# Software Engineering Education Goes Global and Agile

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*Thanks:*
*Olly Gotel*
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# Agenda

- Global Software Development (GSD) 2005-2008
- Focus for 2009
- Focus for 2010
- Scrum and Agile
- 2009 – Setting, Research Questions, Scrum / Agile, Tools, Outcomes, Findings
- 2010 – Setting, Research Questions, Scrum / Agile, Tools, Outcomes, Findings
- Introducing Scrum / Agile in students' GSD projects
- Future work

# GSD 2005-2008

Globalization

Tooling

Quality

Entrepreneurship

Roles

Socialization

Competition

Deployment

Supply Chain

Software Engineering Process

**Local Team Spirit / Mashups of Tools / Want to be Developer /Late Working Versions of Software**

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# GSD 2009

Globalization

**Tooling**

Quality

Entrepreneurship

**Roles**

Socialization

Competition

Deployment

**Mobile**

upply Chain

**Software Engineering Process**

**Mobile / Global Team Spirit / End-to-end Tooling / Process / Developers, Developers… / Early Working Version of Software**

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# GSD 2010

Globalization

**Tooling**

**Quality**

Entrepreneurship

**Roles**

Socialization

Competition

Deployment

**Mobile**

Supply Chain

**Software Engineering Process**

**Mobile / End-to-end Tooling / Process/ Developers, Auditors, Testers… / Process /Early Working Version of Software**

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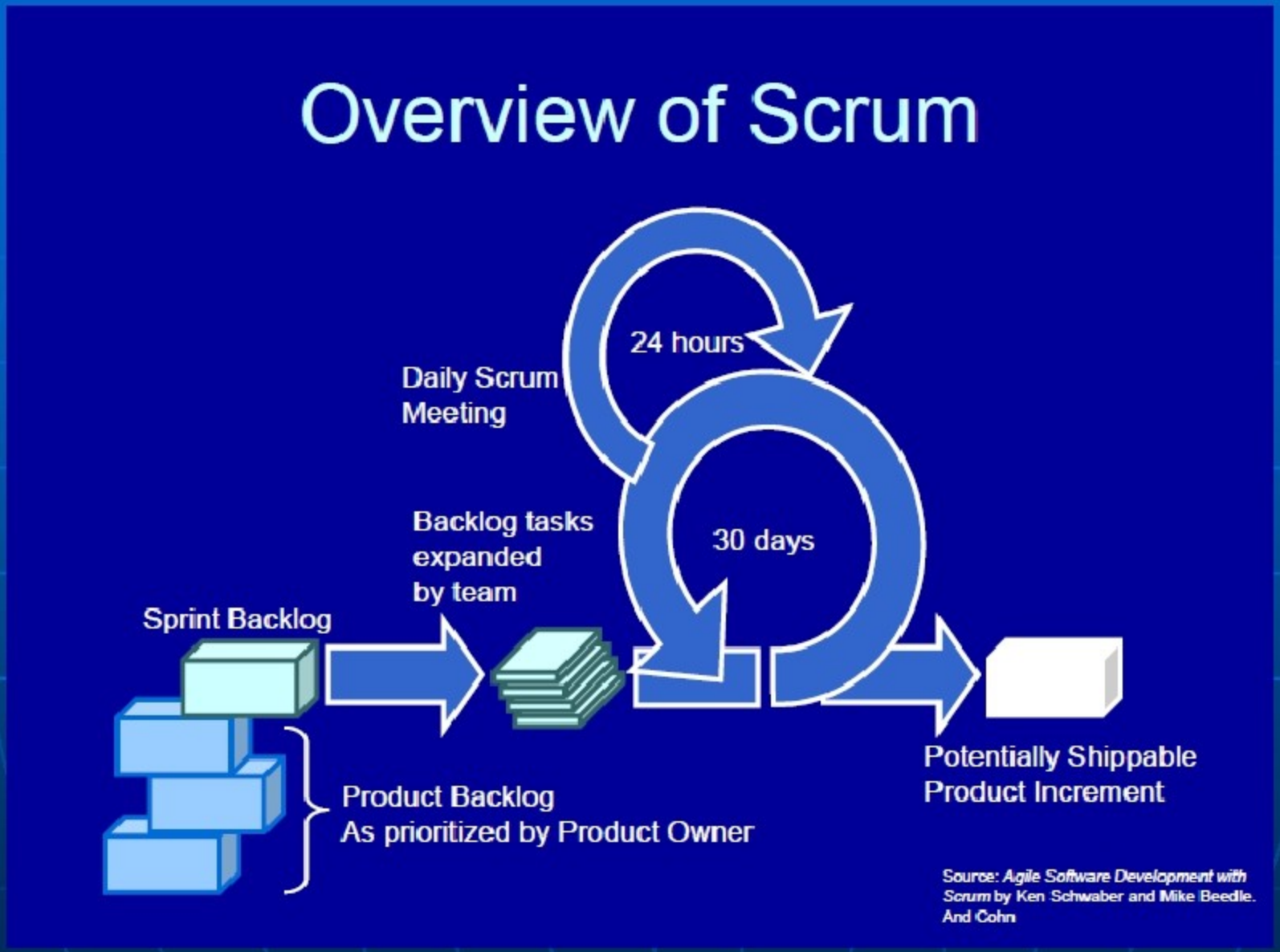



