Architecting System Performance; Managing System Performance

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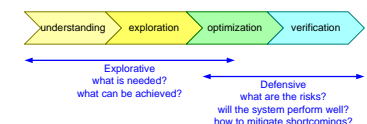
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Abstract

This presentation presents the ideas behind the course Architecting System Performance. A number of frameworks and mental models show the context of this course and the approach to performance advocated in this course.
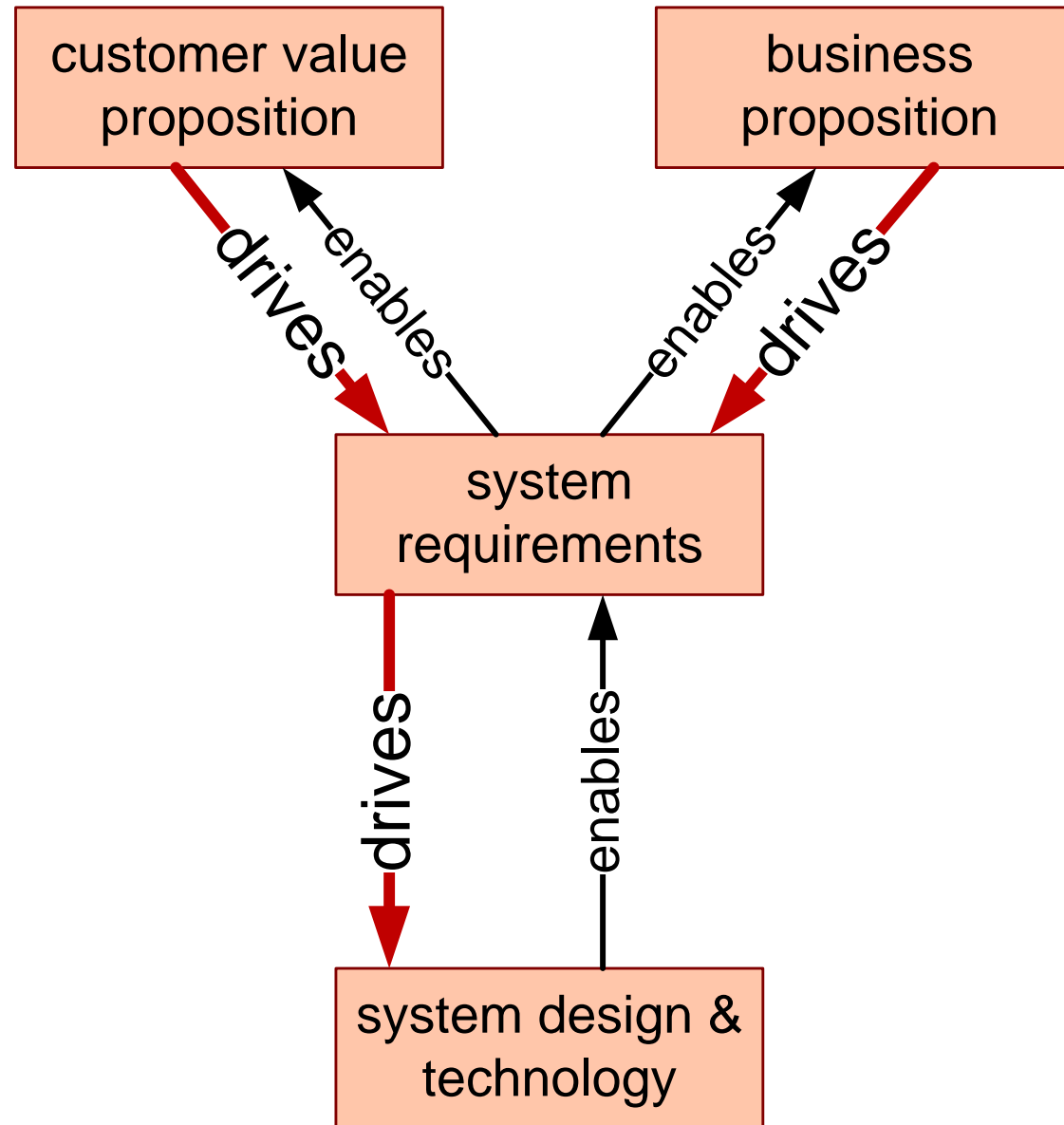
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Architecture Top View

Performance Playing Field

consumer experience
enterprise performance:
   enterprise productivity
   enterprise throughput
   enterprise response time

competitiveness
service response time
service cost

customer value proposition		business proposition

drives — enables   enables — drives

Performance attributes

require means for analysis

evaluation, and creation of

   structure (parts and interfaces)

   and dynamic behavior (functions)

at all levels.

