Complex Project Management Systemic Innovation

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Abstract

Systemic innovation requires organizational competences that ensure that resources and time work properly together to achieve results.

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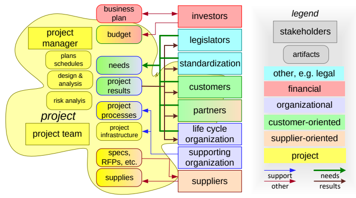


Project Management Tasks

Composing the project team

Organizing and facilitating project members

Orchestrating solution design and analysis

Organizing the project infrastructure and processes

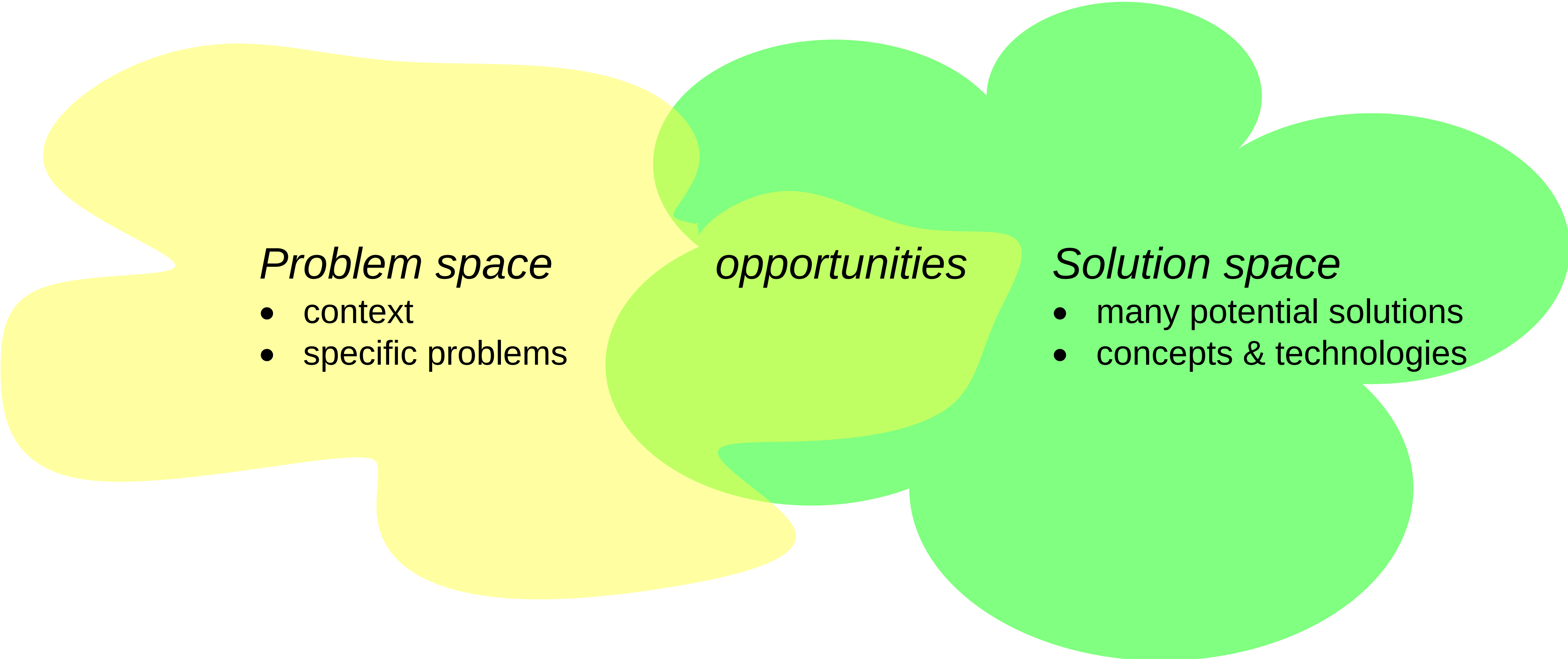
Managing budget and business and project plans

