Best Practices
of
Top-Gun Engineering Managers

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Shannon Johnston—Sr. Director, Services & Support, Numetrics

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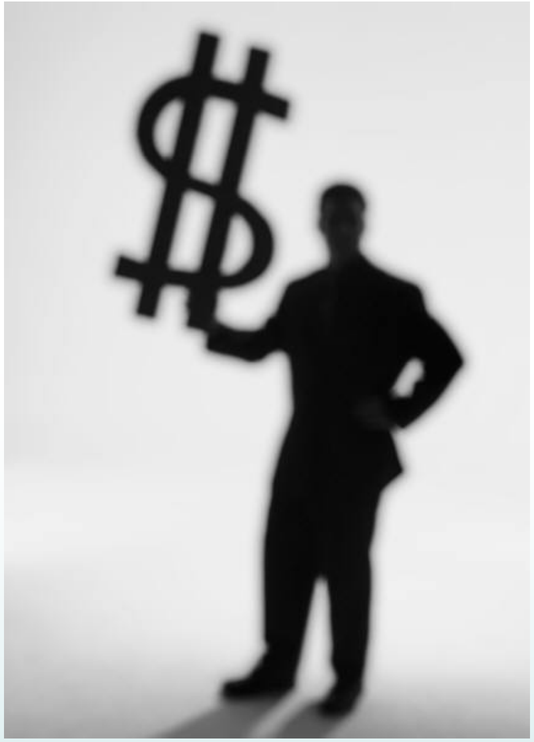
Agenda

- Introduction
- Eight Best Practices (20 minutes) – Alex Silbey
- Demonstration (20 minutes) – Shannon Johnston
- Q & A (15 minutes) – Alex and Shannon

Profile of “top-gun” IC engineering managers

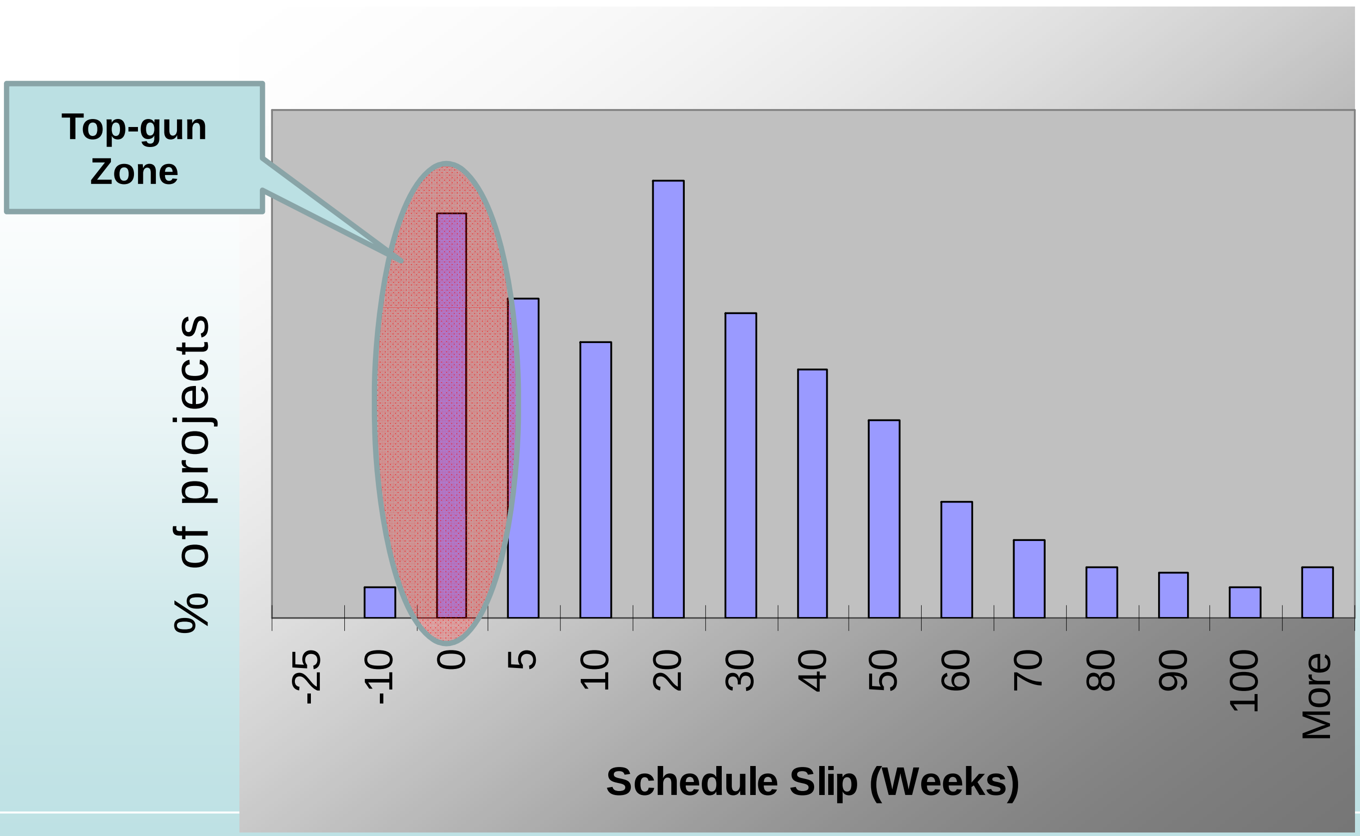
- Top-gun IC managers increase project performance over industry norms
  - 119% better project productivity
  - 40% shorter design cycle times
  - 50% fewer re-spins
  - 50% less schedule slip



- Better project performance translates directly into increased competitiveness

Schedule predictability—a candid view

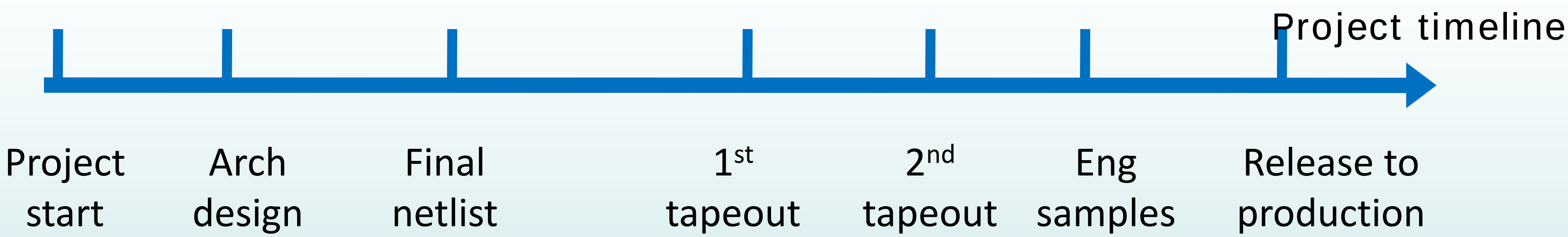
- 60% of IC projects slip at least one quarter
- 16% of IC projects slip more than one year



Lessons derived from extensive data analysis (NMX IC industry database)

Where Top-guns Operate

- Top-gun managers use best practices throughout the project life cycle
- We define project duration from architectural description to release-to-volume



