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software development

Deliberate Practice

In Software Development

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Hockey Players

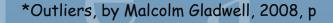Elite hockey players in Canada are likely to have been born in the earlier months of the year than in the later months.*

In *any* elite group of Canadian hockey players

- 40% were born between January and March
- 30% were born between April and June
- 20% were born between July and September
- 10% between October and December.

The same pattern exists in European Football (Soccer).

What might account for this anomaly?

The age cut-off date for youth hockey in Canada is January 1.

*Outliers, by Malcolm Gladwell, 2008, p

Violin Players

Berlin Academy of Music

	Elite Musicians	Good Musicians	Future Teachers
Age 5	2-3 hours/week	2-3 hours/week	2-3 hours/week
Age 8	6 hours/week	2-3 hours/week	2-3 hours/week
Age 12	8 hours/week	6 hours/week	4 hours/week
Age 16	22 hours/week	11 hours/week	7 hours/week
Age 20	30+ hours/week	24 hours/week	12 hours/week
Accumulated hours	10,000 hours	8,000 hours	4,000 hours

The Role of Deliberate Practice in the Acquisition of Expert Performance
K. Anders Ericsson, Ralf Th. Krampe, and Clemens Tesch-Romer; 1993

What is Talent?

Definition 1: (Nature)

The abilities, powers, and gifts bestowed upon a person; natural endowments; general intelligence or mental power.

Hypothesis 1:

There is a widely held belief that one's future is mapped in one's genes; that great performers are born with special abilities.

See ***Success is all in the Mind*** by Shelley Gare, <u>The Australian</u>, January 24, 2009

Definition 2: (Nurture)

A special innate *or developed* aptitude for an activity.

Hypothesis 2:

"With the exception of the influence of height and body size in some sports, no characteristic of the brain or body has yet been shown to constrain an individual from reaching an expert level."

– K. Anders Ericsson

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Talent is Overrated

What makes people really good at what they do?

1993: *The Role of Deliberate Practice in the Acquisition of Expert Performance* by K. Anders Ericsson, Ralf Th. Krampe, and Clemens Tesch-Romer

2006: *The Cambridge Handbook of Expertise and Expert Performance* edited by K. Anders Ericsson, Neil Charness, Paul J. Feltvoich, and Robert R. Hoffman

Over 15 years of research has led to remarkably consistent findings across a wide array of fields:

The most accomplished people need around ten years of "deliberate practice" before becoming world-class.

This a pattern is so well established that researchers call it the ten-year rule.
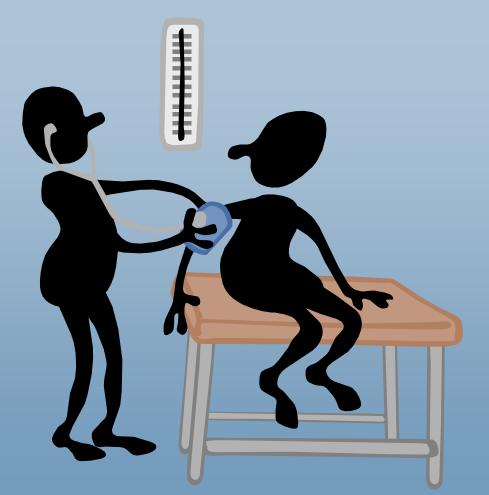
Deliberate Practice

10 Years of 10,000 hours of Deliberate Practice

- ✓ Identify a specific skill that needs improvement.
- ✓ Devise (or learn from a teacher) a focused exercise:
  – designed to improve the skill.
- ✓ Practice repeatedly.
- ✓ Obtain immediate feedback:
  – adjust accordingly.
- ✓ Focus on pushing the limits:
  – expect repeated failures.
- ✓ Practice regularly & intensely:
  – perhaps three hours a day.

Doctors

How good is the diagnosis?

How much feedback
do doctor's get?

✓ Most doctors – very little
And make increasingly
poor diagnoses.

✓ Some doctors – seek it
And make increasingly
good diagnoses.