Ensuring and monitoring progress

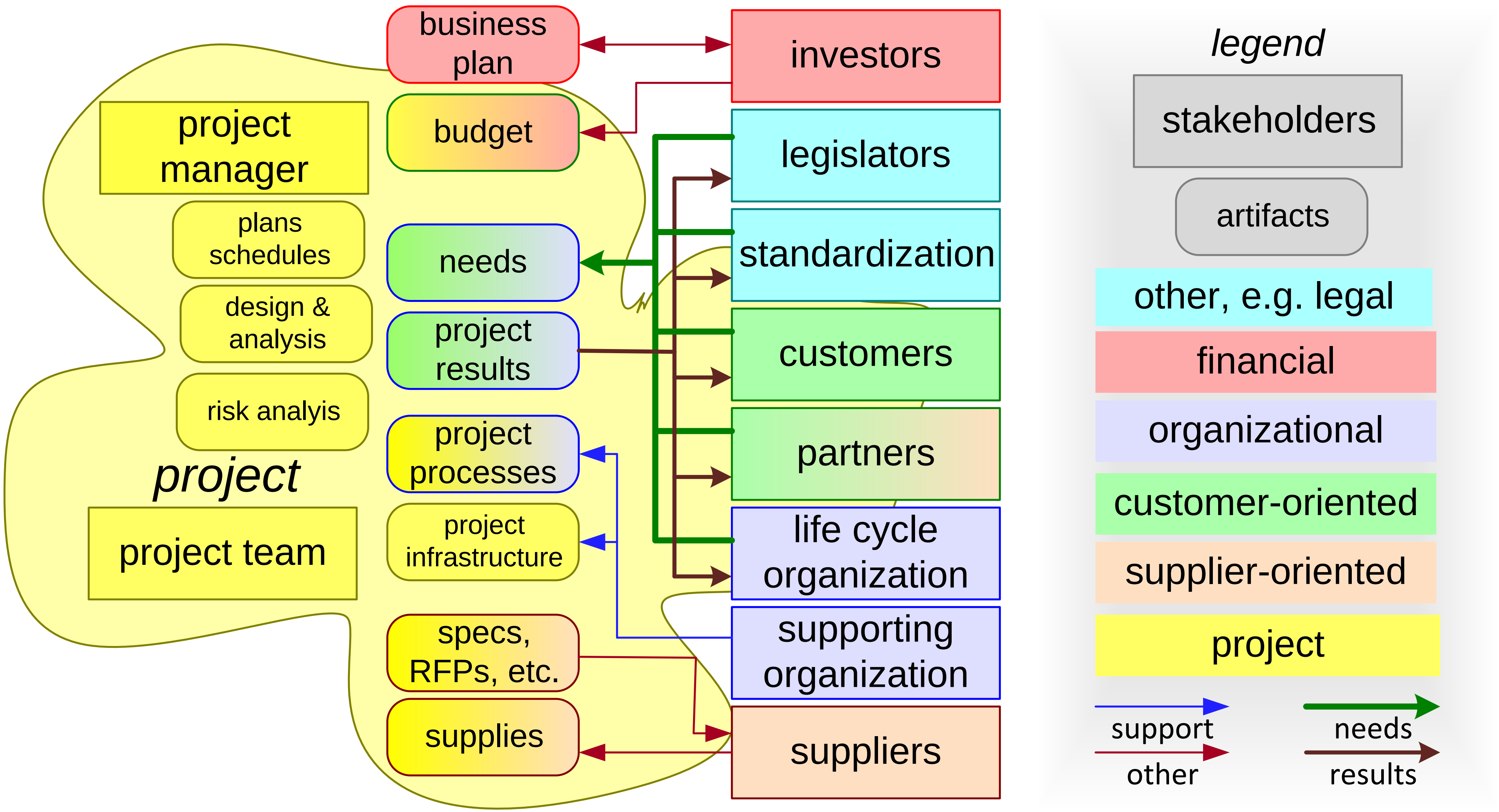
Managing external contacts

Detecting and mitigating risks

Problem and Solution Space



The Landscape for Project Management in Innovation



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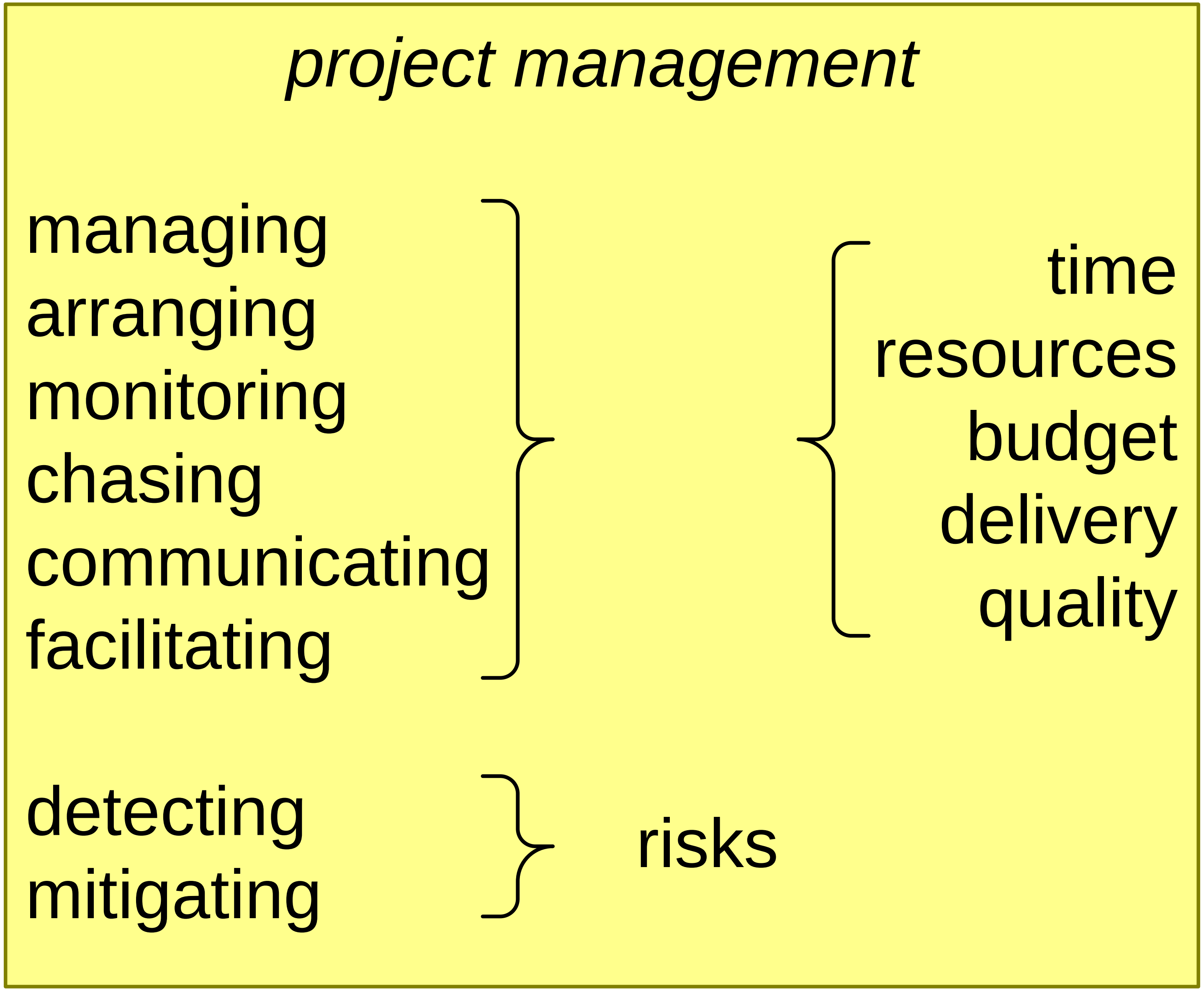
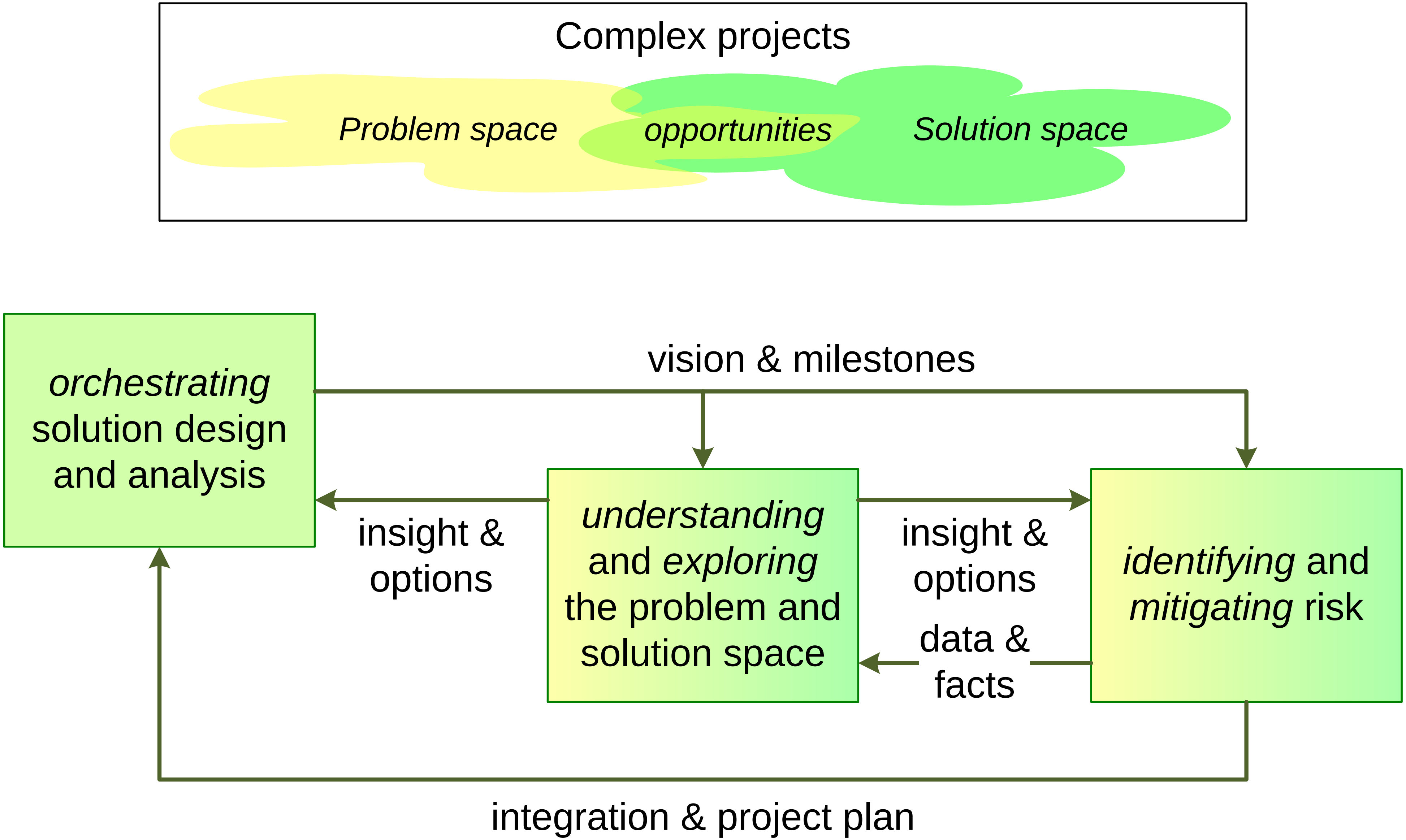


Value of Tools for Complex Project Management



Planning Methods

planning	*decision timing*	*long term outlook*
pacing[1]	set-based design[6,7]	roadmapping[11,12]
agile, wall[2]	real option theory[8,9]	foresight[13]
last planner[3]	late decision making[10]	gigamaps[14]
PERT planning[4]		scenario planning[15]
planning for integration[5]		

1 https://www.entrepreneur.com/article/288769

2 http://deepali10dulkars.blogspot.com/2014/07/pm-toolkit-series-release-planning-wall.html

3 Combating Uncertainty in the Workflow of Systems Engineering Projects, INCOSE 2013

4 https://en.wikipedia.org/wiki/Program_evaluation_and_review_technique

5 https://gaudisite.nl/SystemIntegrationHowToPaper.pdf

6 http://lean-analytics.org/set-based-concurrent-engineering-sbce-why-should-you-be-interested/

7 https://gaudisite.nl/INCOSE2012_Hansen_Muller_SetBasedDesign.pdf

8 Ivanovic, A. and America, P., 2008, Economics of architectural investments in industrial practice; 2nd International Workshop on Measurement and Economics of Software Product Lines.

