TIME MANAGEMENT

Time management
Introduction

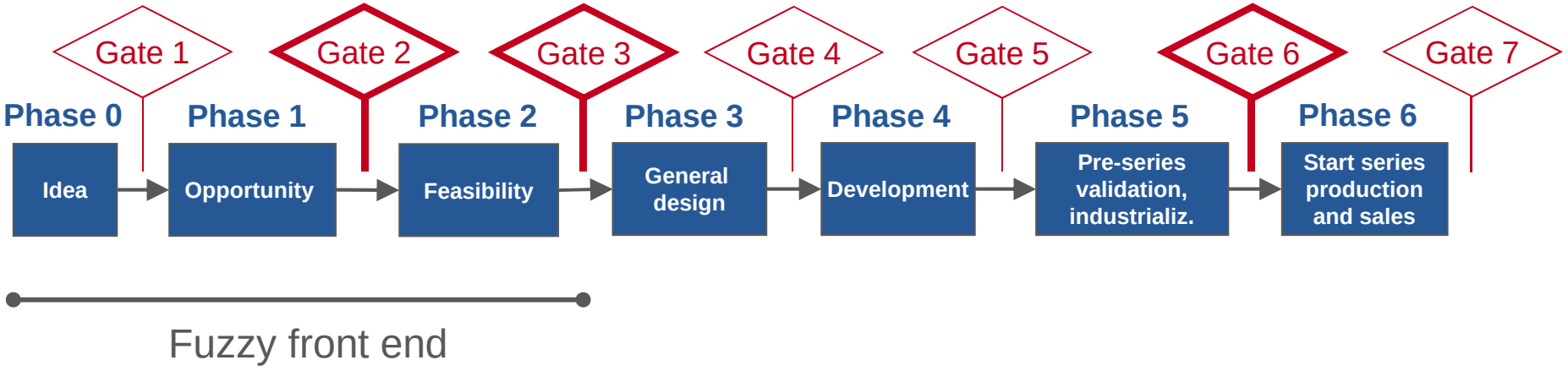
Product development time depends on the industry. **Projects with longer development time are more difficult to manage.** Time-to-market being critical for companies, development time tends to decrease

- New drug: over **10 years**
- New aircraft: **7 to 8 years**
- Apple Newton: **6 years**
- New car: **3 to 5 years**
- Apple watch: **3 years**
- Apple iPhone 1: **2.5 years** (development from early 2005, started selling in June 2007)
- Accucheck: **2 years** (Gate 3 to Gate 6)
- New electronic board: **4-6 months**

Time management
Introduction

Fuzzy front end, zone between time when opportunity is known and when serious effort is invested in project, is major source of time waste, especially in large companies

- In fuzzy front end, market opportunity is highest, but sense of urgency is lowest
- Changing project priorities often delay project start



Time management
Introduction

Beware typical pitfall: often, particularly in start-ups and SMEs, a **product launch date is fixed based on arbitrary wishful-thinking decision** (e.g. because a date had to be communicated to investors), before any proper planning completed

- Start with crude retro-planning from arbitrary date
- Neglect scope definition phase due to lack of time. As a consequence, come to conclusion that timing should be ok, or if lucky realize that workload is much higher than available resources
- Cannot increase resources, cash limited to outsource the work, come to personal conclusion that challenge is insurmountable
- Accept to manage and start project anyway to please management
- Watch as project getting delayed, development cost increase, team motivation drops
- Management under maximal pressure, investors angry, project manager pays for the mess

Time management
Introduction

Methodology for planning creation

- Use WBS structure to create planning structure
- Start from project deliverables contained at lowest level of WBS
- For each deliverable, as described in WBS dictionary, project team identifies all activities required to produce that deliverable and estimates effort. Organize interactive session to investigate alternatives, detect potential risks or discover the team's level of confidence
- Sequence activities in logical order (activity sequencing). Certain activities can only be started when others have been completed
- Assign resources to each activity; in case of conflict, change sequence of activities
- Determine critical path, include project buffer after risk analysis, estimate project duration

Time management
Activity estimation

For each work package, estimate effort for each task (e.g. using 3-point estimates). Identify and keep track of assumptions made during activity estimation. Example with case study

