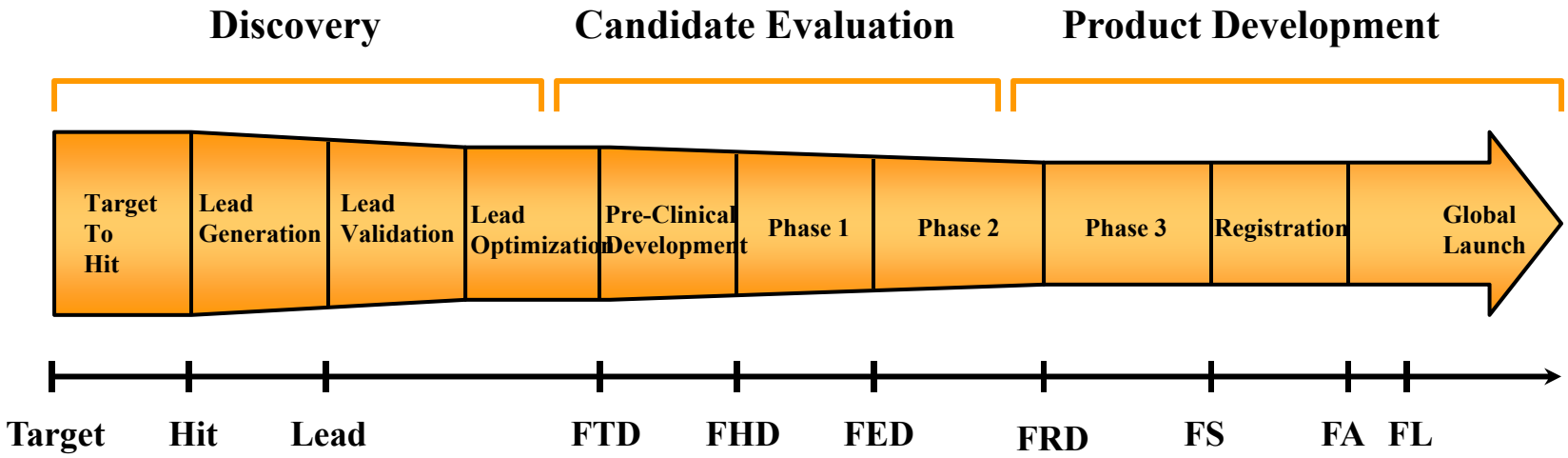
# Measuring Flow Rates for Projects in an R&D Portfolio: A Case Study

- Traditional Scorecards for R&D Performance
- Measuring Project Progress with Flow Rates
- A New Scorecard for R&D Performance
- Pros & Cons: Two years with the new scorecard

*Jay Andersen*
*Eli Lilly and Company*

# A Traditional Milestone Scorecard

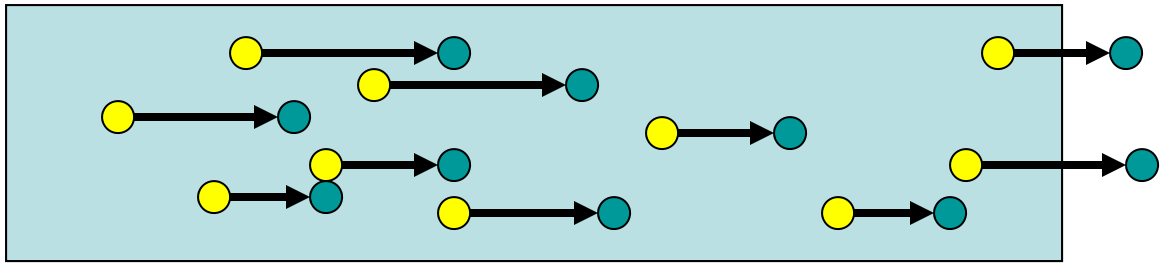
| Milestone | plan | YTD | % plan |
|---|---|---|---|
| Lead | 32 | 8 | 25% |
| First Toxicology Dose | 20 | 12 | 60% |
| First Human Dose | 8 | 4 | 50% |
| First Efficacy Dose | 6 | 3 | 50% |
| First Registration Dose | 3 | 0 | 0% |
| First Submission | 1 | 1 | 100% |
| First Approval | 2 | 1 | 50% |