9 Ivanovic, A. and America, P., 2008, Economics of investments in evolvable architecture in industrial practice, ICSM08

10 https://electricalfundablog.com/agile-model-methodology/

11 http://www.cambridgeroadmapping.net/

12 https://gaudisite.nl/RoadmappingPaper.pdf

13 Miles, I., Saritas, O., and Sokolov, A., 2016. Foresight for Science, Technology and Innovation. Springer

14 Skjelten, E.B.: Complexity & other beasts a guide to mapping workshops. The Oslo School of Architecture and Design, Oslo (2014).

15 Wilkinson, A. and Kupers, 2013, R. Living in the Future, Harvard Business Review, May 2013

Stakeholder Methods

stakeholder communication

A3AOs[1,2]

T-shaped presentation

physical & virtual demonstrators:

prototypes, animations, simulations, mockups

understanding and exploring problem and solution space

conceptual modeling[3,4]
illustrative ConOps[5,6,7]
Ideation, Creativity techniques[8, 9, 10, 11]
storytelling, scenarios[12]
virtual prototyping[13]
value network analysis

business model analysis
Business Model Canvas[14]
low-tech tools:
flip over sheets, sticky notes, markers
high-tech tools:
modeling, simulation, animation, virtual reality

1 Borches D, 2010 A3 architecture overviews: a tool for effective communication in product evolution.
2 https://gaudisite.nl/BorchesCookbookA3architectureOverview.pdf
3 Muller, G. Challenges in Teaching Conceptual Modeling for Systems Architecting, ER 2015
4 Muller, G. Teaching conceptual modeling at multiple system levels using multiple views, CIRP 2014
5 https://gaudisite.nl/INCOSE2016_Solli_Muller_VisualConOps.pdf
6 https://gaudisite.nl/INCOSE2015_MullerEtAl_SubseaOverviewA3.pdf
7 ISO/IEC 2011. Systems and software engineering - Life cycle processes - Requirements engineering.
8 https://www.ideou.com/pages/ideation-method-mash-up
9 Skjelten, E.B.: Complexity & other beasts a guide to mapping workshops. The Oslo School of Architecture and Design, Oslo (2014).
10 Young, J.W. 2016: A Technique for Producing Ideas, Stellar Editions.
11 Bhattacharya, Hemerling & Waltermann, 2010, Competing for Advantage; How to Succeed in the new Global Reality. Boston Consulting Group https://www.bcg.com/documents/file37656.pdf
12 Muller, G., 2011, Systems ArchitectIng; a Business Perspective, CRC Press
13 http://www.esi.nl/innovation-support/documents/symposium-2016/2-PT_Virtual-Prototyping-Interventional-X-Ray-Systems.pdf
14 Osterwalder, A. et al., 2004, The business model ontology: A proposition in a design science approach.

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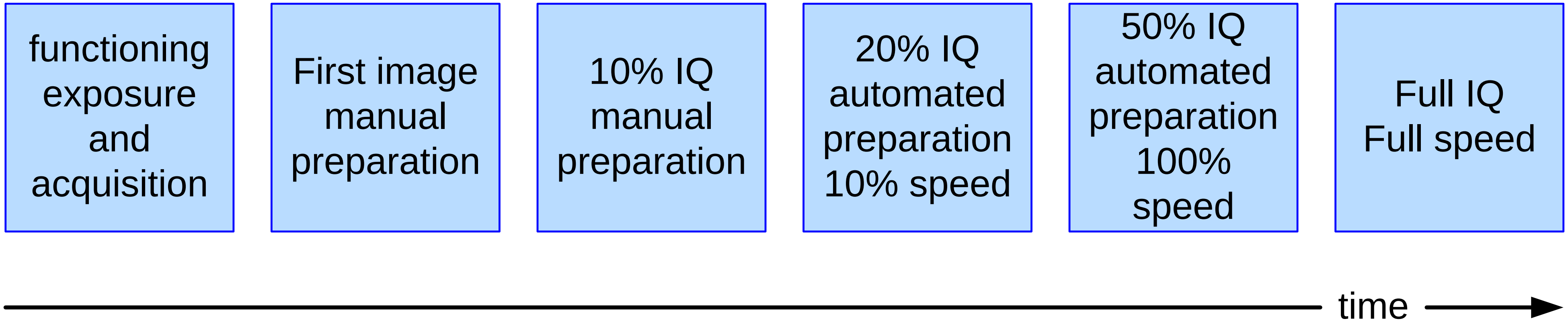
Example of Pacing Milestones