*Source: http://www.rallydev.com*

## Roles

PO

Product Owner: Set priorities

SM

ScrumMaster: Manage process, remove blocks

T

Team: Develop product

SH

Stakeholders: observe & advise

## Key Artifacts

### Product Backlog
- List of requirements & issues
- Owned by Product Owner
- Anybody can add to it
- Only Product Owner prioritizes

### Sprint Goal
- One-sentence summary
- Declared by Product Owner
- Accepted by team

### Sprint Backlog
- List of tasks
- Owned by team
- Only team modifies it

### Blocks List
- List of blocks & unmade decisions
- Owned by ScrumMaster
- Updated daily

### Increment
- Version of the product
- Shippable functionality (tested, documented, etc.)

## Key Meetings

### Sprint Planning Meeting
- Hosted by ScrumMaster; ½-1 day
- In: Product Backlog, existing product, business & technology conditions

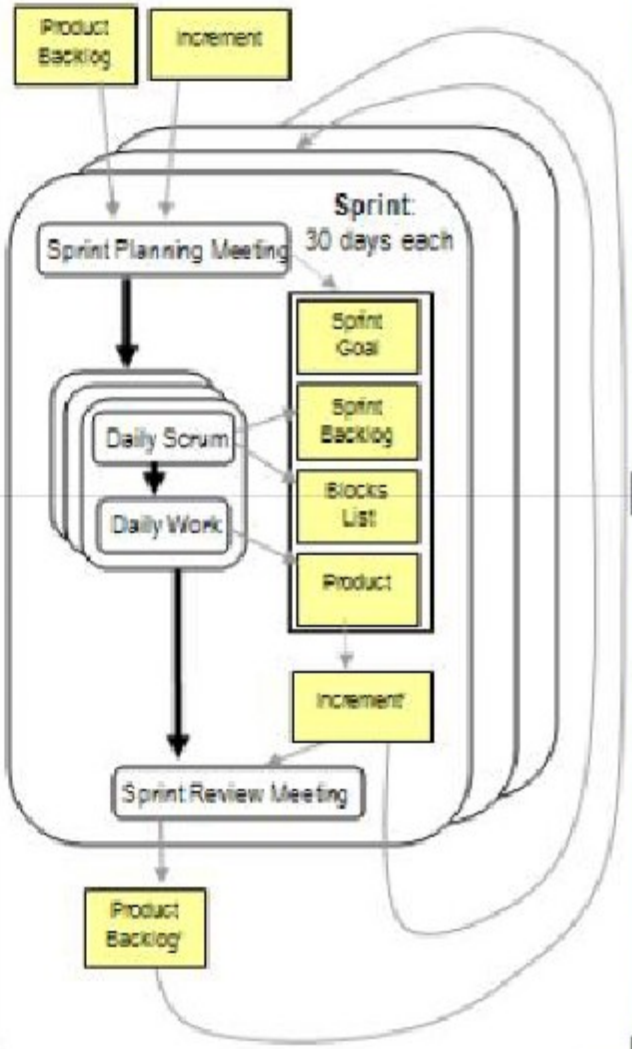
1. Select highest priority items in Product Backlog; declare Sprint Goal
2. Team turns selected items into Sprint Backlog

- Out: Sprint Goal, Sprint Backlog

### Daily Scrum
- Hosted by ScrumMaster
- Attended by all, but Stakeholders don't speak
- Same time every day
- Answer: 1) What did you do yesterday? 2) What will you do today? 3) What's in your way?
- Team updates Sprint Backlog; ScrumMaster updates Blocks List

### Sprint Review Meeting
- Hosted by ScrumMaster
- Attended by all
- Informal, 4-hour, informational
- Team demos increment
- All discuss
- Hold retrospective
- Announce next Sprint Planning Meeting

## Development Process



# Scrum Implementation

- *Communicate.* Sharing information creates visibility, better decision-making and a common understanding of shared goals
- *Empower the team.* Nothing is more powerful than a team that is in control of its own destiny – a team that thinks the only thing limiting what they can accomplish is how creative they are and how hard they work
- *Learn and improve.* Learning is about trying something, looking at the results and then improving
- *Deliver value early.* Build trust with people by prioritizing work, committing to deliverables and delivering them reliably

# Agile Implementation

- *Client.* The client must be constantly involved in the process
- *Requirements.*
  - Requirements must be captured at a high level
  - The team must accept the reality of requirements changes
  - Requirements must be prioritized and the 80/20 rule must be applied, i.e., 80% of the time will be spent on 20% of the features with more priority to the client
  - Requirements will include acceptance test that are written and verified by the client
- *Planning.* Planning is done at the beginning of each iteration based on estimates and velocity.
- *Coding.* Coding has to be done in pairs and code will be shared in a repository.
- *Testing.* Testing will be done early and integrated in the project lifecycle.