*data are for demonstration purposes only*

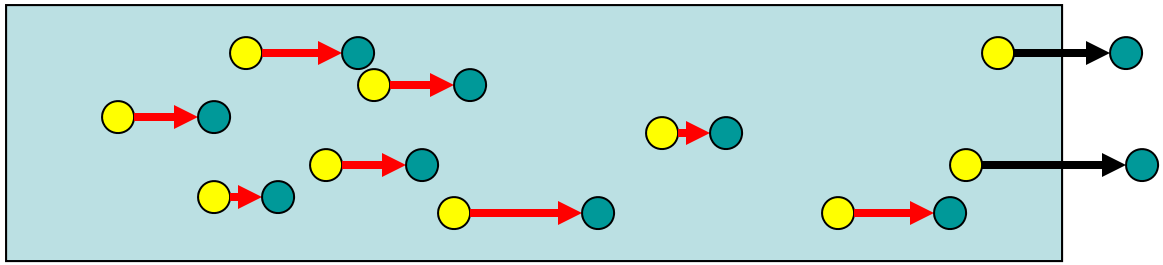
# A Traditional View of Portfolio Progress

Traditional views of portfolio progress have been 1-dimensional, and are usually restricted to counting positive milestones achieved. Consider the 10 projects in the stage of development in the diagram below. How would you measure portfolio progress?



*Start of Stage* *End of Stage*

Now suppose that in order to successfully deliver the two milestones on the right, resources were re-allocated from other teams, slowing them down. You've been able to deliver two milestones (congratulations), but now how would you measure portfolio progress?



*Start of Stage* *End of Stage*

Clearly, we need to develop a more <u>comprehensive</u> approach to measuring portfolio progress, that incorporates the movement of <u>all</u> projects within a stage.

# A More Comprehensive Approach to Measuring Portfolio Progress

A measure for Portfolio Flow should incorporate:

1. The number of projects
2. The speed of the projects
3. Whether progress is being made according to plan – cycle time slippage & accelerations
4. The likelihood of success
5. The relative value of the projects

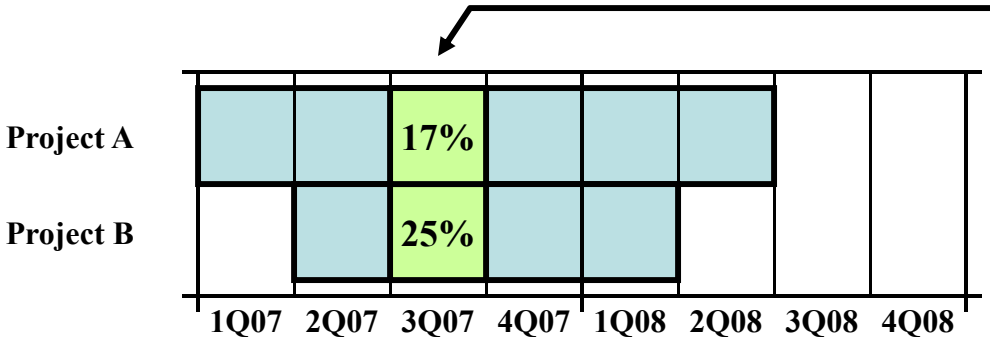
# Measuring Project Speed

## Project Speed

The fraction of the stage cycle time completed during a specific time period.

Speed Example:

- Project A has a stage cycle time of 6 quarters.
- Project B has a stage cycle time of 4 quarters.



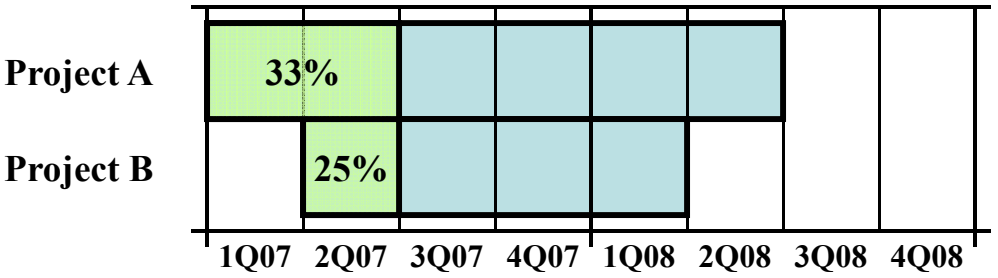

During 3Q07, Project A completed 1 of its 6 planned quarters (17%), whereas project B completed 1 of its 4 planned quarters (25%).