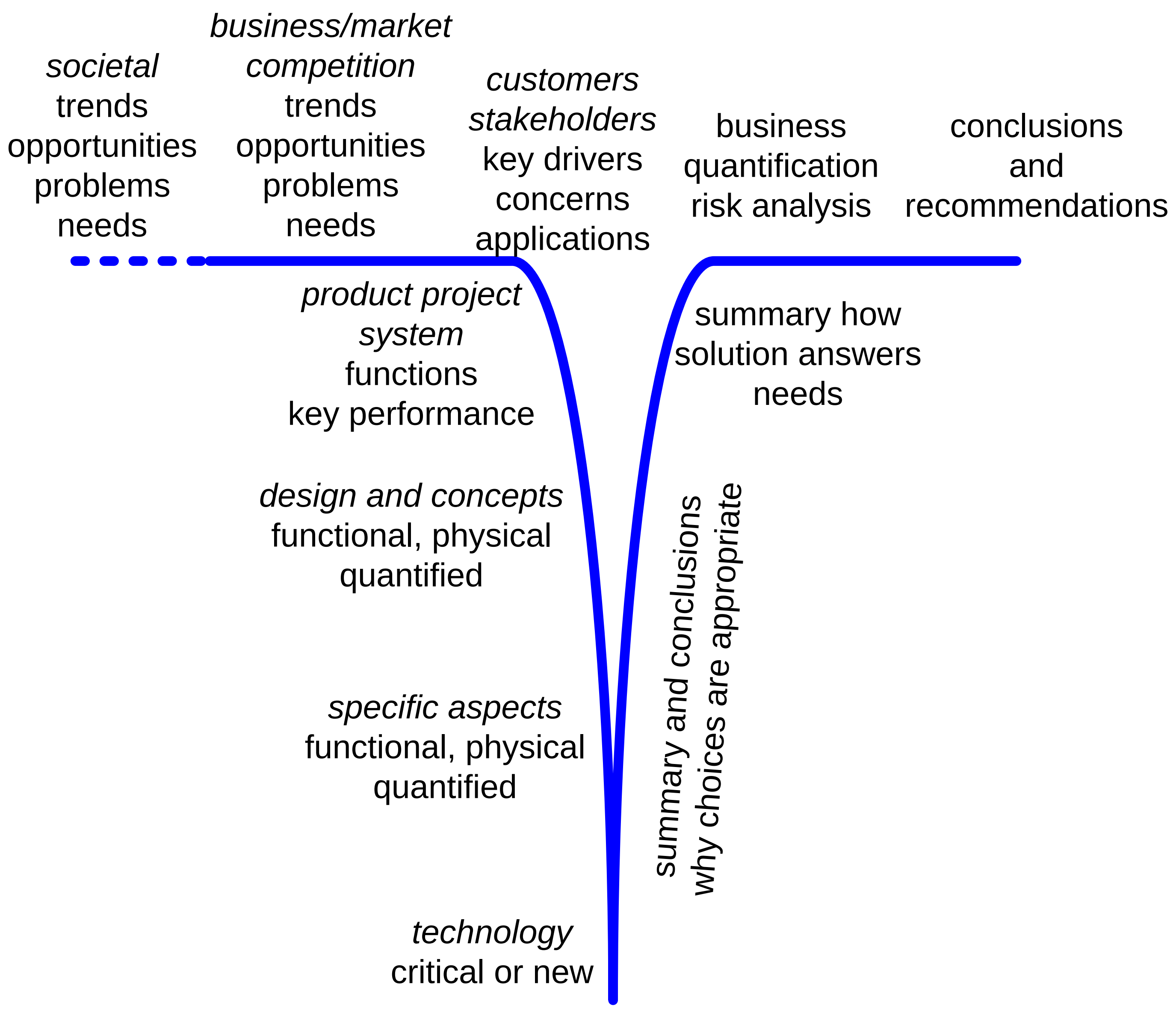


pacing:

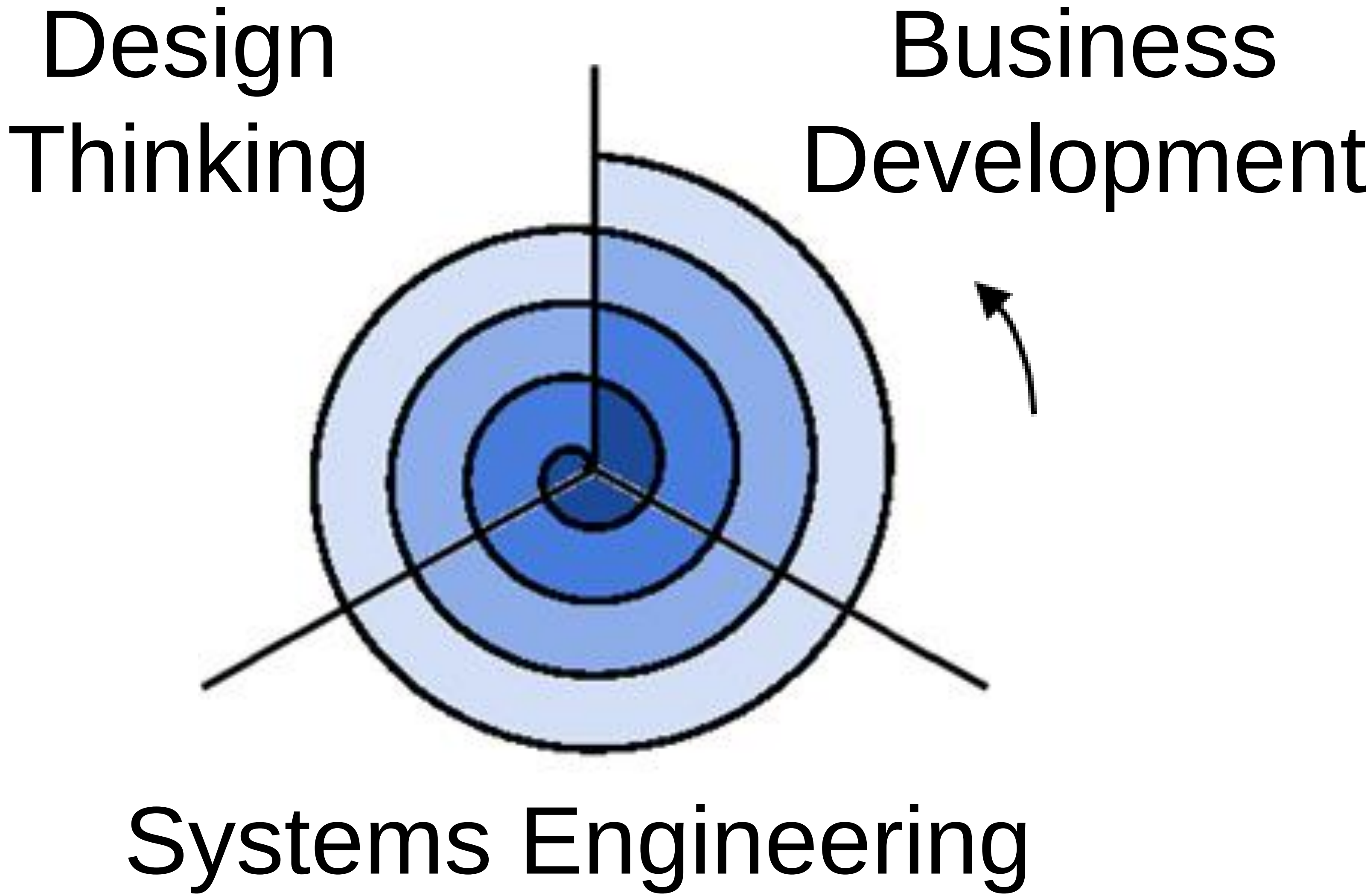
maximum 6 month between milestones

depending on technology and domain

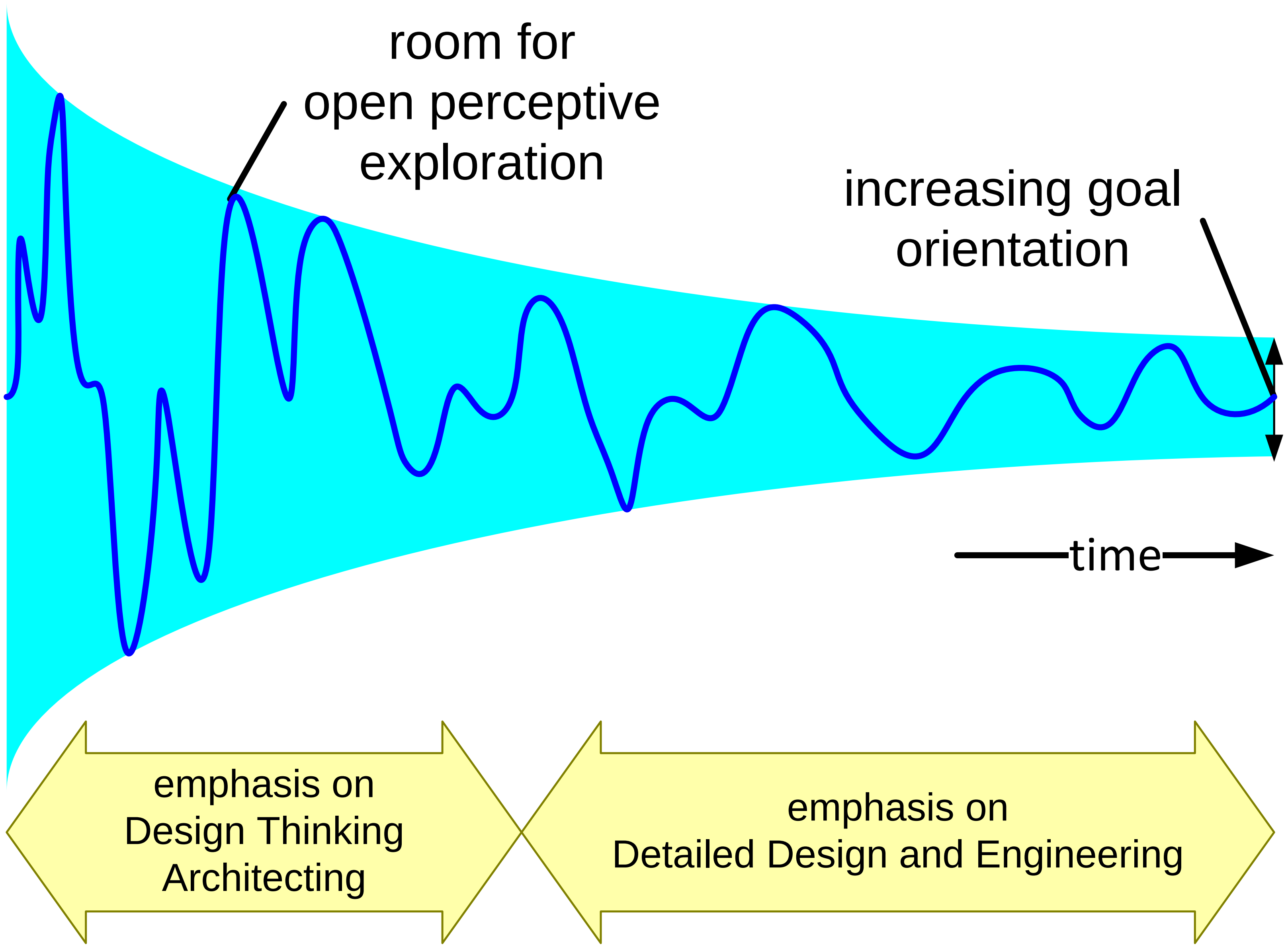
T-shaped Presentation