# GSD 2009

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**Software Engineering Process**

**Mobile / Global Team Spirit / End-to-end Tooling / Process / Developers, Developers… / Early Working Version of Software**

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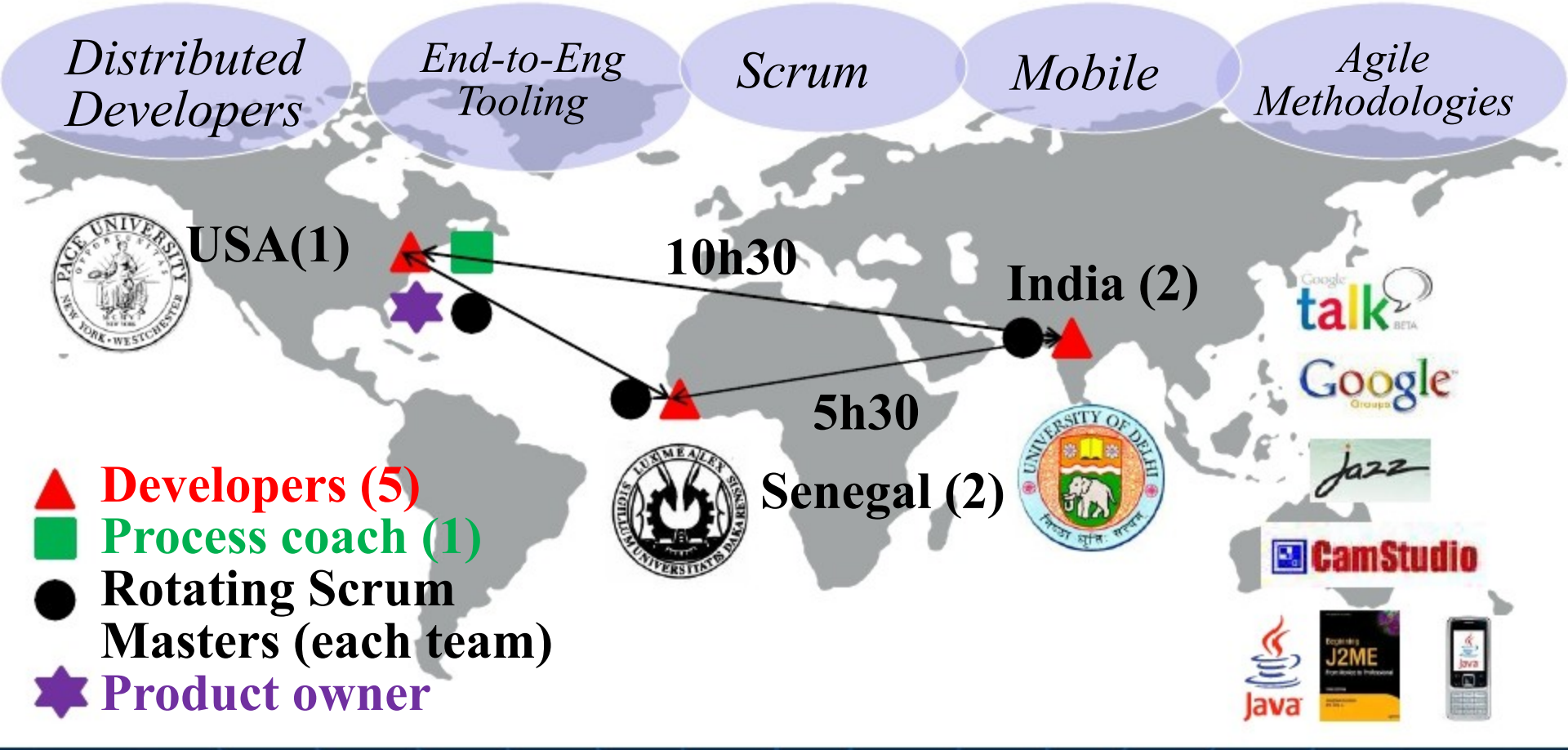
# Research Questions

- ***Role of the Process*** -- How well do Agile and Scrum practices support the work of distributed developers?

- ***Role of the Tooling*** -- How important is end-to-end tooling in supporting distributed developers using Agile and Scrum practices?