Mechanical support 1.3

WP 1.3 Mechanical support ACTIVITY	MOYEN 50%	OPTIMISTE 20%	PESSIMISTE 80%	(4+1+1)/6	Cash-out	Fait par	Estimé par	Remarque
P3 sous-total P2								
Lighting module								
• Définir forme et composants mécanique Lighting Module	6	4	12	7		MTR	MLY/MTR	
• vérifier aspects dilatation thermique	6	4	12	7		FPI	MLY/MTR	
Miroirs & Vitre								
• Calculer la forme et les tolérances pour les miroirs	80	80	80	80		FPI	MLY/MTR	
• Définir fixation miroir	8	8	8	8		MTR	MLY/MTR	
• Rechercher fournisseurs injection & métallisation	16	4	32	17		MTR	MLY/MTR	
Thermal dissipation (air cooling)								
• Recherche partenaire et analyse concept global	12	8	24	13		FPI	MLY/MTR	
· Définir forme du radiateur, débit wr circuit d'air après étude thermique du partenaire	12	8	24	13		FPI	MLY/MTR	
• Définir température de travail du radiateur	4	2	8	4		FPI	MLY/MTR	
• Choisir ventilateur et définir sa fixation	4	2	8	4		MTR	MLY/MTR	
• Design interface entre les deux PCBs et le radiateur	8	4	16	9		MTR	MLY/MTR	
Structure mécanique de base								
• Définir atructure mécanique de modules qui porte cartes, miroirs, glass, radiateurs	40	40	80	47		MTR	MLY/MTR	
• Réaliser étude pour miroirs	16	8	32	17		MTR	MLY/MTR	
• Réaliser étude pour refroidisseur	16	8	24	16		MTR	MLY/MTR	
• Créer dessins de détails	60	40	100	63		MTR	MLY/MTR	
P4 sous-total P4								
• Suivi fabrication pièces pour Lighting module	8	8	8	8		MTR	MLY/MTR	
• Suivi fabrication miroirs et vitre	8	8	8	8	CHF 10'000.00	MTR	MLY/MTR	Moule à réaliser
• Suivi fabrication refroidisseurs	8	8	8	8	CHF 2'000.00	MTR	MLY/MTR	
• Assemblage général	16	8	24	16		MTR	MLY/MTR	Assemblage d'un système à 10 modules
• Corriger les dessins (structure, miroirs et vitre, refroidisseurs)	20	15	40	23		MTR	MLY/MTR	
P5 sous-total P5								
• Suivi fabrication et corriger pièces pour Lighting module	8	4	16	9		MTR	MLY/MTR	
• Au besoin correction miroirs et vitre	6	4	12	7		MTR	MLY/MTR	
• Suivi fabrication et correction refroidisseurs	6	4	12	7		MTR	MLY/MTR	
• Assembler le tout	24	8	32	23	CHF 3'000.00	MTR	MLY/MTR	Prix des retouches
• Corriger les dessins (structure qui tient le tout, miroirs et vitre, refroidisseurs)	20	15	40	23		MTR	MLY/MTR	
Suivi première serie	20	15	40	23		MTR	MLY/MTR	
• Documentation & introduire dans SAP	24	16	40	25		MTR	MLY/MTR	
Total	456	333	740	**483**	**CHF 15'000.00**			

Time management
Activity estimation

Different techniques exist to estimate activity duration. Top-down estimations best suited in early project phase. Bottom-up (cross-checked with top-down) estimates better suited later in project

- **Expert judgment (top-down)** – use knowledge from people who have performed similar activities before, e.g. colleagues, experts, outsourcing firm
- **Analogous estimating (top-down)** – use estimates from previous similar projects to estimate duration and cost of given activity or entire project (e.g. 800-1200h for new electronic board)
- **Parametric estimating (top-down)** – linear extrapolation, finding metrics in activity (e.g. 10 new parts to design, on average 3 studies per part and 10 hrs per study, total 300hrs); best applied for activities that can be scaled
- **3-point estimates (bottom-up)** from engineers who will perform the work
- **Group Decision Making techniques** - team-based approaches useful for improving duration estimates

Time management
Activity estimation

3-point estimates to estimate activity duration

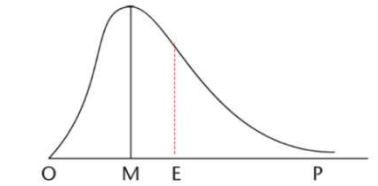
Example for very simple task (note: much more difficult for real R&D task with innovative content!): how long will it take to drive from Lausanne to Geneva airport (60km)?