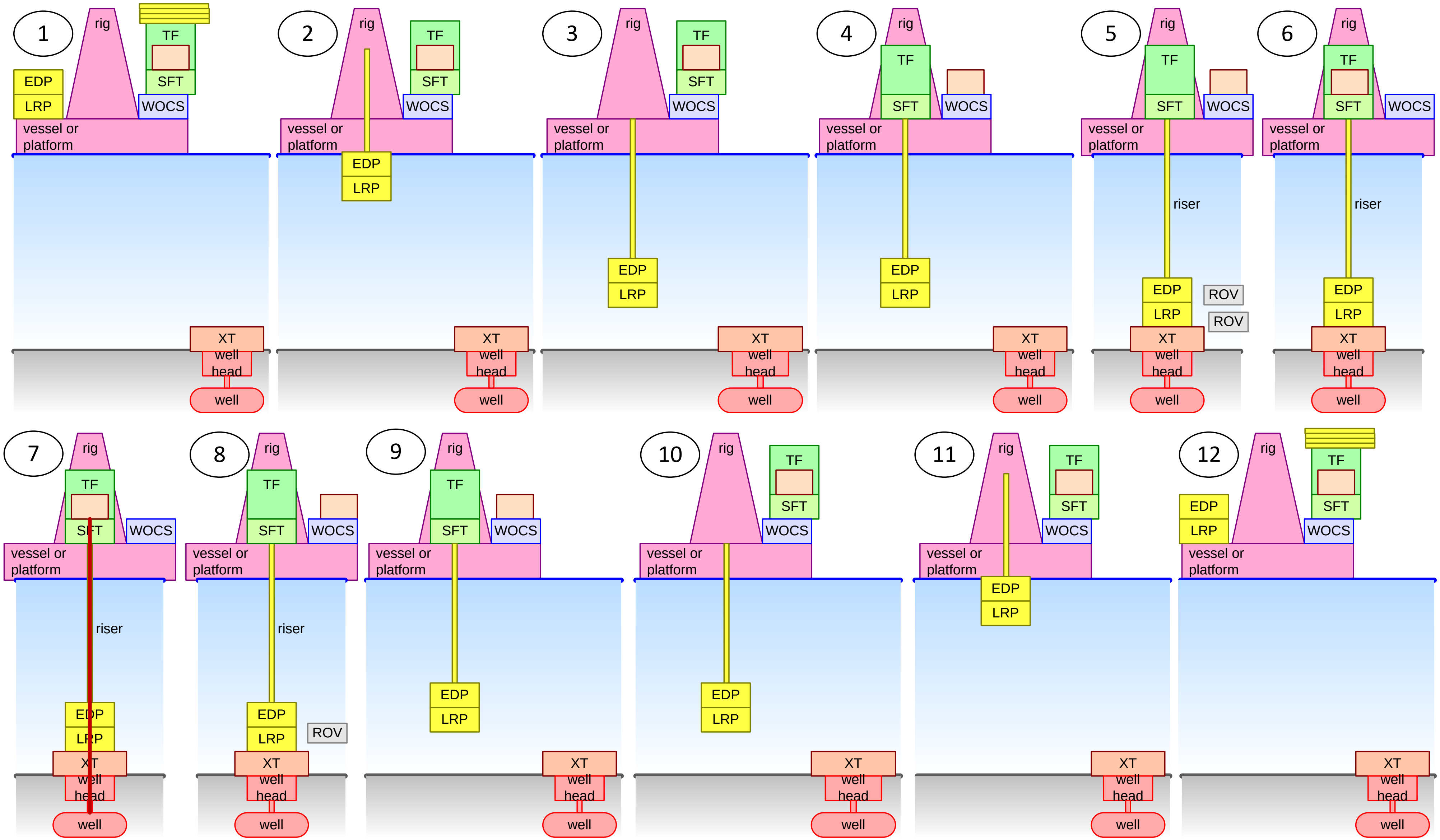
The development spiral



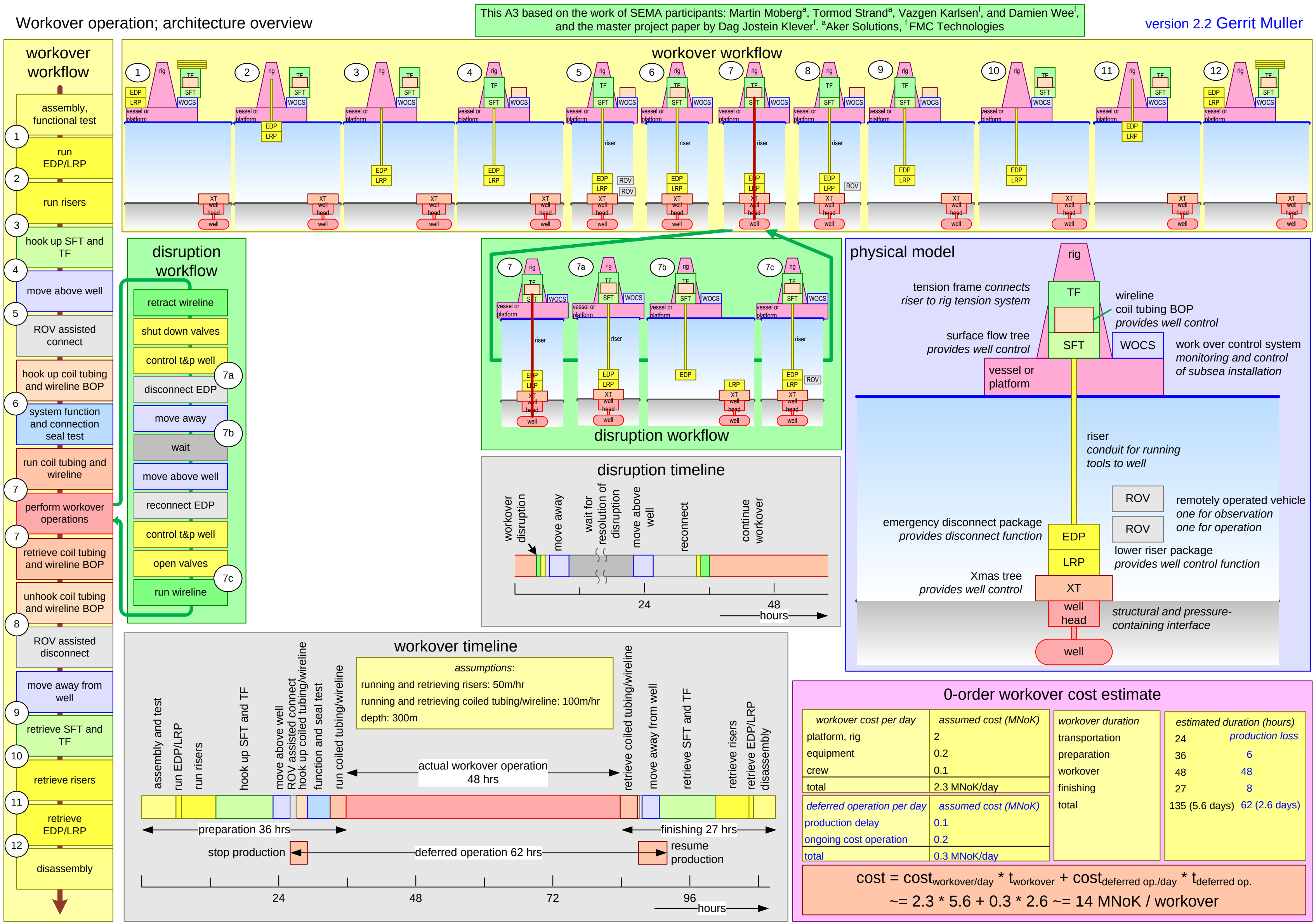
The mindset of the project team shifts over time