# GSD 2009 – Project Setting

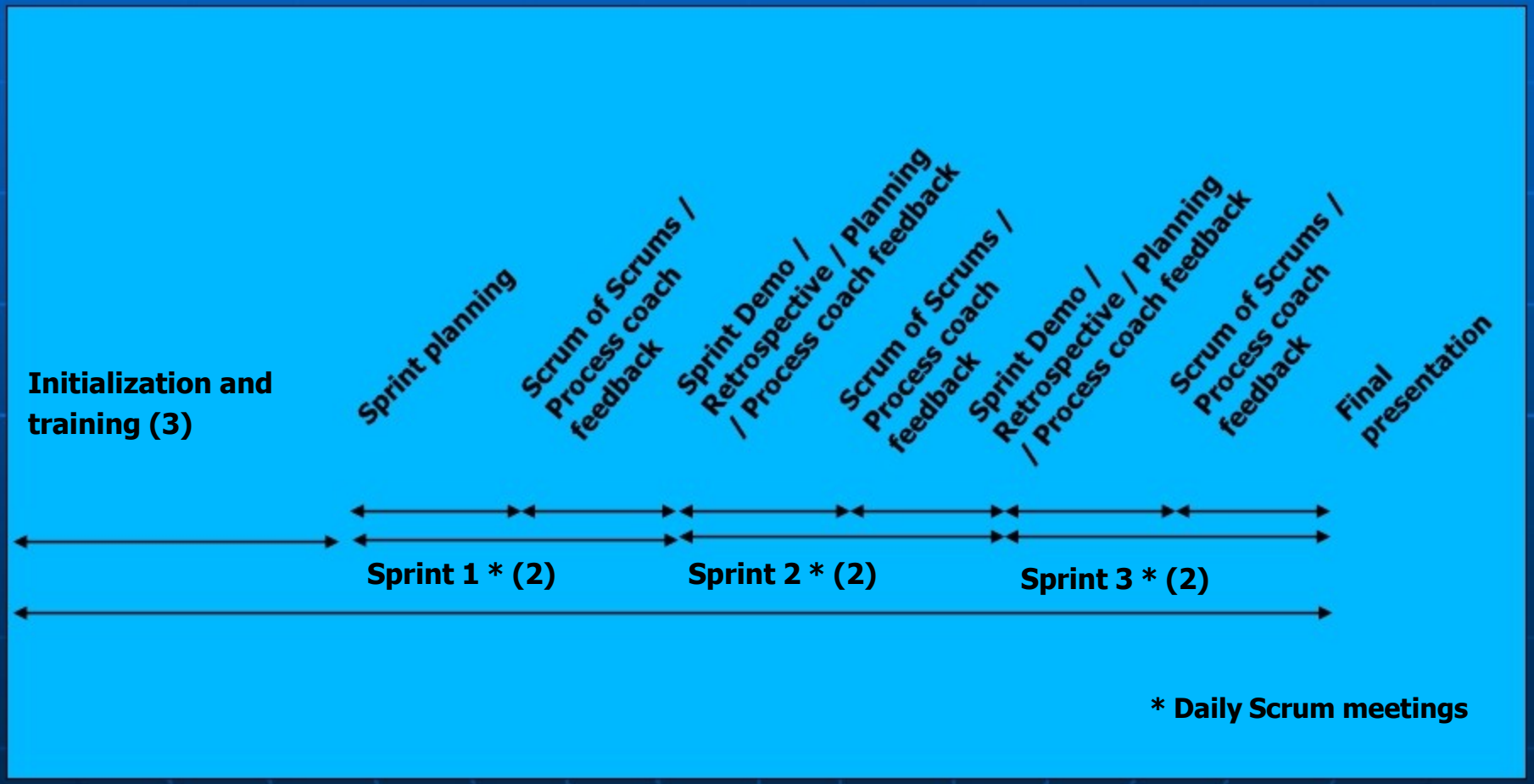


# Software Development Project

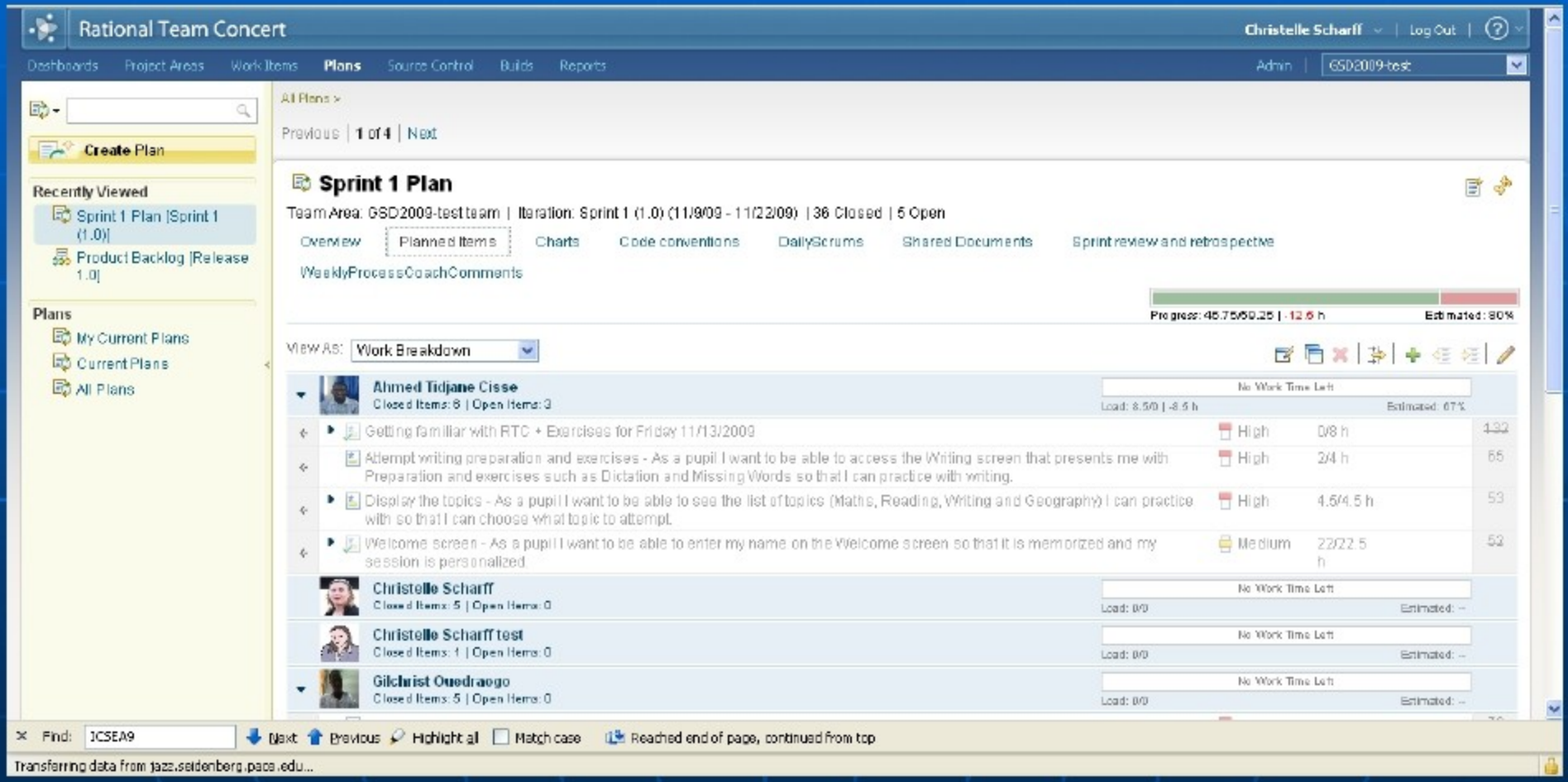
- **TargetFirstGrade – Product owner: Dr. Scharff**
  - Mobile application to assess the learning of pupils in first grade (5-6 year old) in topics such as Mathematics, Reading, Writing and Geography
  - To be used in large classes in the developing world
  - Delivery of exercises in the form of open-ended and multiple choice questions
  - Automated computation of the scores
  - SMS of the scores to the teachers and parents
  - Customization of the list of topics and problems by the teachers
  - English and French versions

