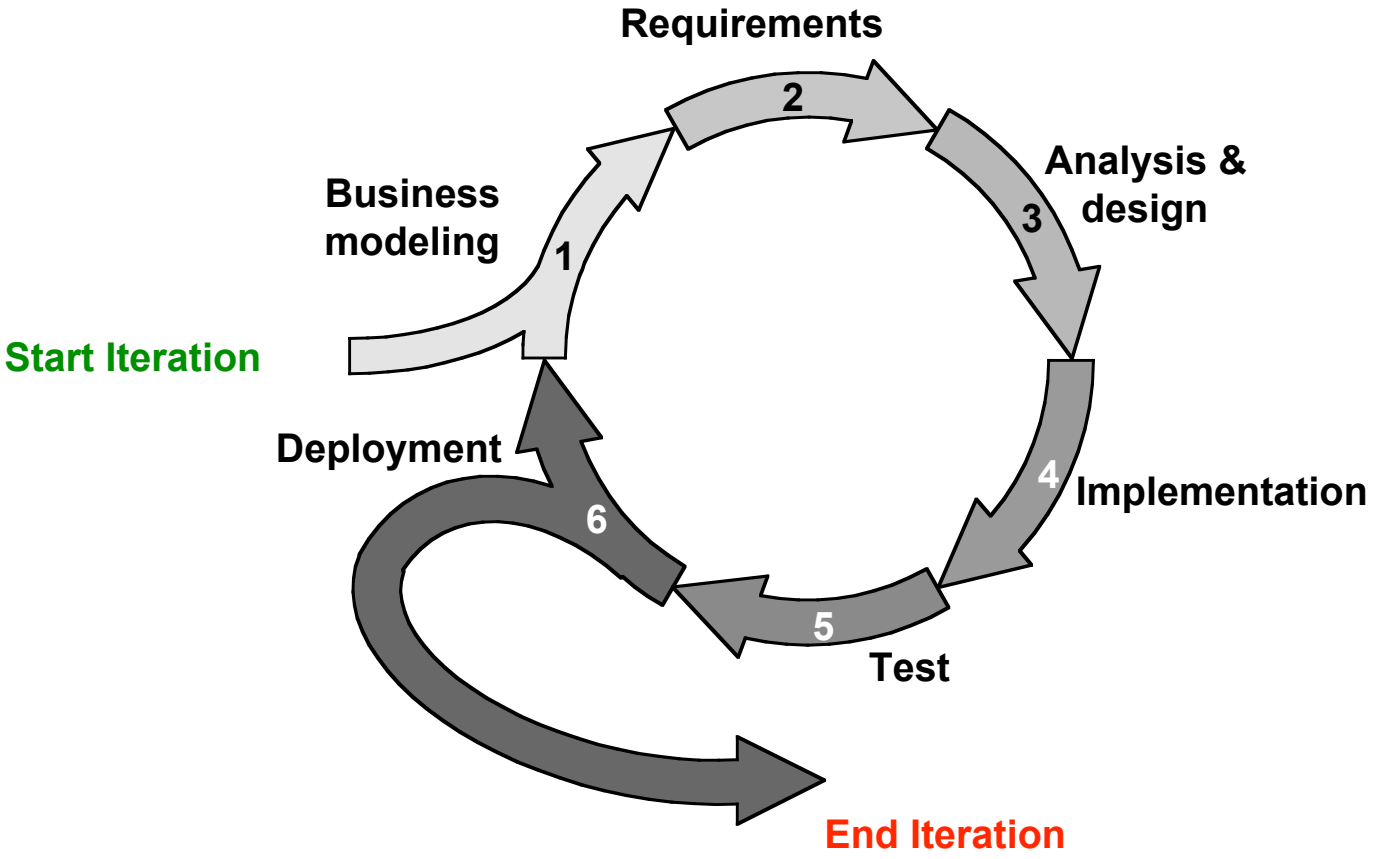
Iteration



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Iterative methodology

- Embraces changes, not resists them
- Emphasis on working software, not documents
- Creates working system as early as possible
- Continuous testing, continuous integration
- Risk driven: greatest risks handled first

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Release early

- Define & create release process and actual release deliverables as early in project life-cycle as possible (iterations)
- Minimizes integration problems
- Avoids “end of build” rush

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Framework group

- A group to define company-wide common architecture, development tools, & methodology
- Promotes reuse of common components
- Decreases risks

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Do a post-mortem

- At project end, key players analyze every problem that occurred in project
- Goal is to document, analyze, and learn from mistakes
- Metrics can also be gathered
- Usually takes 3-5 days
- Great benefits to future projects

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Best Practices

- General BPs
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Captain's Log

- Keep a log of what was done
- Can be written or electronic
- Especially important for build
- Easier recall of what or why
- Easier post-mortem analysis

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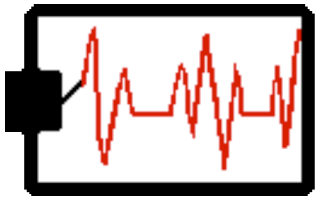
Daily build



- System completely rebuild every day (usually overnight)
- Treat it as heartbeat or synch pulse of project [Cus95]
- Fixing broken build is given top priority
- Minimizes integration risk
- Easier defect diagnosis