Example of an Illustrative ConOps



Example A3AO from Offshore Energy

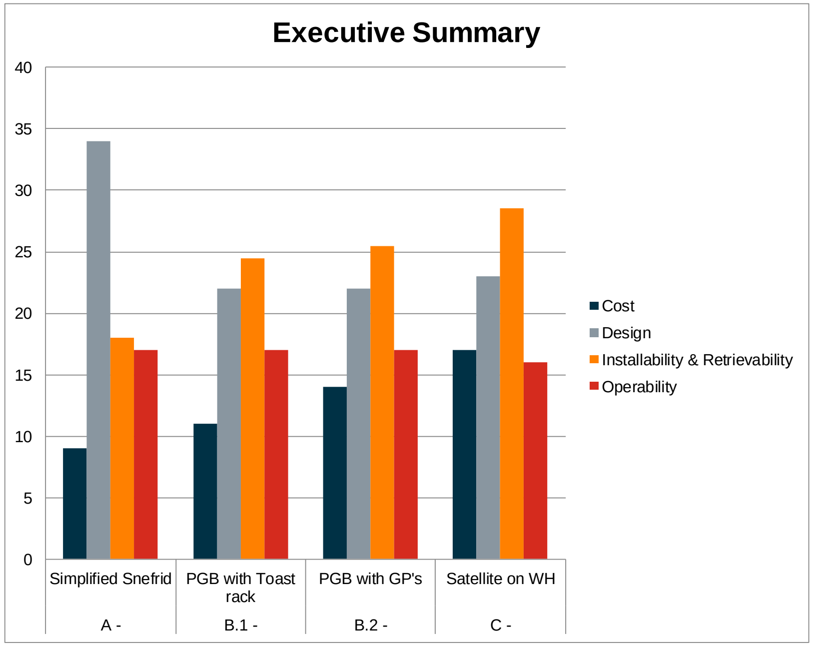


Example Pugh Matrix

	Criteria	Priority setting	A Simplified Snefrid	B.1 PGB with Toast rack	B.2 PGB with GP's	C Satellite XT on WH
Cost	Hardware Cost	High	2	3	4	5
Cost	Installation Cost	Standard	2	2	3	4
Cost	Operational Cost	Standard	3	3	3	3
Design	Engineering hours (Amount of new engineering, re-use, analysis)	Standard	5	3	3	2
Design	Design familiarity (Is the design known in AkSo? Previously delivered?)	Standard	4	2	3	3
Design	Requirement compliance	Standard	5	4	3	2
Design	Deliverytime from call-off (Long lead items, fabrication time)	High	3	3	3	4
Design	Amount of new qualifications (TQP's)	High	5	2	2	2
Design	On-shoreTestability (Availability of necessary equipment and procedures)	Standard	4	3	3	4
Installability & Retrievability	Number of installation runs required	Standard	1	2	2	5
Installability & Retrievability	Installation time	Standard	1	2	3	4
Installability & Retrievability	Weather vulnerability (Metocean constraints, Hs)	Low	2	4	4	4
Installability & Retrievability	Need for special tools	Low	4	3	3	3
Installability & Retrievability	Guide system robustness	High	4	4	3	2
Installability & Retrievability	Size of vessel required (Rig, heavy lift vessel, installation vessel)	Standard	1	2	3	5
Installability & Retrievability	Weight & Size	Standard	1	3	4	5
Installability & Retrievability	Retrieval flexibility of equipment	Standard	3	4	4	2
Operability	ROV access	Standard	3	4	4	4
Operability	Flow assurance (Hydrate/Scale, pipeline friction, pressure bleed-off)	Standard	3	3	3	3
Operability	Dewatering & start-up (Service access, injection points, etc.)	Standard	3	4	4	4
Operability	Reliability	Standard	3	4	4	4
Operability	Interchangeability	Standard	5	2	2	1
	Indicating summary:		**78**	**74,5**	**78,5**	**84,5**

The priority setting enables you to prioritize individual criteria to a higher or lower importance. If the priority is set to low for a criteria, that criteria will count less compared to a standard or higher prioritized one.

Rating	Description
1	Unfavorable performance
2	Less than satisfactory performance
3	Satisfactory performance
4	More than satisfactory performance
5	Excelent performance



Stepwise Approachto Planning for Integration

Understand Solution Design and Context

Parts inside solution and in context, their interactions, emergence of Key Performance Parameters

Identify Risks

gaps in knowledge of problem and solution space, uncertainties, and ambiguity

Determine an Integration Sequence to get Key Performance Parameters functioning ASAP

using a pacing process (regular visible results)

Merge Constraints from Test Configurations, Suppliers, Partners, Resources, etc.

with a mindset to fail early

From Integration Sequence to Project Master Plan