1: Compute IC complexity statistically

Chip Description

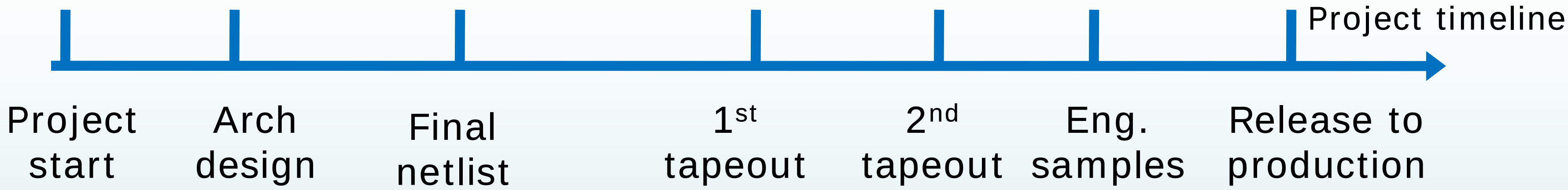
Complexity Calculation Engine

Industry Norm Effort

A systematic method for calculating complexity calculation is essential

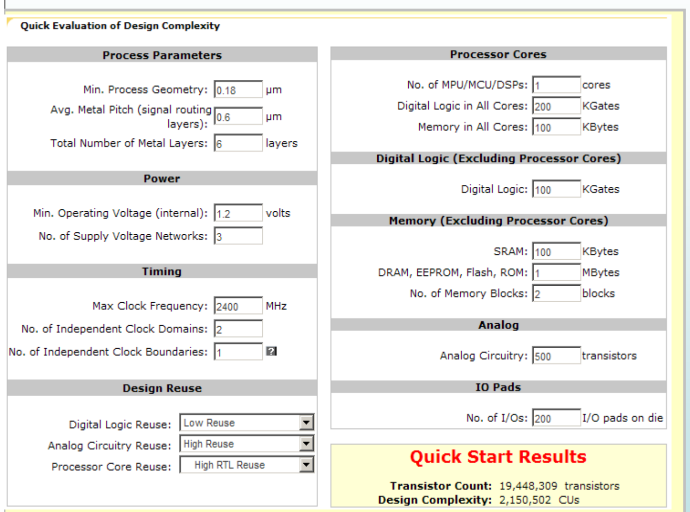
Best-practices throughout project

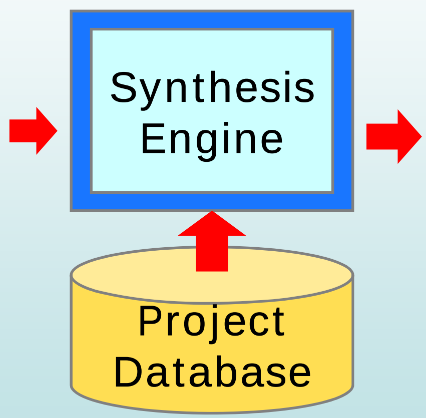
1 Accurately compute project complexity

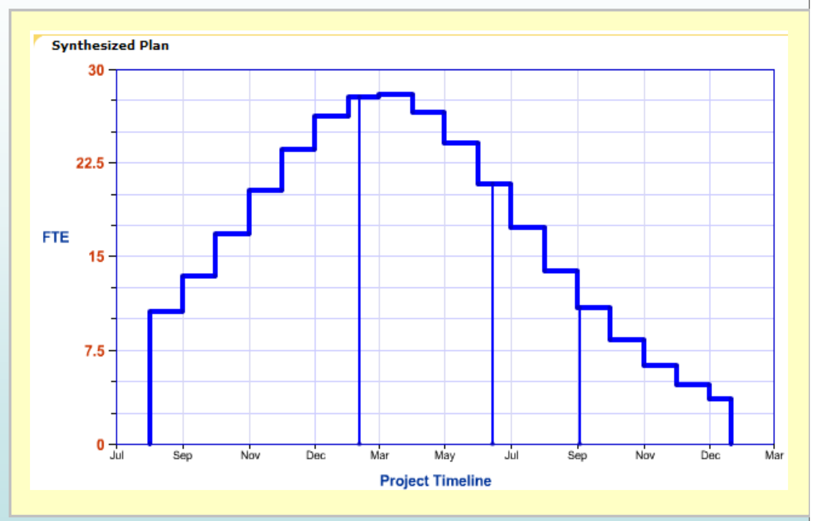


2: Estimate resources and schedule—based on models

- Accurately estimating project's resources and schedule requires statistical models
- Models help guide intuition and experience

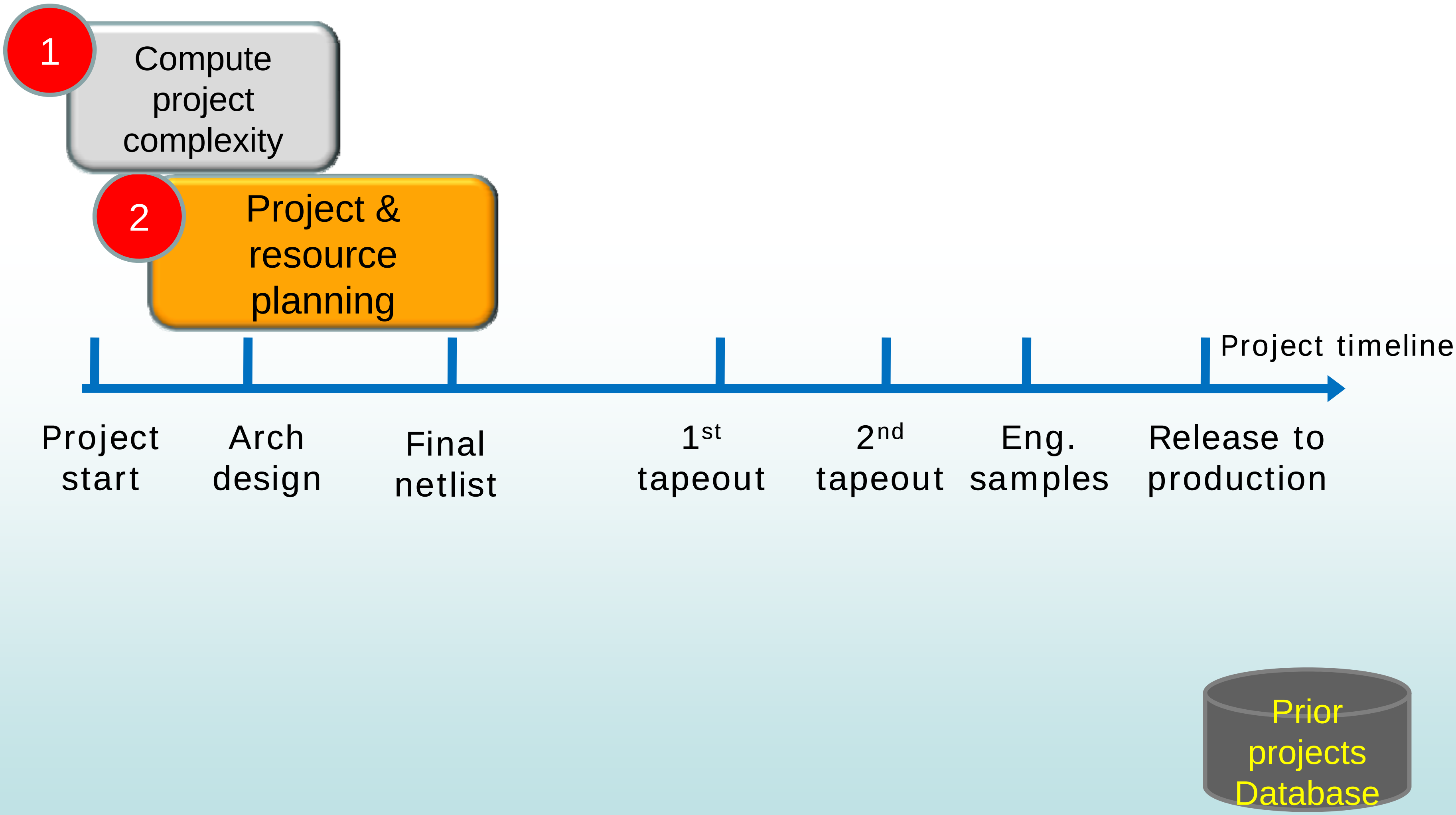






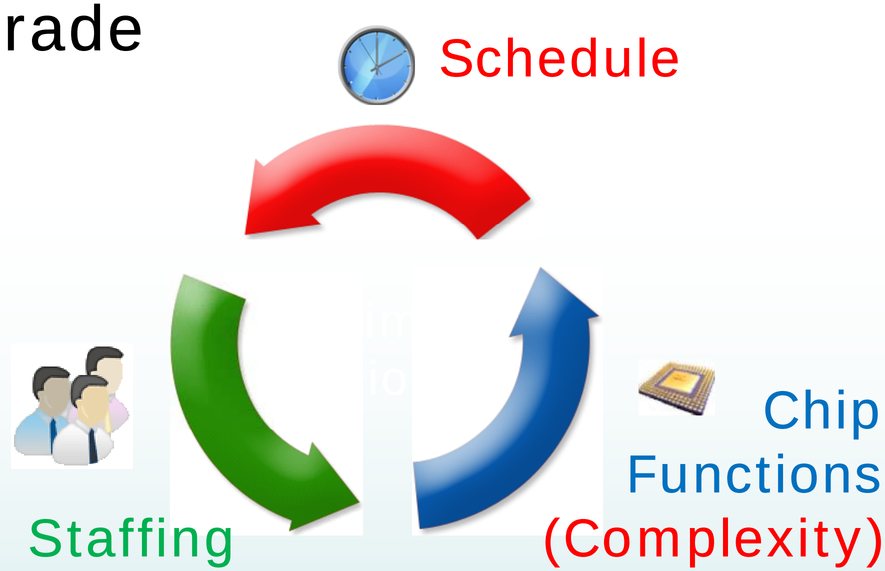
Synthesized Plan Staffing Profile & Timeline