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October 09

Pilots

Captain Chesley B. Sullenberger III, age 58: 19,000 hours of flying experience over 44 years. 7 years F-4 Phantom jet pilot. Glider pilot. Aircraft accident investigator.
"I felt like I spent my entire life preparing for this day."
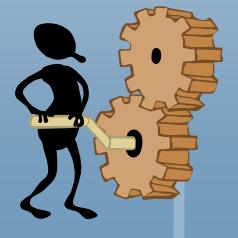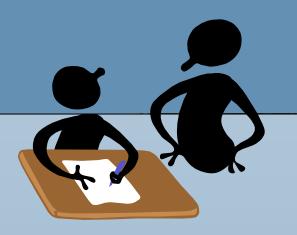
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The Four Elements of Deliberate Practice

1. Mentor

2. Challenge
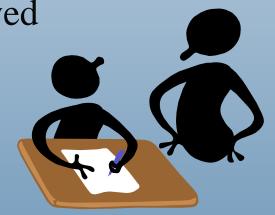
3. Feedback

4. Dedication

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1. Mentor

The Competency Leaders

- ✓ Masters
- ✓ Teachers
- ✓ Deeply knowledgeable and involved

What do they do?

- ✓ Hire and Grow People
- ✓ Review and Guide work
- ✓ Set Technical Standards
- ✓ Ensure Technical Excellence

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The Competency Leader: Master Craftsman & Teacher

The Music Teacher

The Conductor

Competency Leader

Product Champion

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2. *Challange*

If it's hard – do it frequently and it will get easy.

- ✓ Test – Integrate – Release
  - ✗ Early and Often!
- ✓ Change the Code Frequently
  - ✗ It will get easier to change

Challenging Work Assignments

- ✓ Assign work to develop people
  - ✗ Don't do what's easy, look for challenges

Focus on Constant Improvement

- ✓ Improve the product, the process, the people.

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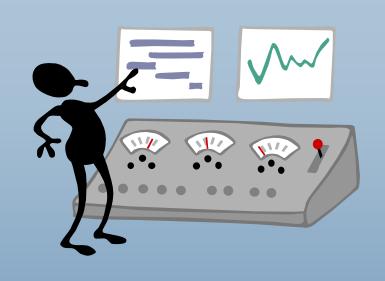
Do Our Organizational Practices Develop Experts?

1. Are work assignments structured to provide challenges so developers can push the limits of their competence?

   ✓ Or are people assigned work that they are already good at?

2. Do managers have the technical depth to understand the work they manage and provide regular, focused feedback so developers can improve?

   ✓ Or is there an alternate way to generate this kind of feedback?

3. Do you have a "High Potential" selection program?

4. Are developers kept at arm's length from their customers?

   ✓ Or do they get immediate feedback and become deeply engaged in the overall success of their efforts?

5. Is time available for constant improvement?

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3. Feedback

Immediate feedback
- ✓ Design Reviews
  - ✗ Mentors Provide Guidance
- ✓ Common Code Ownership
  - ✗ Peers Provide Visibility
- ✓ Test Driven Development
  - ✗ xUnit and Acceptance tests
- ✓ Continuous Integration
  - ✗ Stop if the tests don't pass
- ✓ Customers Feedback Every Iteration
  - ✗ Leave room to take feedback into account
- ✓ Escaped Defect Feedback and Analysis
  - ✗ Determine how to prevent them in the future

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The Appeal of Open Source

"If you want to get really good at developing software – work on an Open Source Project."

Feedback is immediate, Constant, and Detailed

1. Committer Review
2. Community Feedback

Footnote on Open Source:

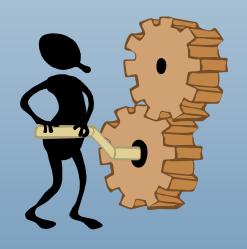Communication is always written using a simple, searchable tool.

(Face-to-face communication excludes the community from the conversation.)