Hence, we need conceptual
modeling at all levels.

system requirements

system performance:
   system productivity
   system throughput
   system response time

drives   enables

technical concepts for:
   resource management
   internal logistics
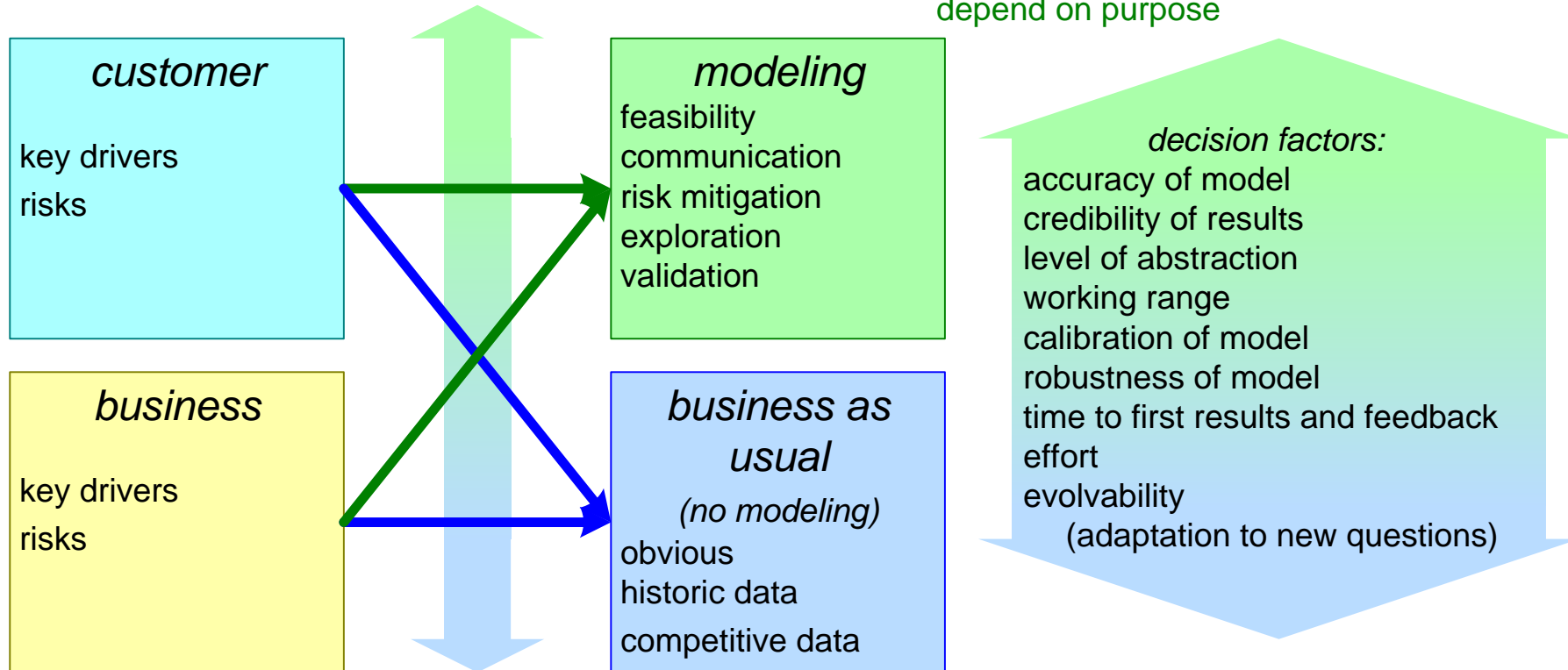   processing

system design

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What and Why to Model

how well is the customer served?
how credible becomes the solution?
how much are time and effort reduced?
how much is the risk reduced?
how much is the solution improved?