Best practice: resource planning based on models & data



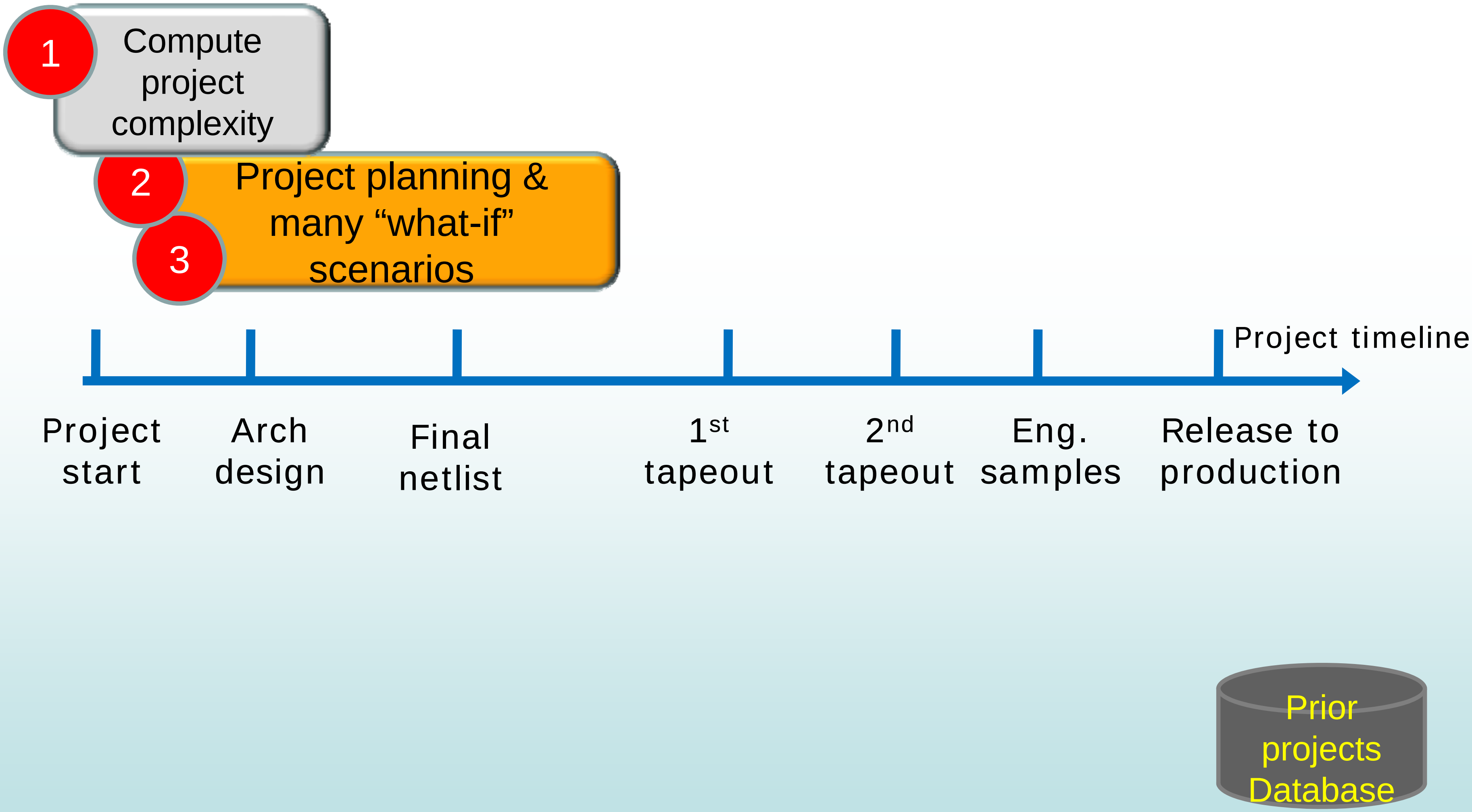
3: Rigorously perform “what-if” scenarios for schedule/resource optimization

- Tools must accurately trade off between project constraints



Ability to generate several scenarios very early in cycle, before settling on one, is extremely powerful

Best practice: do several “what-if” scenarios

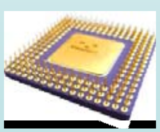


4: Benchmark project execution assumptions

- Benchmark project execution assumptions against your own history and industry data
- Compute your schedule risk given IC complexity, resources allocated and cycle time

Inputs

Manager's Staffing & Schedule



Chip Description

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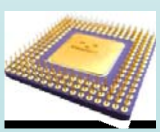
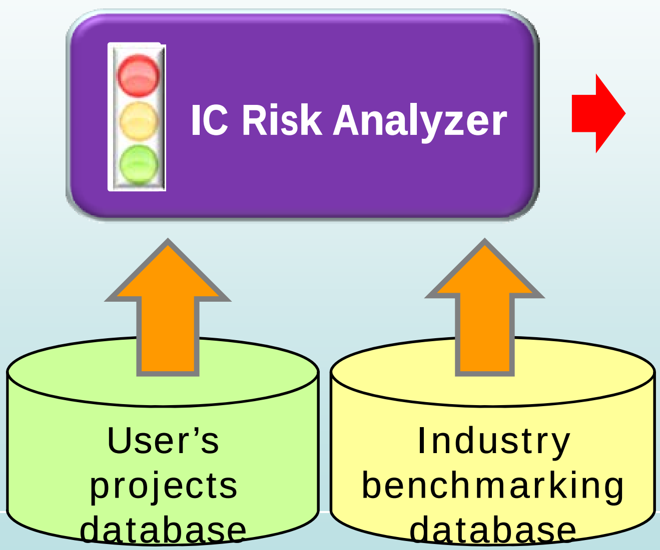


Chip Description

Risk Analysis



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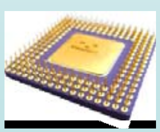

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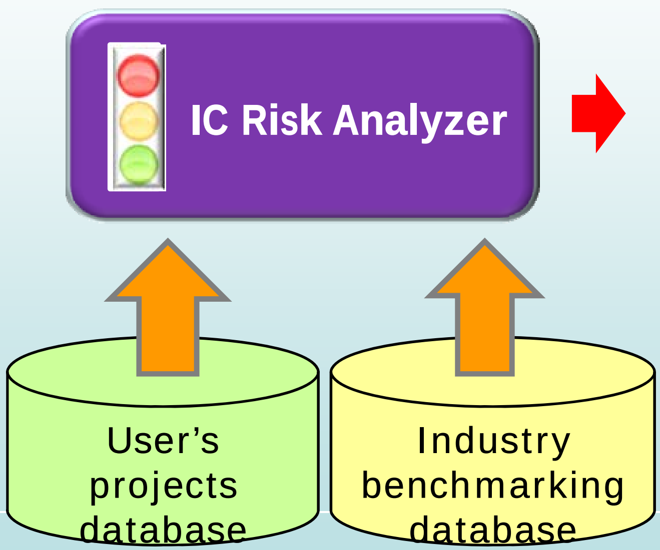
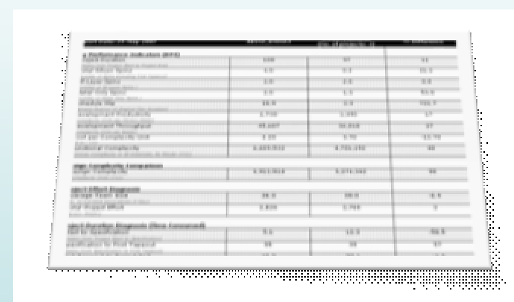


Automated Risk Reports



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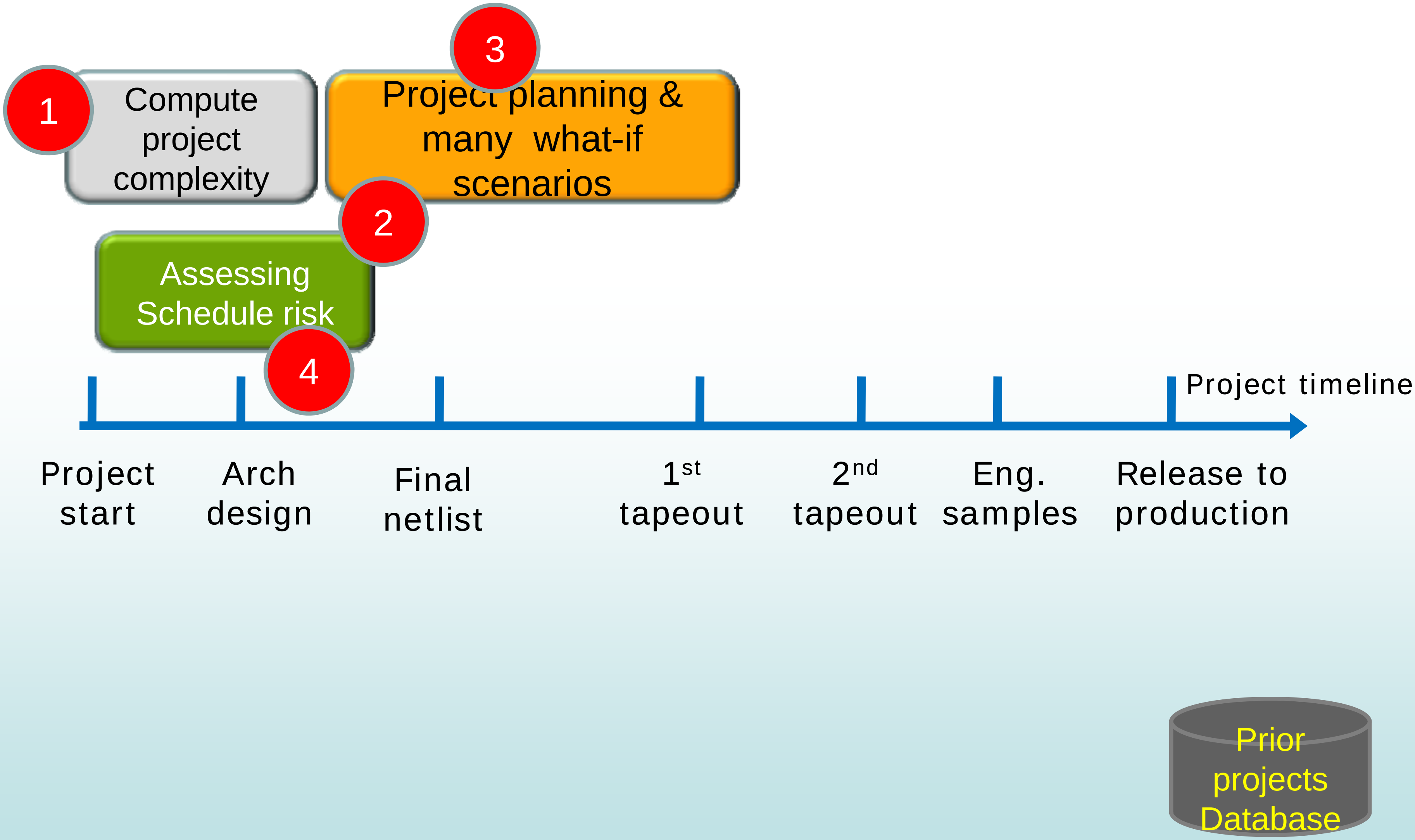
Best practice: benchmark project plan assumptions to compute project risk