4. Dedication

Skill development takes time

- ✓ Time in place
    - ✗ Rapid job movement doesn't develop skill
- ✓ Time to learn
    - ✗ Focused time without interruption
- ✓ Time to invent
    - ✗ Efficiency is not the objective
- ✓ Motivation
    - ✗ Do a job you'll love
- ✓ Career Paths for Technical Experts
    - ✗ Management can't be the only way to advance

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Pride of Workmanship

The Gold Standard: Tandberg – Oslo, Norway

Telepresence

Everyone who works there told us the same thing:

*"Everything we do here is to make it
easier for people to communicate."*

"This is a great company. We think of programmers and salespeople as being the most important and respected positions, the "others", like the VP you met, all think of themselves – and express loudly – that they are in a supporting role." Olve Maudal, C++ Programmer

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Towering Technical Competence at Toyota

Hiring

- ✓ Loves the work and the product
- ✓ Technical capability
- ✓ Creative problem solving ability
- ✓ Teamwork
- ✓ Ability to "grasp the situation
  - ✗ Quickly
  - ✗ Thoroughly
  - ✗ At a detailed level
- ✓ Ability to communicate a situation succinctly
- ✓ Discipline to work consistently to a time schedule
- ✓ Motivation to work to targets
- ✓ Dedication to craft and company

The Toyota Product Development System
by James Morgan and Jeffrey Liker, 2006

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Towering Technical Competence at Toyota

Induction into the company
- ✓ 1 month general training
- ✓ 3-4 months assembling cars
- ✓ 2-3 months selling cars
- ✓ 4-9 months doing a challenging freshman project
  - ✗ Under the guidance of a mentor
  - ✗ Learn the Toyota approach to solving problems
    - ❖ Genchi Genbutsu – Go-to-the-source and learn the facts.
- ✓ 2 years at heads-down detailed, routine work   **Apprentice**
  - ✗ Under the guidance of a senior engineer
- ✓ 3-6 years doing simple designs   **Journeyman**
  - ✗ Under the guidance of a manager (a master engineer)
- ✓ Only then is the person considered an   **Master**
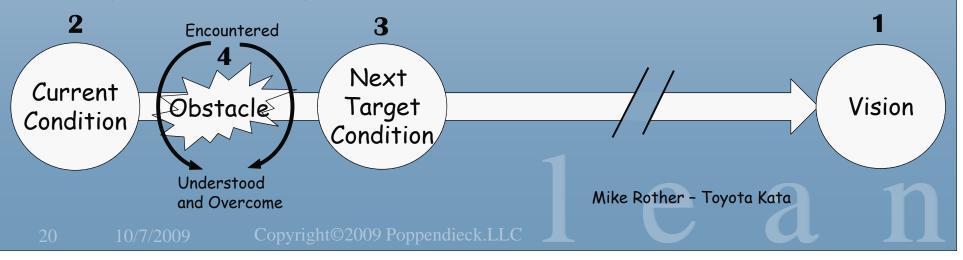independently functioning lead engineer

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The Toyota Product Development System
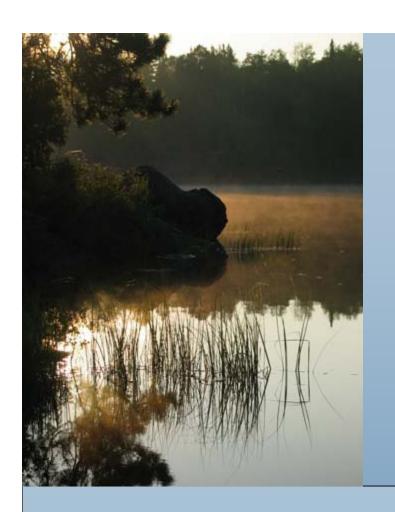by James Morgan and Jeffrey Liker, 2006

Toyota Improvement Kata

1. Visualize perfection
2. Have a first hand grasp of the situation
3. Define a target condition on the way to perfection
4. Strive to move step-by-step to the target
5. As obstacles are encountered, they are systematically understood and overcome

2

Encountered

4

3

1

Current Condition

Obstacle

Next Target Condition

Vision

Understood and Overcome

Mike Rother – Toyota Kata

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Toyota Coaching Kata

Everyone has a Mentor

The Mentor

- ✓ Knows the details
- ✓ Asks questions
- ✓ Teaches the kata
- ✓ Focuses on learning
  - ✗ Not results

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Thank You!

More Information: www.poppendieck.com