- Best case: no traffic, 40 minutes
- Realistic: moderate traffic, 50 minutes
- Worst case*: heavy traffic, need to fill in car tank, 80 minutes

* Risk analysis will consider additional risks:
  - flat tire (low probability, impact 30’ delay and extra cost 100$)
  - accident ahead (moderate probability, impact 30’-60’ delay)
  - car crash (low probability, impact 3hrs delay, extra cost 5’000$)

Time management
Activity estimation

Which value shall I put in the planning?



Three-point or PERT estimate technique

- Ask resources for Optimistic (O), Most likely (M) and Pessimistic (P) task durations, with probability to finish task of 20% (O), 50% (M), 80% (P)
- **Estimated Activity Duration EAD = (P + 4M + O) / 6**
- Standard deviation SD = (P – O) / 6, variance VA = SD^2
- Example: O = 40', M = 50', P = 80' ⇨ EAD = 54', SD = 7', VA = 44'
- **Enter EAD or 3 values (O, M, P) in project planning tool**
- Technique allows to quickly identify tasks with highest uncertainty

Time management
Activity estimation

Assume project with 20 different activities

- A1, A2, A3, …, A20
- Identify activities on critical path (e.g. A1, A3, A8, A12)
- $\mathbf{EAD_{project} = \Sigma\ EAD_{activities\ on\ critical\ path}} = EAD_{A1}+EAD_{A3}+EAD_{A8}+EAD_{A12}$
- $\mathbf{SD_{project} = Sqrt\ (\Sigma\ VA_{activities\ on\ critical\ path})} = Sqrt\ (VA_{A1}+VA_{A3}+VA_{A8}+VA_{A12})$

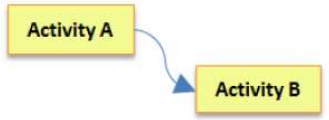
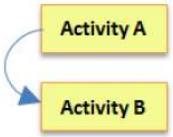
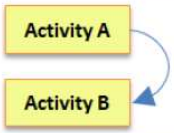
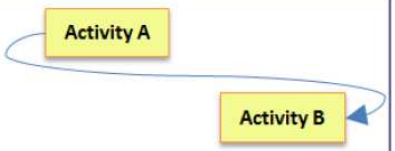
Time management
Activity estimation

After first iteration, challenge estimations given by project team members

- Activities sufficiently well understood?
- Clear deliverables?
- Unnecessary padding (= extra buffers) included?
- Technical solutions selected?
- Missing activities or work packages?
- Risks identified and communicated?

Time management
Activity sequencing

Once activity list is ready, **sequence activities in logical order**. Can be done with project team using post-its, or directly in project management tool. Take into account all dependencies

Logical relationship	Definition	Example	Bar chart representation
Finish-to-start, FS Normal precedence	Activity 2 cannot start until activity 1 finishes	Finish cooking before the dinner can start	
Start-to-start, SS Start precedence	Activity 2 cannot start before activity 1 starts	When the camera starts recording, the actor can start acting	
Finish-to-finish, FF End precedence	Activity 2 cannot finish until activity 1 finishes	The integration test has to be finished before the acceptance test is finished	
Start-to-finish, FS Jump precedence	Activity 2 cannot finish until activity 1 starts	The pilot phase is not finished until the production phase starts	

Time management
Resource allocation

Allocate resources for all activities

- Determine resources that are required (people, equipment, material)
- Define competences required (type, skill, previous experience, languages, affinities with other team members) and match with available resources
- Check resource availability (work on other projects or activities, vacation, number of projects per resource) and motivation
- Fix availability level (e.g. maximum 80%). Without vacation and holidays, a 100% availability level corresponds to about 1’500h/year. At 80% availability it gives 1’200h/year/resource