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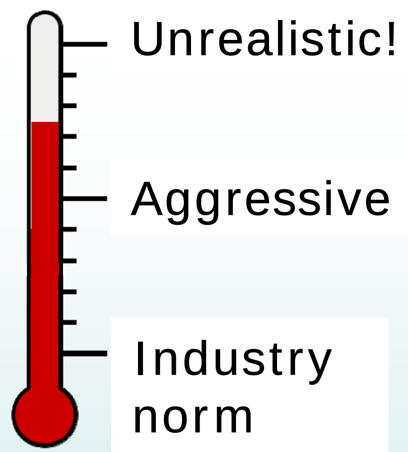
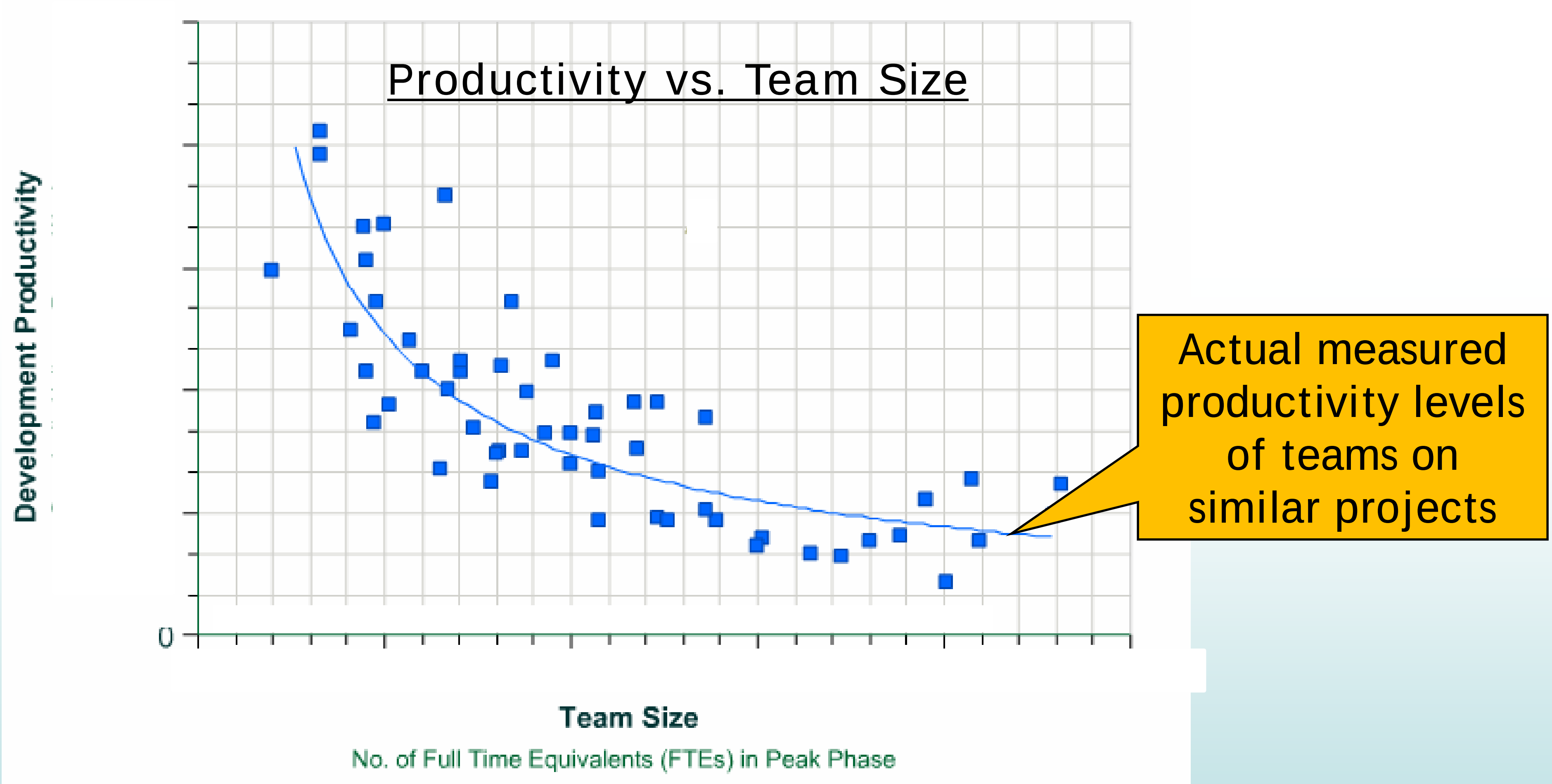
5: Determine <u>most</u> aggressive, *yet achievable*, project plan

- Manager must know what is the highest achievable productivity of his/her team
  - Quantitative
  - Accurate
  - Reliable



Your Project Plan

Do you know how risky your plan is?



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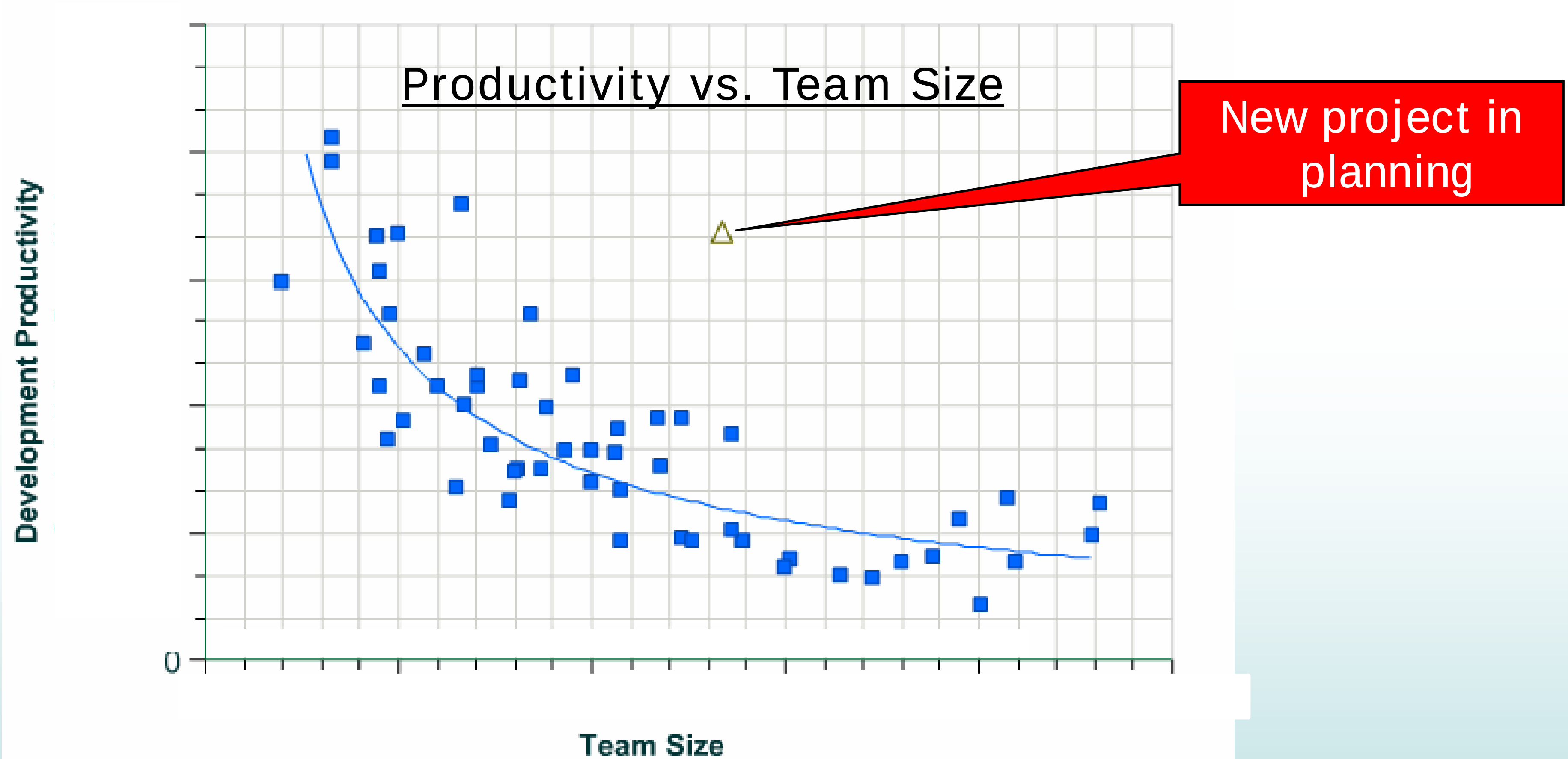