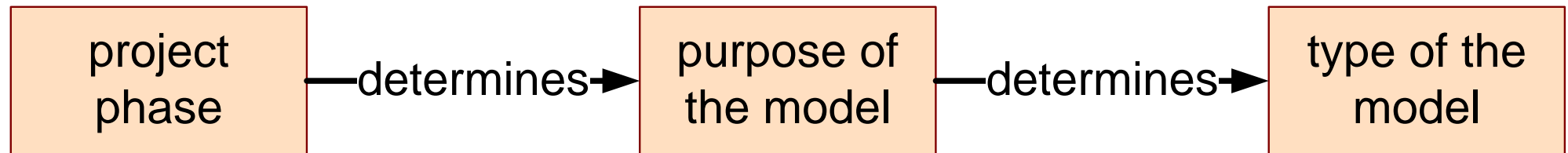purpose and type of model
depend on project life cycle

type of model and views
depend on purpose

customer

key drivers

risks

modeling
feasibility
communication
risk mitigation
exploration
validation

decision factors:
accuracy of model
credibility of results
level of abstraction
working range
calibration of model
robustness of model
time to first results and feedback
effort
evolvability
    (adaptation to new questions)

business

key drivers

risks

business as usual
(no modeling)
obvious
historic data
competitive data
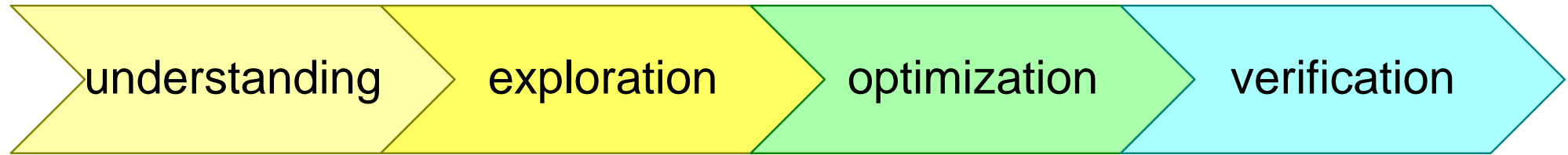
how much effort is needed to create model(s)?
how much effort is needed to use and maintain model(s)?
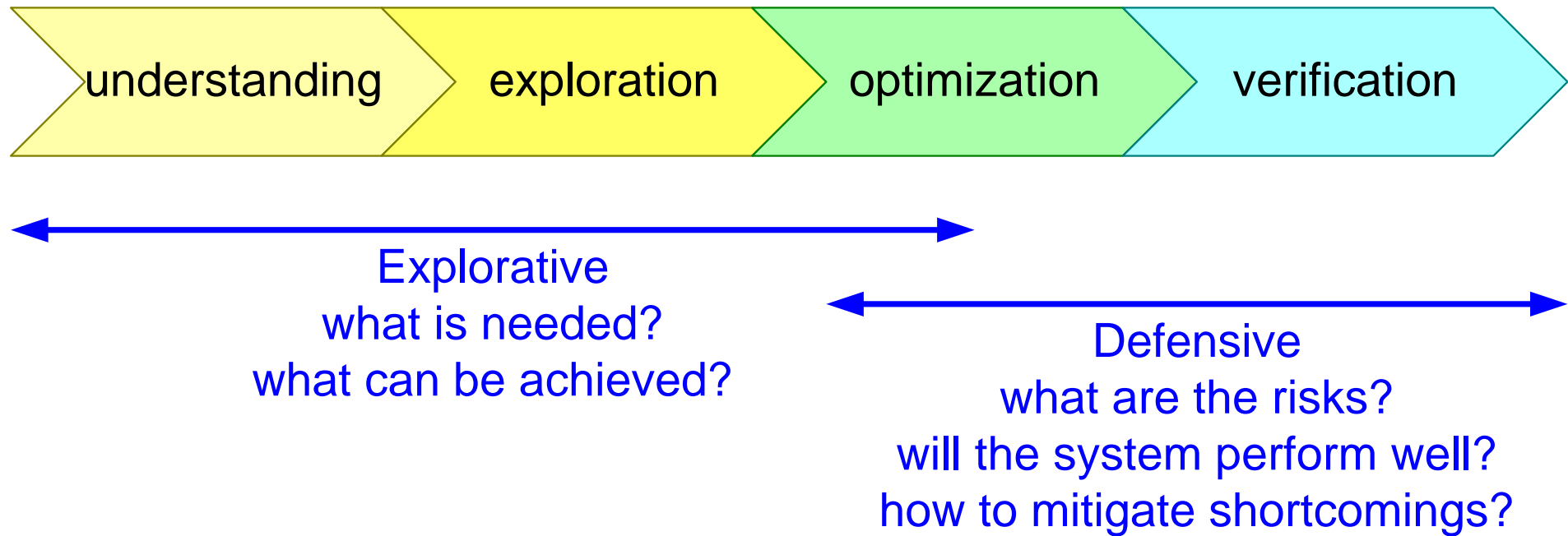how much time is needed to obtain useful result?