*The Product Backlog of Target First Grade comprised 45 user stories – 18 high, 16 medium and 11 low priority user stories.*


# Scrum Implementation



# IBM Rational Team Concert



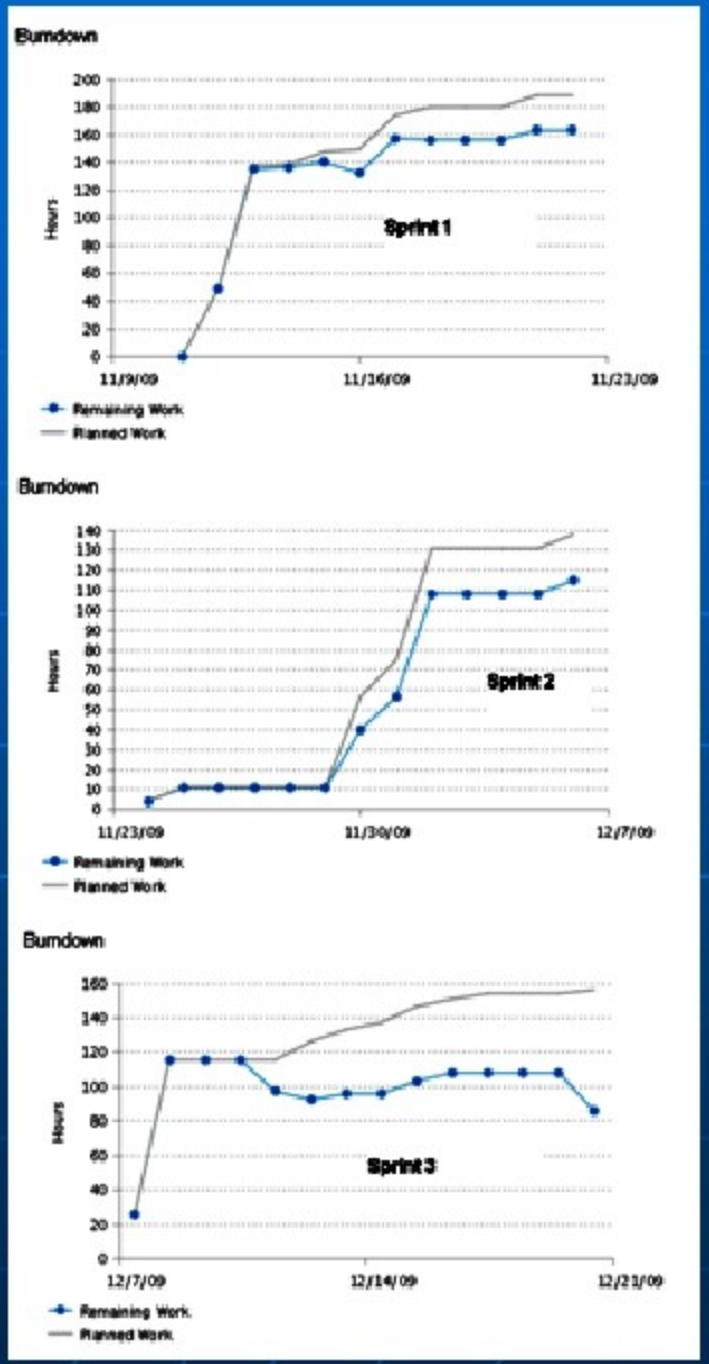
# Summary of Project Statistics

| Metrics | Sprint1 | Sprint2 | Sprint3 |
|---|---|---|---|
| Number of planned stories* | 10 | 18 | 18 |
| Number of stories Implemented by the Scrum Team and accepted by the Product Owner | 1 | 2 | 12 |
| Planned work hours* | 59.25 | 82 | 153.5 |
| Actual work hours done*<br>% of tasks estimated* | 46.75<br>80% | 77.5<br>75% | 67.5<br>75% |
| Tasks closed/Total number Of tasks*<br>Quality of planning* | 36/41 (88%)<br>73% | 43/63 (68%)<br>38% | 17/61 (28%)<br>70% |