Benchmark assumed productivity in your bottom-up plans

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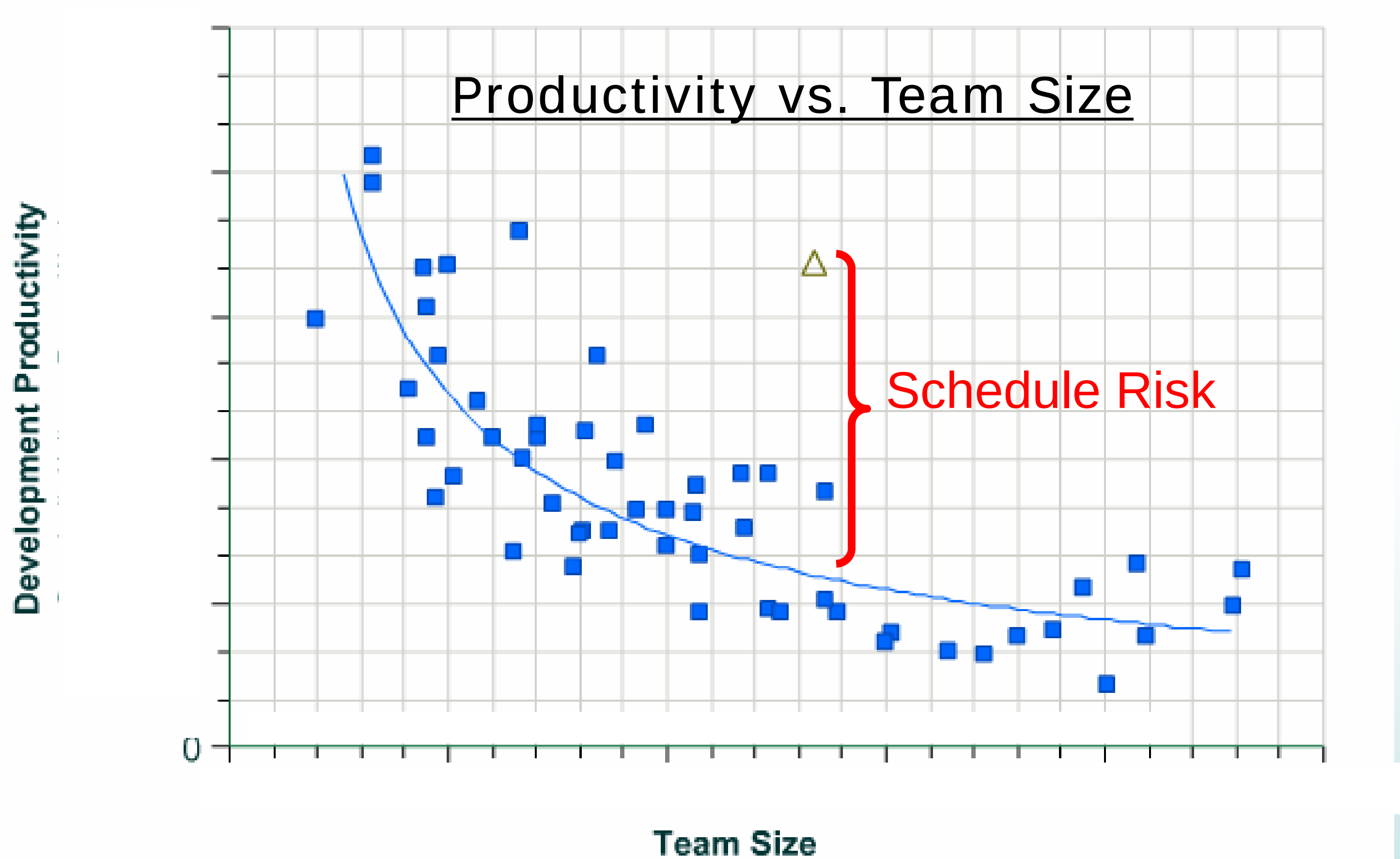
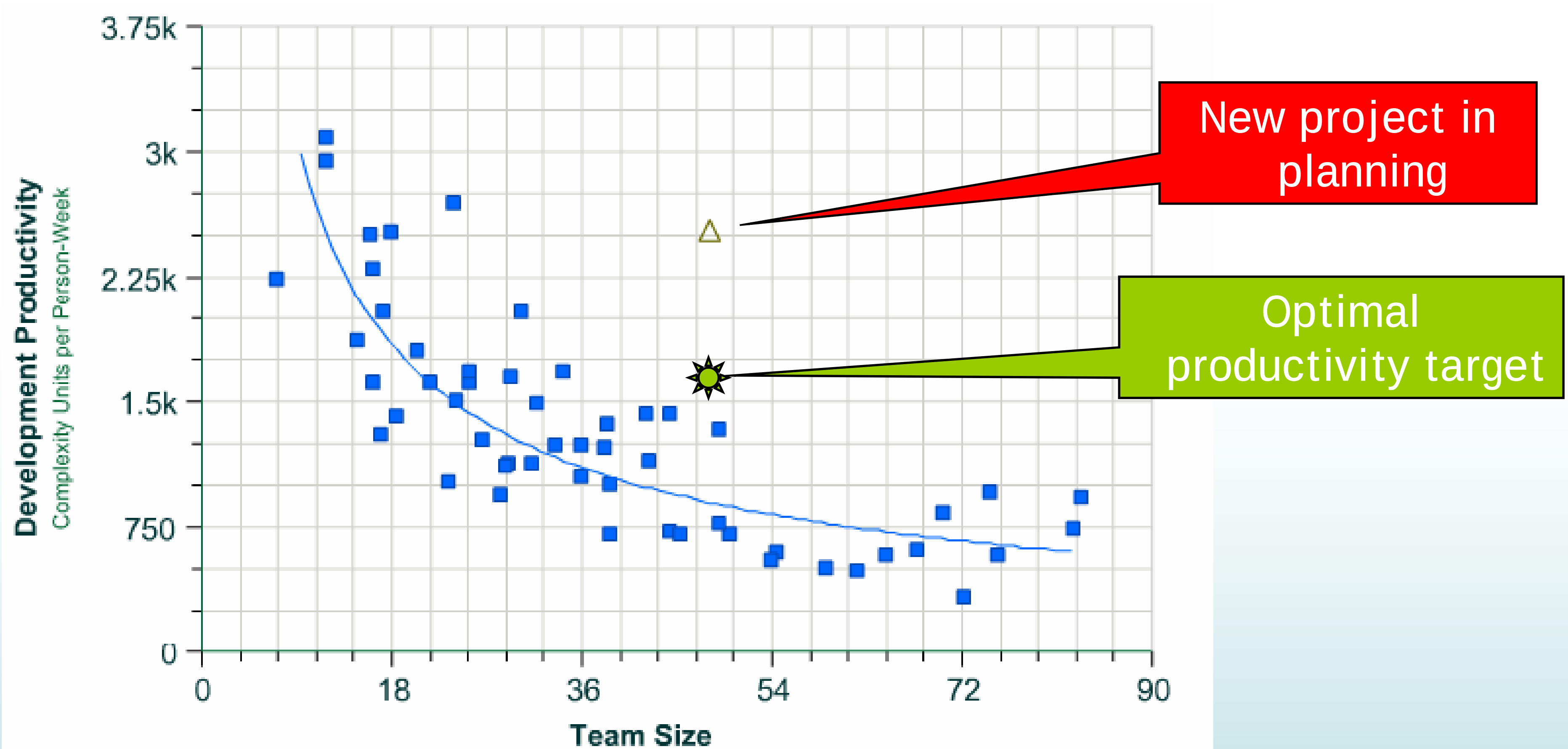


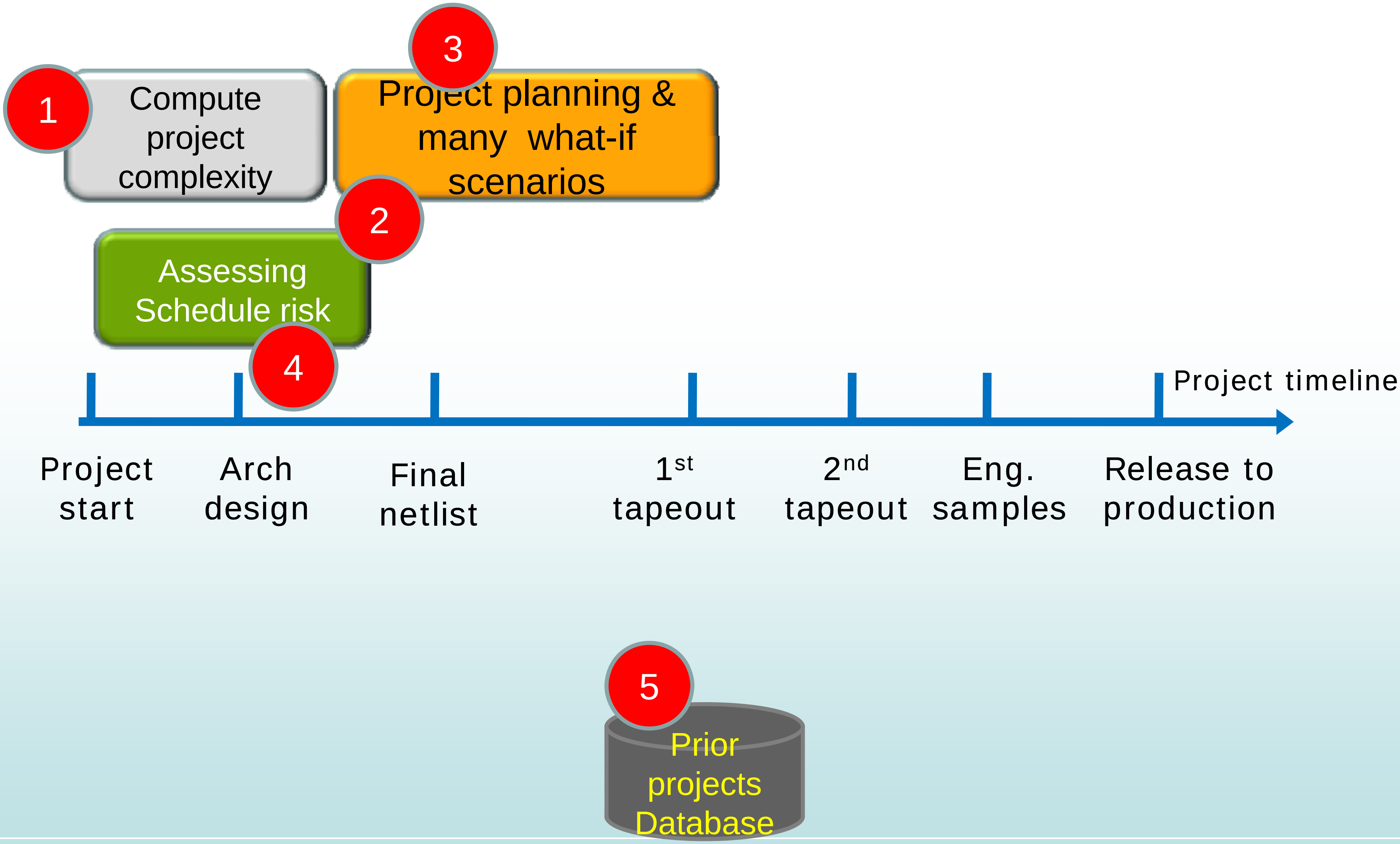
Benchmark assumed productivity in your bottom-up plans