speed of A = 0.17
speed of B = 0.25

# Dealing with Changes to Forecasted Milestone Dates

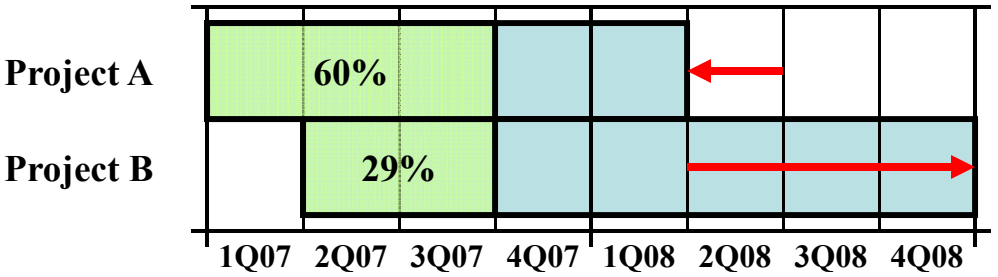
Timeline Change Example: At the beginning of 3Q07,

- Project A had completed 2 of its 6 quarters (33% done).
- Project B had completed 1 of its 4 quarters (25% done).




By the end of 3Q07:

- Project A accelerates its timeline by 1 quarter
- Project B's timeline slips by 3 quarters

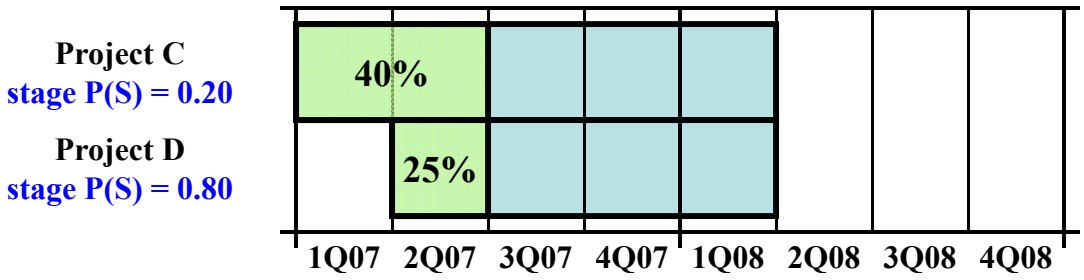



During 3Q07, Project A completed an incremental 27% of its plan (60% - 33%), whereas project B completed an incremental 4% of its plan (29% - 25%).

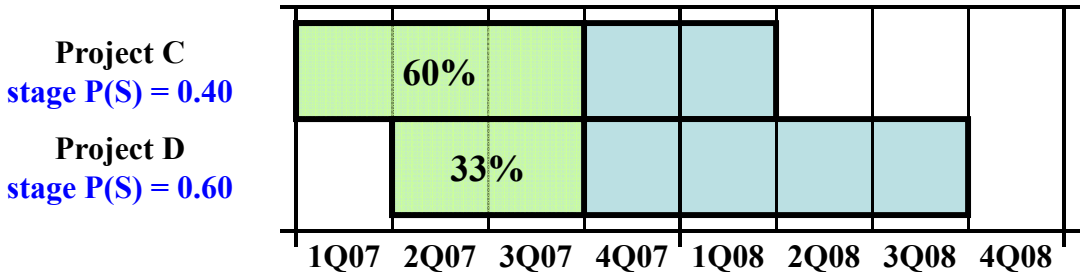
speed of A = 0.27
speed of B = 0.04

# Contribution to Flow

A project's contribution to flow can be measured by combining a project's speed with its probability of successfully completing its current stage of development.




During 3Q07, Project C completed 1 of its 5 planned quarters and its stage probability increased by 0.20; project D completed 1 of its 4 planned quarters, but added 2 Qs to its timeline and its stage probability decreased by 0.20.