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Daily smoke tests

- A set of tests that exercises major functional areas of system
- Should be automated
- Run it after each Daily Build
- Update the set as more functionality are added to each iteration

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Fix bugs as soon as found

- Don't wait "until later"; "later" never comes
- Fix while code is still fresh in memory
- No new features until bugs are fixed
- Greatly increases quality of product

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Single-step through every line of code

- Step through code in debugger
- Step through EVERY SINGLE line of code that was added, changed, moved

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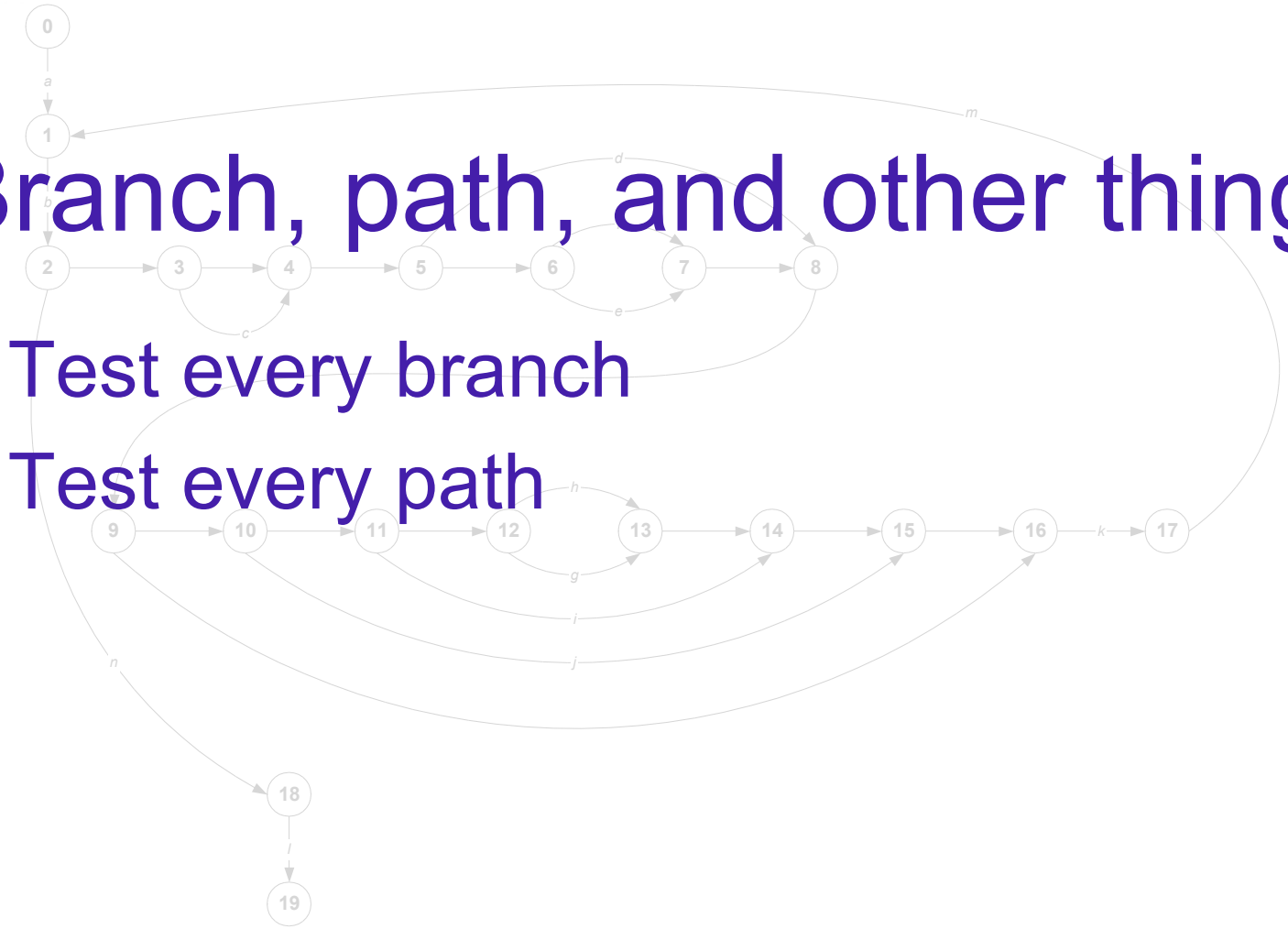

Branch, path, and other things

- Test every branch
- Test every path

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Do Inspections

- Catches high percentage of bugs
- Promotes good coding practices
- Promotes use of coding standards
- Great for people new to project or code

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Create a glossary & index

- Every document should have glossary & index
- Especially important for User documents (requirements specs, user manuals)

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Be boring

- Which is better?
  - "There are three types of special commands. Regular commands come in four varieties."
  - "There are three types of special commands. There are four types of regular commands."

[Dav95]

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Speak the reader's language

- Don't put technical terms in documents destined for Users
- Use the reader's terminology

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Where to get more information

- S.McConnell, *Rapid development*. Microsoft Press, Redmond, Wash., 1996.
- A.M. Davis, *201 principles of software development*. McGraw Hill, 1995.
- Bibliography lists 31 other books, papers, and web sites.

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Questions and Answers