Optimal target: Stretch but don't break



Achieve productivity excellence

Best practice: most aggressive *yet achievable* plan based on database & models

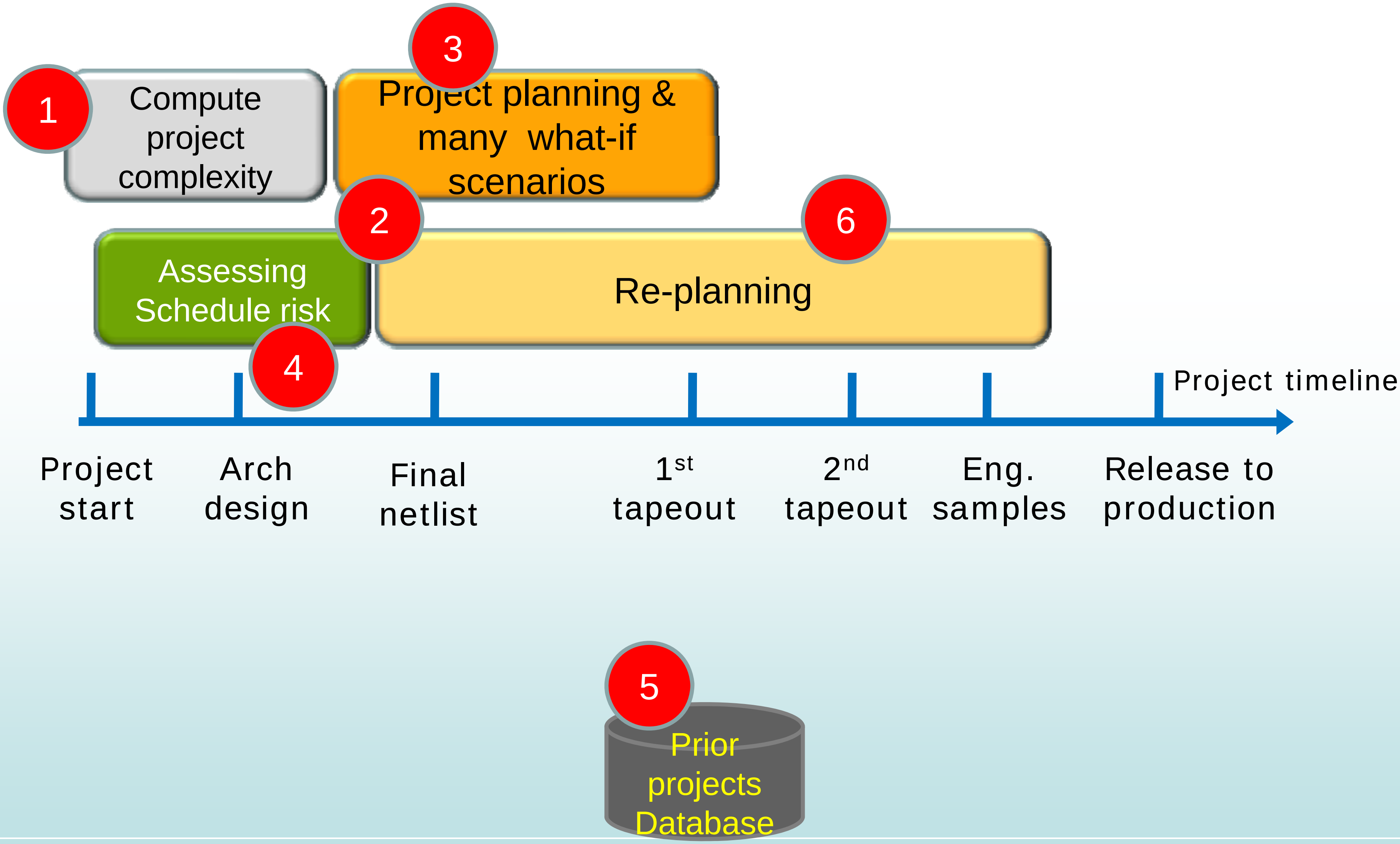


6: Quantitatively assess schedule/resource impact of each feature request

- Changes are inevitable
- Re-planning requires a rational discussion of the impact of changes

Compute cost of each request in terms of schedule slips or resources by project phase