Flow for C

= 0.60*0.40 – 0.40*0.20

= 0.24 – 0.08 = **0.16**

Flow for D

= 0.33*0.60 – 0.25*0.80

= 0.20 – 0.20 = **0.00**

# Assembling the data into the Flow Scorecard

An example of how the portfolio data are used to assemble the Flow Scorecard metrics for the FHD to FRD stage (phase 1 & phase 2 projects).

| project | % done on 1/1 | % done on 3/31 | 1Q09 speed | P(FRD) on 1/1 | P(FRD) on 3/31 | 1Q09 flow | Relative Value | 1Q09 VA-flow |
|---|---|---|---|---|---|---|---|---|
| **Project A** | 60% | 70% | 0.10 | 0.60 | 0.60 | 0.06 | 0.50 | 0.03 |
| **Project B** | 60% | 65% | 0.05 | 0.40 | 0.48 | 0.07 | 0.10 | 0.01 |
| **Project C** | 20% | 35% | 0.15 | 0.40 | 0.40 | 0.06 | 1.50 | 0.09 |
| **Project D** | 80% | 70% | -0.12 | 0.75 | 0.60 | -0.18 | 1.00 | -0.18 |
| **Project E** | 90% | 100% | 0.10 | 0.80 | 1.00 | 0.18 | 0.80 | 0.14 |
| ⋮ | *Summed over all projects in the FHD to FRD portfolio* | | | | | ⋮ | | ⋮ |
| **Total for Scorecard** | | | | | | 3.02 | | 2.85 |
| **Flow Targets** | | | | | | 2.50 | | 2.50 |

# 1Q09 R&D Flow Scorecard
# Throughput Flow Rates

## New Molecular Entities

| | Target | Actual |
|---|---|---|
| Target to Lead | 20.0 *Leads per year* | 13.2 |
| Lead to FHD | 10.0 *FHDs per year* | 12.1 |
| FHD to FRD | 2.5 *FRDs per year* | 2.1 |
| FRD to Launch | 1.5 *Launches per year* | 1.0 |

## New Indications/Line Extensions

| | Target | Actual |
|---|---|---|
| pre-FRD | 3.5 *FRDs per year* | 3.2 |
| FRD to Launch | 2.0 *Launches per year* | 2.3 |

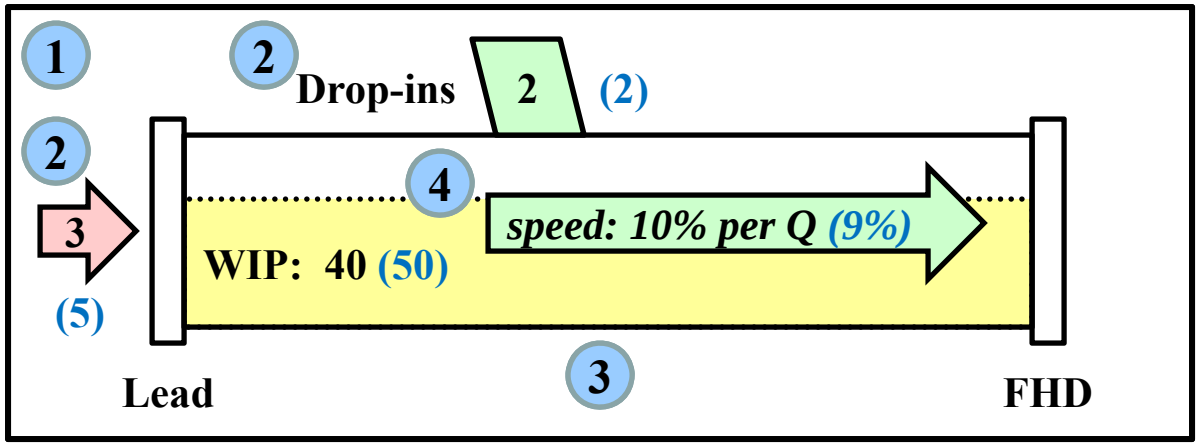
A **Pipeline Metaphor Map** is now used to provide clearer insight into the flow rates in the individual stages of development. For illustration purposes, the Lead to FHD portfolio for 1Q09 will be used in the following example.

**1**

Begin with a diagram of an empty pipe. The beginning of the pipe represents Lead, the end represents FHD. Molecules in this stage of development will be represented as liquid moving from one end of the pipe to the other.

**2**

Add in the two ways that projects can enter the pipe, either as a Lead or as a drop-in. There were 3 Leads and 2 drop-ins. The number of Leads was well short of the quarterly targets (in blue text), so the Lead arrow is colored red.




| value | color |
|---|---|
| beat target | green |
| within 70% of target | yellow |
| lower than 70% of target | red |

**3**

Add in the Lead to FHDWIP. There were 40 molecules in the portfolio at the end of 1Q09. It's short of the target of 50, so the water level is a bit low and the color of the water is yellow.