**RTC DATA*

*45 USER STORIES*

# Burndown Charts for Sprints 1, 2 and 3



# Research Questions

- ***Role of the Process*** -- How well do Agile and Scrum practices support the work of distributed developers?
  - Increase transparency and awareness of the distributed team
  - Agile and Scrum require training and discipline
  - Time to factor for students to get familiar with Agile / Scrum
  - Crucial in the delivery of the final product
- ***Role of the Tooling*** -- How important is end-to-end tooling in supporting distributed developers using Agile and Scrum practices?
  - Crucial for team awareness and delivery of the final product
  - Per the participants, not possible without the end-to-end tooling

# GSD 2010

# Research Questions

- *Software Quality Assurance.* How well does quality assurance activities focusing on audits guide and augment adherence to Agile and Scrum?
- *Role of the Tooling.* How important is tooling in supporting quality assurance activities in a distributed setting where developers are using Agile and Scrum?

Quality

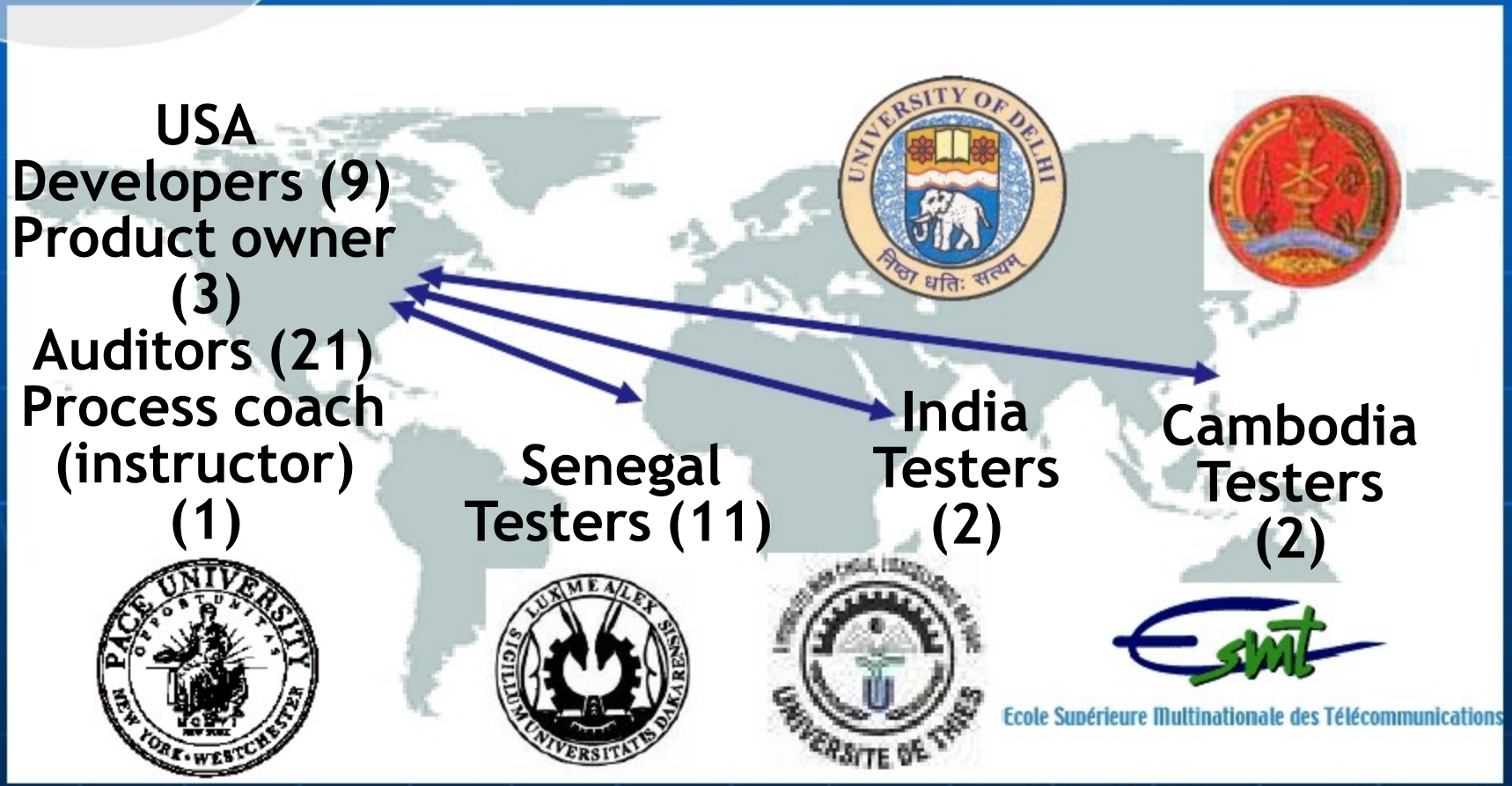
End-to-End Tooling

Scrum

Agile Methodologies

Mobile

# 2010




git redmine eclipse android RALLY Java Rational. Team Concert talk Google Groups

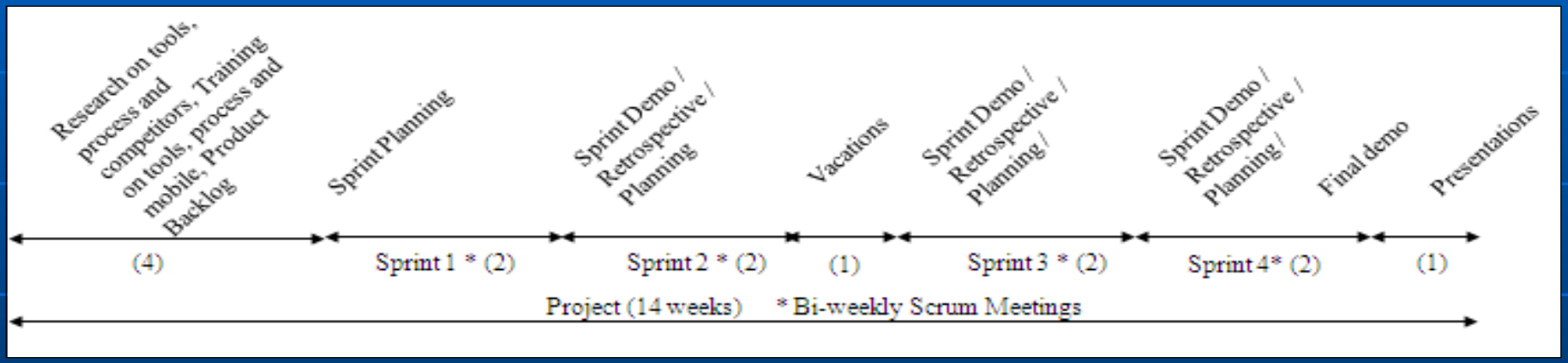
# Software Development Projects

- **Project1: No Ink** for Blackberry phones
  - Taking, annotating and organizing picture notes

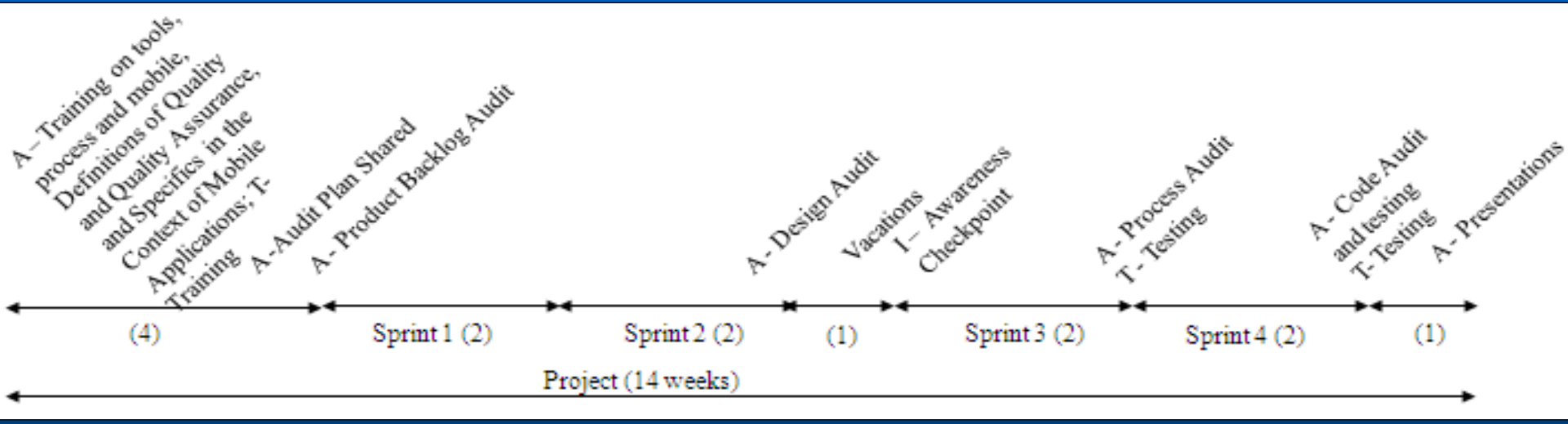
- **Project 2: Back Pocket** for feature phones
  - Budgeting for students