Best practice: re-plan based on computed impact

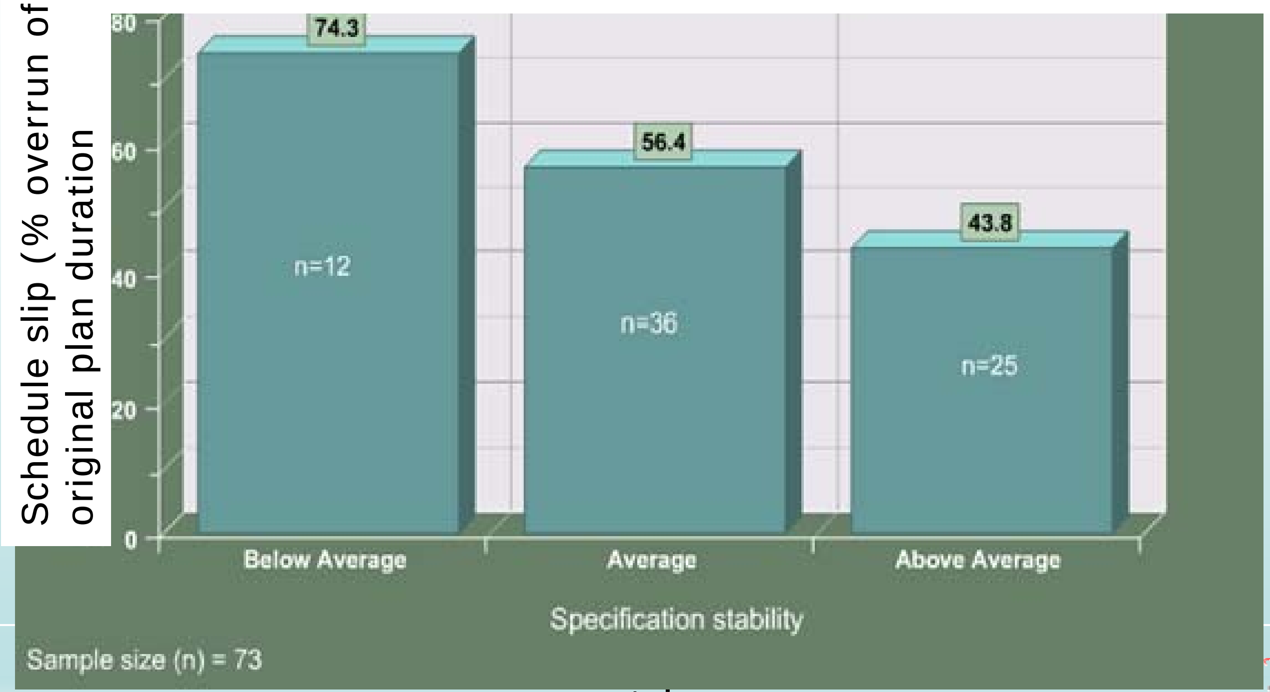


7: Perform root-cause analysis

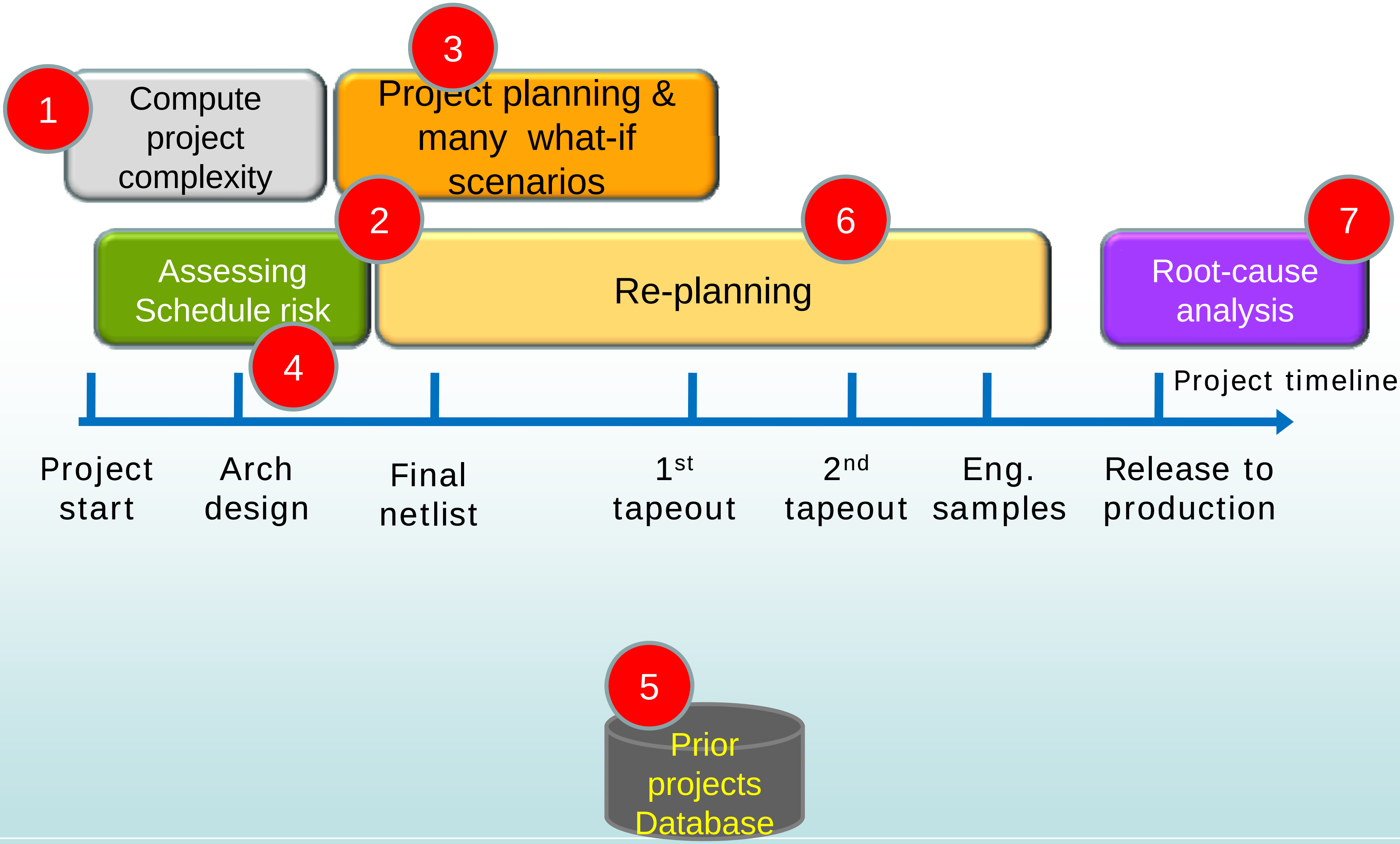
- Store and organize data from prior projects
- Mine data and extract insight

Example of mining the impact of spec stability on schedule slip

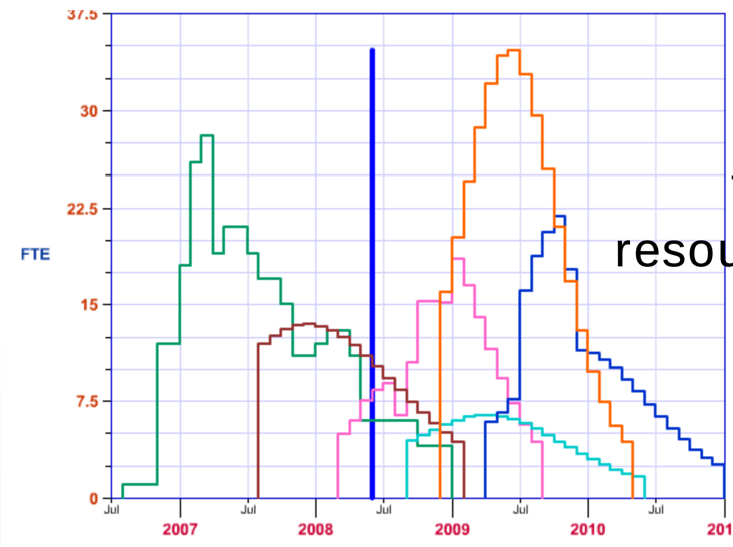
Schedule slip vs. spec stability



Best practice: rigorous root cause analysis



8: Foresee resource shortfall across pipeline



Total resources

today

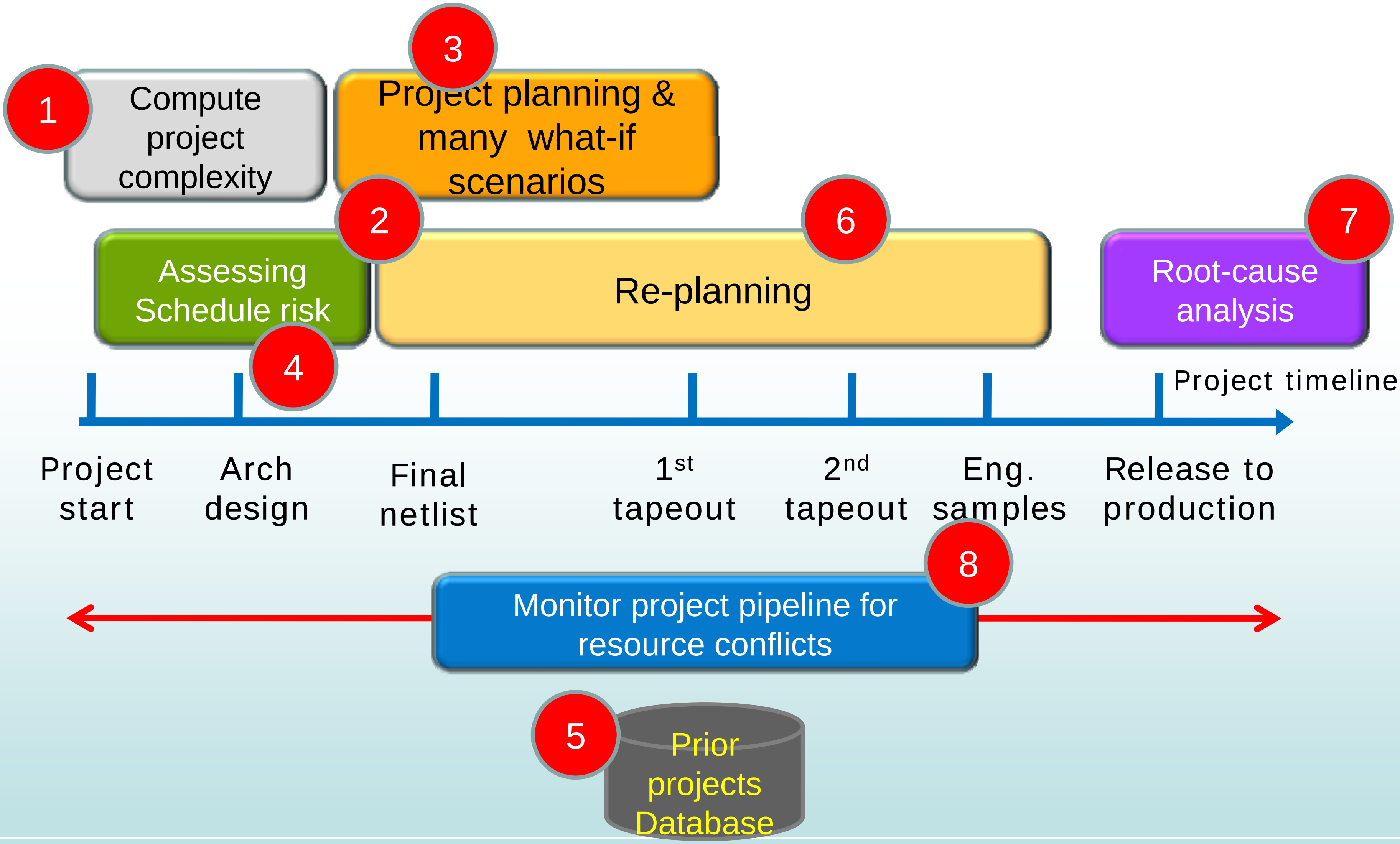
Identifying and Resolving Resource Conflicts