**4**

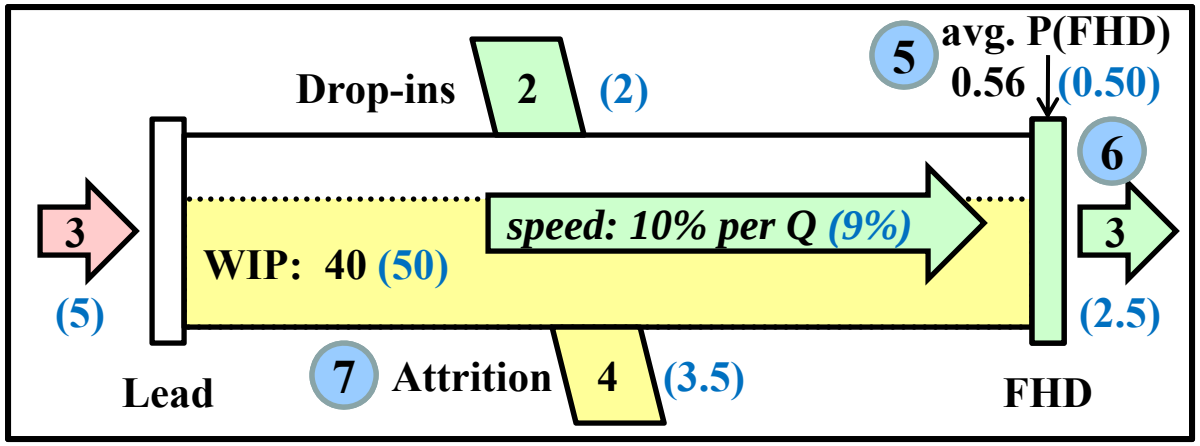
These 40 molecules were moving at an average speed of 10% per quarter. That is, it would take 10 quarters (2 ½ years) on average to go from Lead to FHD. This beats the goal of 9%, so the speed arrow is colored green.

OK, so we have 40 molecules moving at a good average speed. But can they make it through to the next stage of development? That is where the P(FHD) comes in. On the Metaphor Map, this will be represented as the screen at the FHD end of the pipe. The coarser the screen, the higher the probability. The finer the screen, the lower the probability.

**5**

The average P(FHD) for these projects is 0.56. This also beats our goal of 0.50 so the screen, too, is colored green.

Let's recap. At the end of 1Q09, there were 40 molecules in the Lead to FHD portfolio, moving at an average speed of 10%, with an average throughput probability of 0.56. If we can keep this up, quarter after quarter, it will translate into an average flow rate of about 10.1 FHDs per year. But these are not the only contributors to 1Q09 flow.




**6**

There's also the 3 molecules that achieved FHD and "graduated" to the next stage of development. Factoring in their speed and jump in probability, they contributed at a rate of 3.5 FHDs per year.

**7**

Then there's the 4 NMEs that were terminated. This is less than 30% higher than the attrition expectation, so we color the drain yellow. Factoring in their position & drop in probability, this siphoned off flow at a rate of 1.5 FHDs/year.

Therefore, the overall flow rate for 1Q09 was 10.1 + 3.5 – 1.5 = **12.1 FHDs/year**. That exceeds the flow target of **10 FHDs/year**. We can now mark it down to quick projects with high throughput probability.

# Flow Scorecard - Enabling behaviors to support increased productivity

- Teams – What can we do to:
  - Increase the speed of the program?
  - Increase the probability of the program?
  - Enhance the value proposition of the program?
- Governance – How can we select projects, approve plans, and provide guidance that will result in:
  - Shorter cycle times?
  - Higher probabilities?
  - Higher value?

# Scorecard Pros & Cons

| Milestone Scorecard | Flow Scorecard |
| --- | --- |
| • Not all projects are counted.<br>• Ignores in-year delays and accelerations.<br>• All projects are counted the same.<br>• Very easy to understand. | • All projects contribute to the scorecard.<br>• Tracks delays & accelerations.<br>• Incorporates likelihood of success and value.<br>• Not as easy to understand – the metric is a rate. |