- **Project 3: Godiva Flash Cards** for Android phones
  - Social flash cards to revise class topics

# Scrum Implementation



# Quality Implementation



# Summary of Project' Statistics

Product Backlog and Process audits were amber, other audits were green

| | | Team1 | Team2 | Team3 |
|---|---|---|---|---|
| **Sprint 1** | **Planned / Actual Implemented US** | 9/7 | 7/6 | 4/3 |
| | **Planned / Actual Velocity** | 193/100 | 383/371 | 400/300 |
| **Sprint 2** | **Planned / Actual Implemented US** | 8/1 | 11/6 | 6/2 |
| | **Planned / Actual Velocity** | 152/49 | 215/131 | 392/140 |
| **Sprint 3** | **Planned / Actual Implemented US** | 8/8 | 7/4 | 5/5 |
| | **Planned / Actual Velocity** | 132/132 | 173/100 | 159/159 |
| **Sprint 4** | **Planned / Actual Implemented US** | 5/4 | 4/3 | 2/2 |
| | **Planned / Actual Velocity** | 142/94 | 173/160 | 80/80 |

# Research Questions

- *Software Quality Assurance.* How well does quality assurance activities focusing on audits guide and augment adherence to Agile and Scrum?
  - Auditors were “very useful” in pointing out issues developers had to work on
  - Auditors were particularly important in “keep[ing] developers on track”
  - Audits were perceived as checkpoints
  - Recommendations were not always integrated in a timely manner
- *Role of the Tooling.* How important is tooling in supporting quality assurance activities in a distributed setting where developers are using Agile and Scrum?
  - Very important to have access to evidence
  - The work of developers, auditors and testers was integrated in some of the tools