Several projects creating resource crunch 6 months out

	Role	Available FTEs	Peak Demand Original	Peak Demand Optimized	Tolerance	b-09	Mar-09	Apr-09	May-09	Jun-09	Jul-09	Aug-09	Sep-09	Oct-09	Nov-09	Dec-0
☐	Analog Designer	5.6	5.5	5.5						14%	99%	91%	75%			
☐	Concept Design Engineer	20.0	18.9	18.9		%	30%		8%	20%	15%	10%	6%			
☑	Gate Level Designer	8.0	10.2	10.2	2.0	%	80%	80%	80%	102%	60%	60%	67%	81%	14%	
☐	Generic Role	9.0	20.3	20.3	12.0	%	61%	66%	72%	78%	83%	87%	91%	94%	96%	97%
☑	Layout Engineer	6.0	4.2	4.2	3.0			11%	11%	35%	11%	11%	23%	11%	33%	47%
☑	Logic Verification Engineer	5.0	8.0	8.0	1.0		33%	33%	67%	80%	133%	117%	129%	102%	71%	67%
☐	Other Activities	30.0	25.7	25.7	5.0								1%	9%	30%	49%
☐	Physical Verification Engineer	8.0	8.5	8.5	0.3								5%	50%	45%	40%
☐	Project Manager	15.0	9.0	9.0												
☑	RTL Designer	15.0	23.0	23.0	2.0	%	135%	112%	114%							
☑	Verification Engineer	14.0	4.0	4.0	1.0											
☑	Overall Team	37.5	55.6	55.6		%	138%	117%	131%							

Cutting one now will save all remaining projects & resource them properly

Best practice: aggressive yet achievable based on data

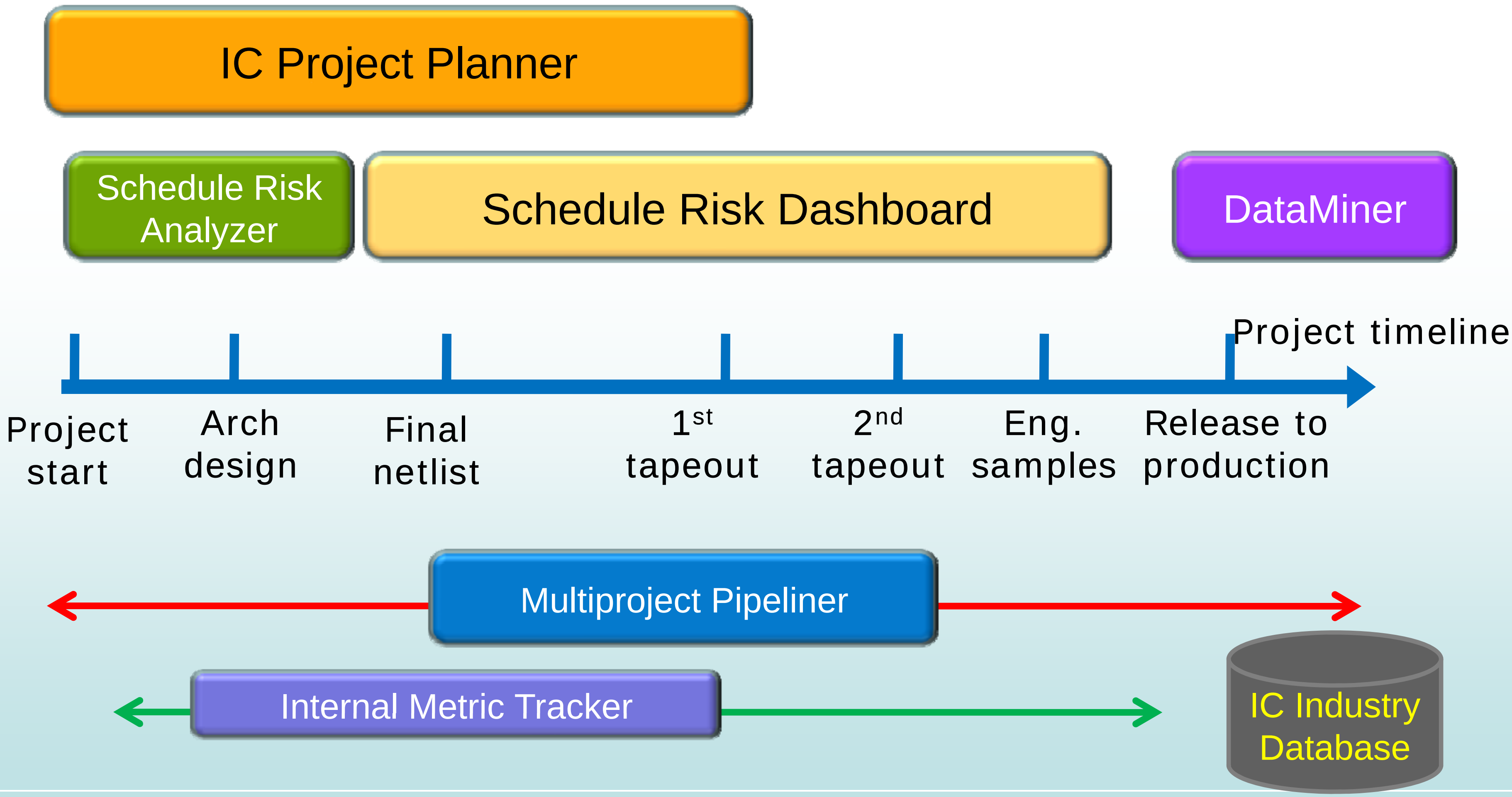


Best practices: Operational disciplines

1. Compute IC complexity statistically
2. Resource planning using models and data
3. Generate multiple scenarios using "what-if" analysis
4. Benchmark project execution assumptions
5. Generate most aggressive, yet achievable, project plan
6. Quantitatively assess impact of feature changes
7. Perform root-cause analysis at project close milestone
8. Analyze multi-project execution pipeline to identify resource shortfalls

Numetrics Products for resource planning

Top-Gun tools for the complete project life cycle



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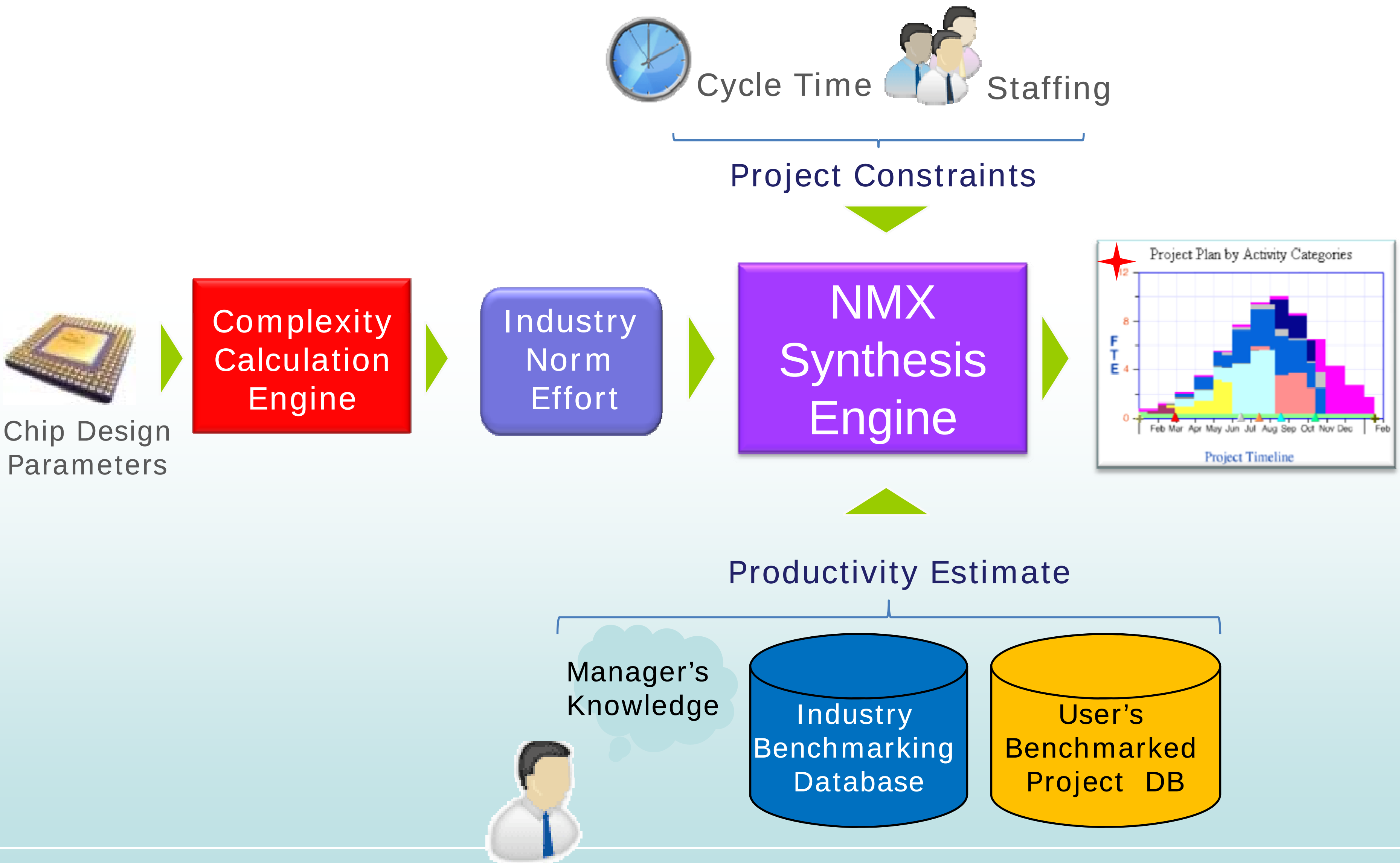
NMX IC project planner



Placeholder for demo video

Summary

- Top-gun schedule predictability ends schedule slip
- Top-gun managers create highly competitive schedules *and* achieve them
- Top-gun managers quantify schedule risk early: before bottom-up plans are available
- Numetrics is the solution in daily use at six of the top ten semiconductor organizations today

To learn more,
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