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Modeling Evolves over Time

understanding ➤ exploration ➤ optimization ➤ verification

| project phase | —determines→ | purpose of the model | —determines→ | type of the model |

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The Modeler's Mindset Evolves too

understanding	exploration	optimization	verification

Explorative
what is needed?
what can be achieved?

Defensive
what are the risks?
will the system perform well?
how to mitigate shortcomings?

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The Architect Can Be "Out of Phase"

understanding › exploration › optimization › verification

Explorative
what is needed?
what can be achieved?

Defensive
what are the risks?
will the system perform well?
how to mitigate shortcomings?

"look ahead"

mindset of most
stakeholders

mindset of
architect
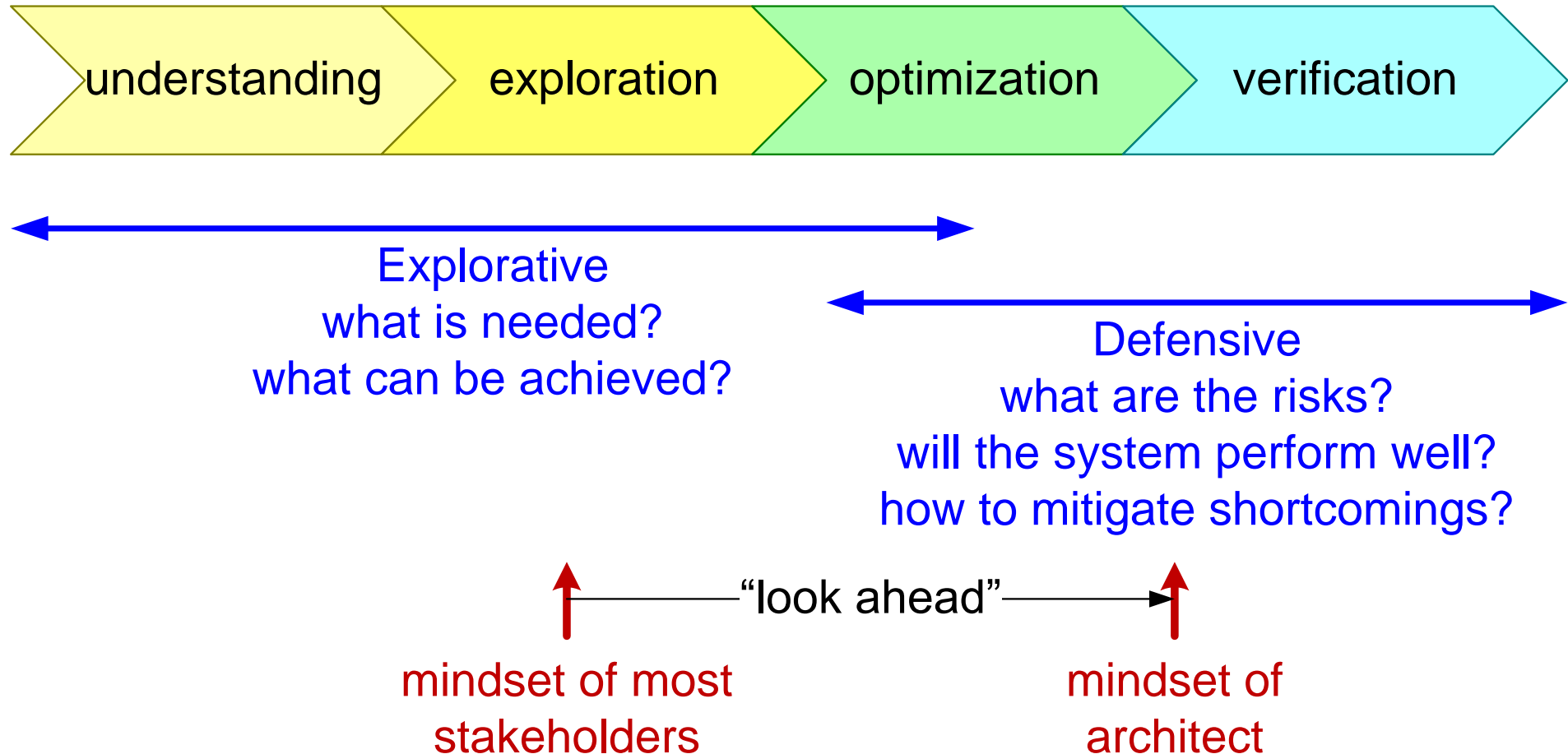
10 Fundamental Recommendations