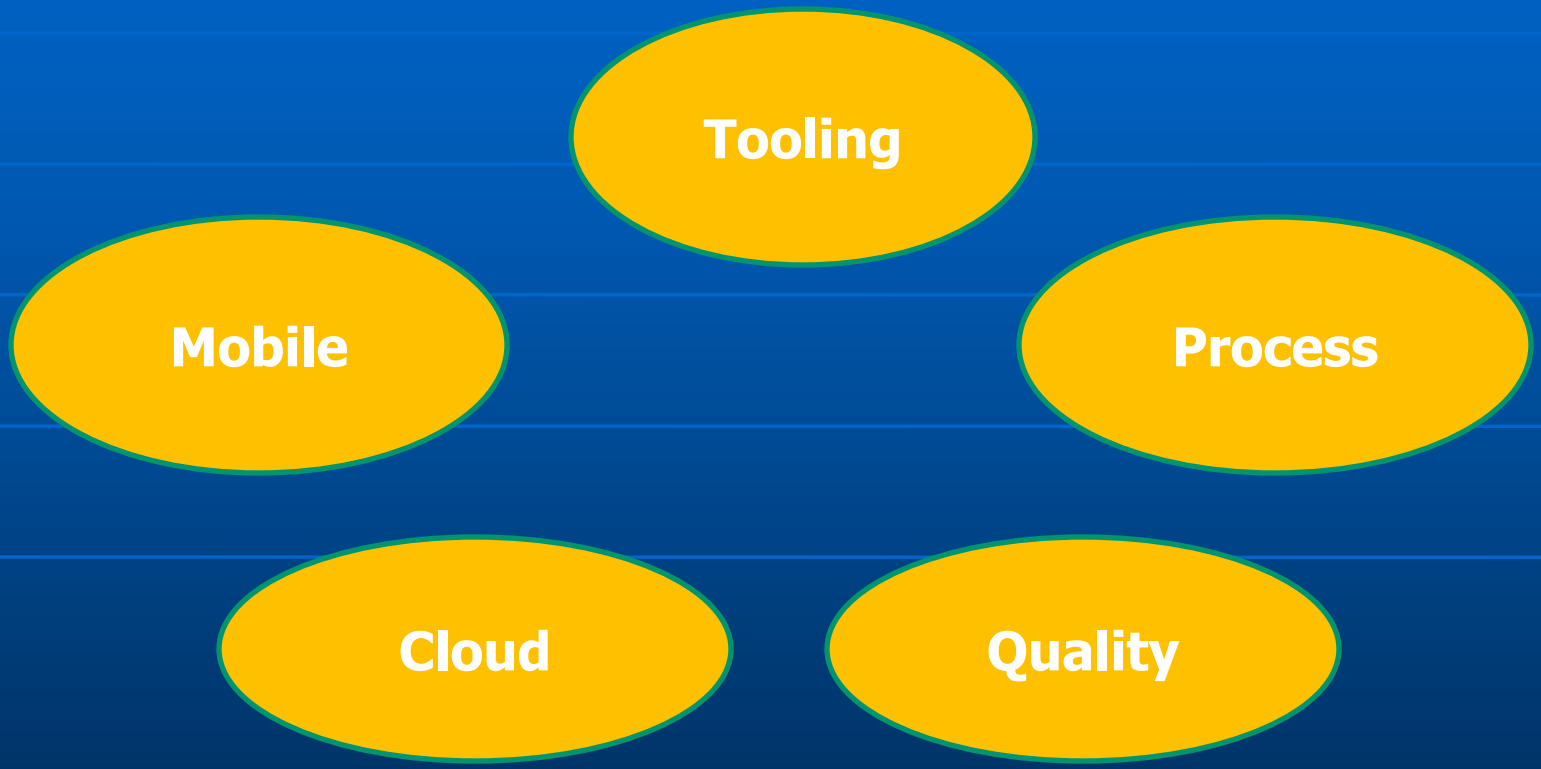
# Guidelines for Instructors

# Introducing Agile and Scrum in Students' GSD Projects

| | |
|---|---|
| **Planning** | Define a Scrum scenario – roles, artifacts and meetings<br>Involve an external professional certified Scrum Master and an external Product Owner<br>Select a real project<br>Identify the constraints and assess the risks<br>Select an end-to-end tooling infrastructure<br>Determine research objectives<br>Set-up data collection instruments<br>Prepare tutorials and evaluate students on their understanding of Scrum / Agile / tools prior to starting the project<br>Train students (e.g., XP game)<br>Have students sign an etiquette form |
| **Facilitating and Monitoring** | Organize a jumpstart meeting for the project<br>Organize socialization activities involving all team members<br>Facilitate Scrum meetings/retrospective/reviews<br>Monitor the Scrum artifacts and their updates<br>Mix synchronous and asynchronous communications<br>Have students be prepared for meetings and produce minutes after the meetings<br>Introduce external eyes as soon as possible<br>Take notes about what is happening on the project |
| **Reflecting** | Formally close the project with thanking the different actors involved<br>Summarize what went well on the project and what did not, and determine how to refine the model |

# Future Work

# Future Work



# Thanks

- All professors and students involved to date
- NCIIA
- IBM
- Pace University