principles

use feedback
work incremental
work evolutionary

be explicit
make issues tangible

translate into

objectives

support communication

facilitate reasoning

support decision making

create
maintain | understanding
insight
overview

help to achieve

translate into

help to achieve

recommendations

Time-box

Iterate

Quantify early

Measure and validate

Multiple levels of abstraction

(Simple) mathematical models

Analysis of accuracy and credibility

Multi-view

System and its context

Visualize

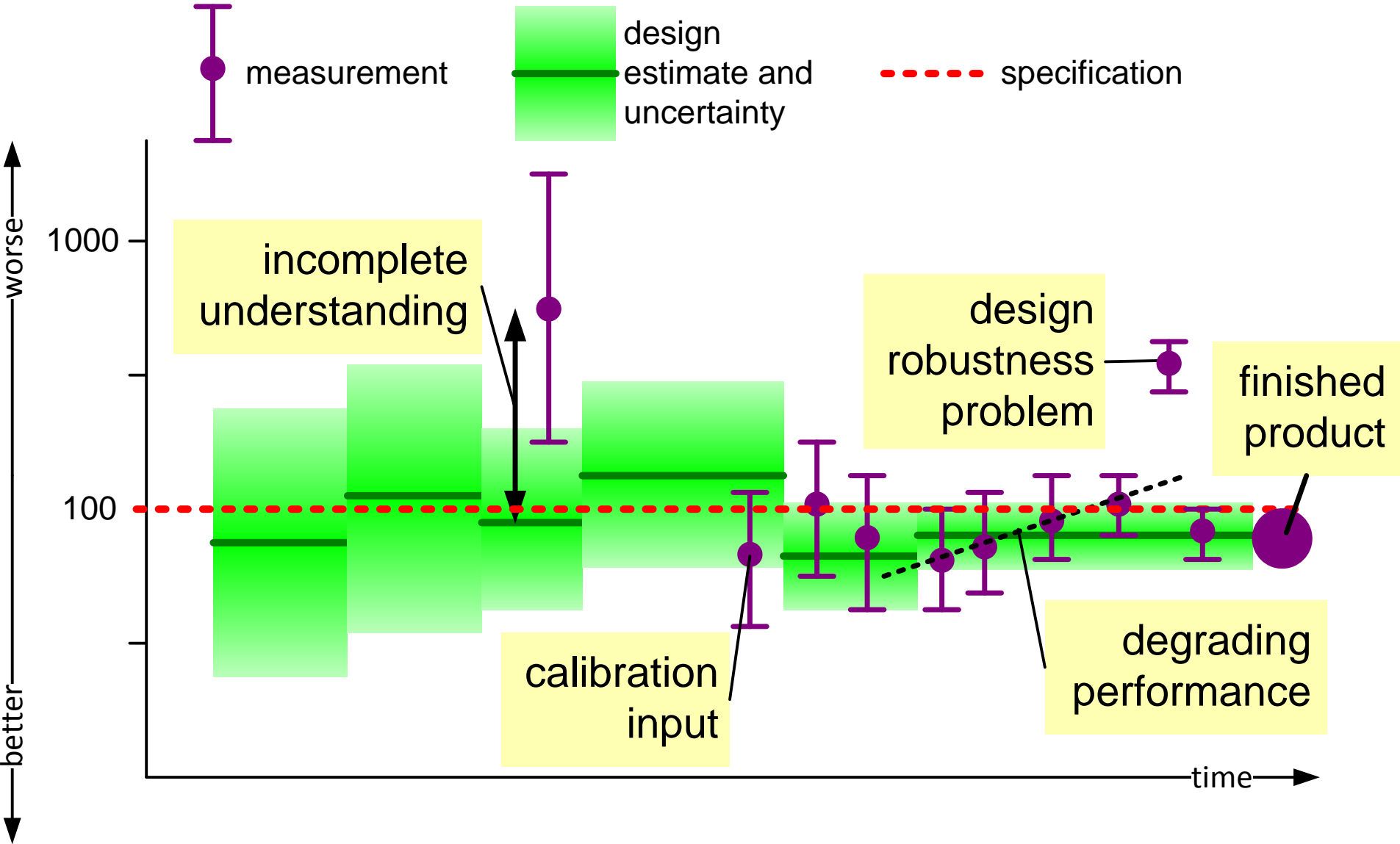USN ESI

measure
evaluate
analyse

determine most
important and critical
requirements
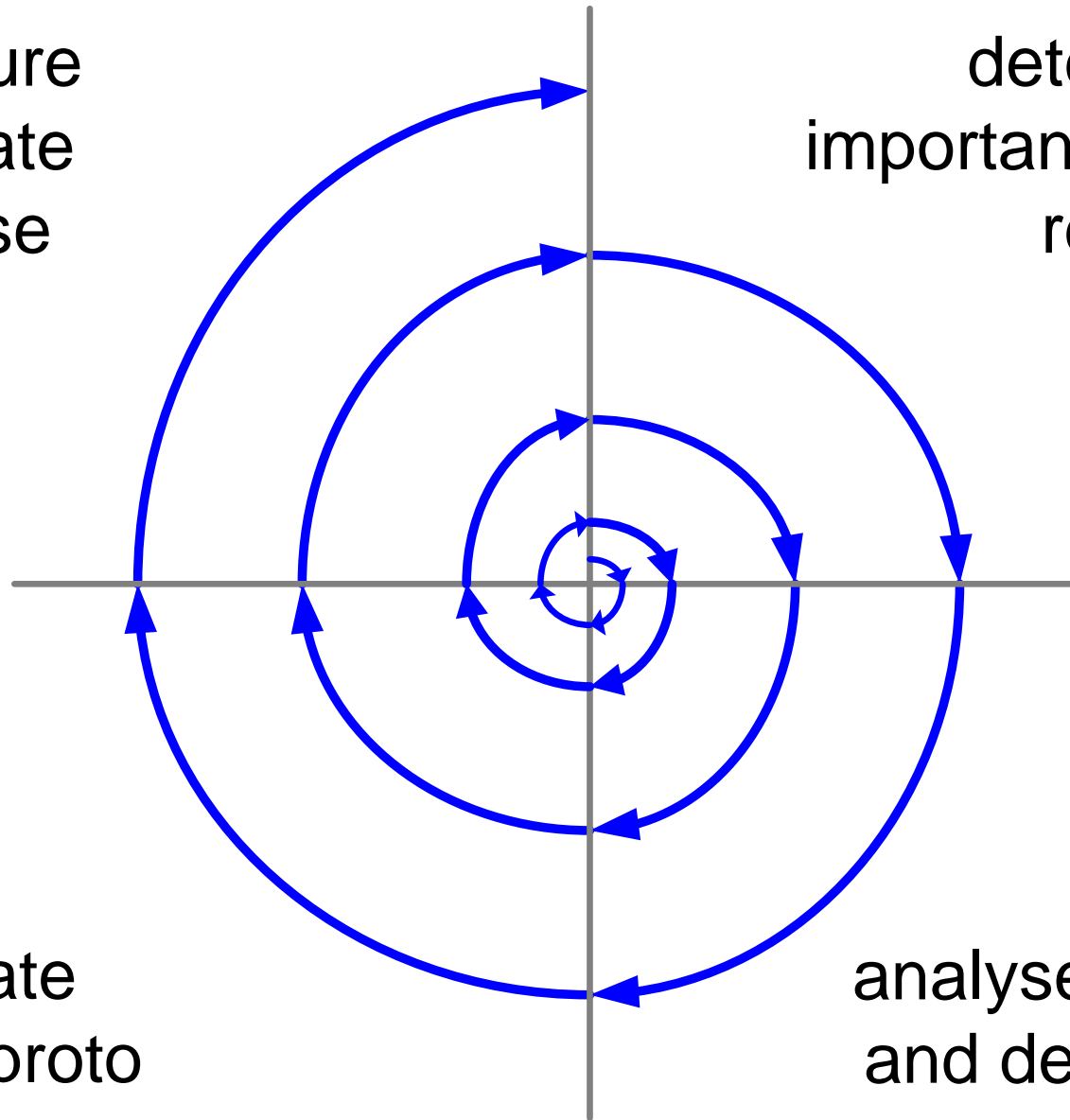
simulate
build proto

model
analyse constraints
and design options

Managing Performance during Product Development

Quantification Steps

10   30   100   300

back of the envelope

order of magnitude

30   300

benchmark, spreadsheet calculation

guestimates

50   200

calibrated estimates

70   140

measure, analyze, simulate

feasibility

90 115

cycle accurate

99.999 ➔ ⬅ 100.001