Time management
Resource allocation

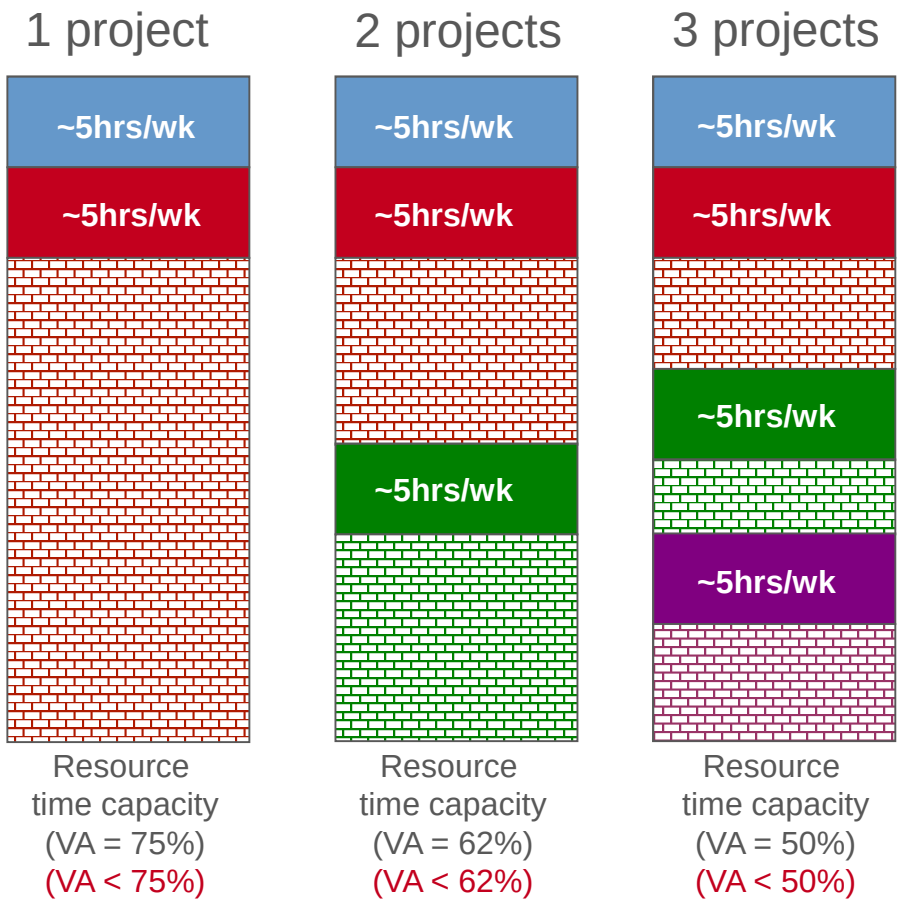
Maximum 2 major projects or 3 minor projects per developer

Non value-added time on general activities
(Admin, general meetings,
support, interruptions, coffee breaks, …)

Non value-added time on project
(Status meetings, schedule updates, project-related emails, interactions with team members, …)

Value-added time on project
(Development activities)

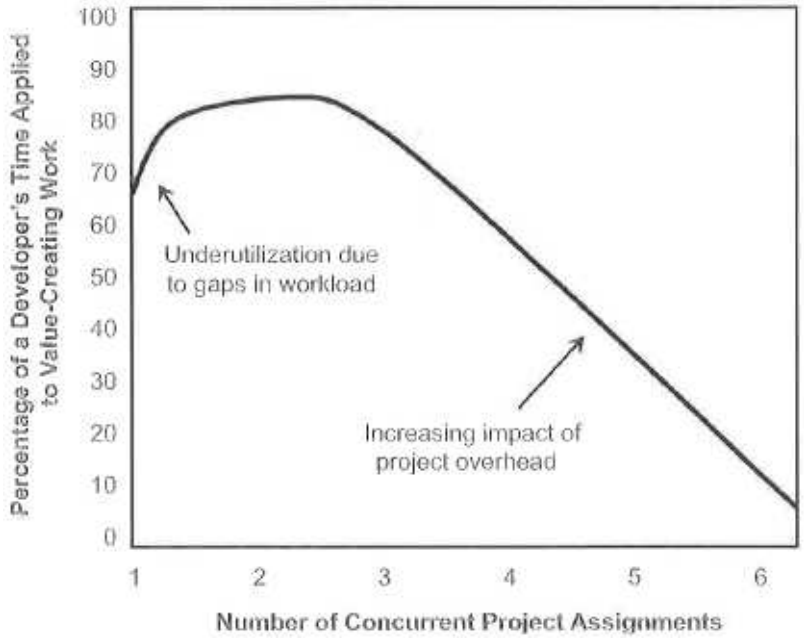
In addition, multi-tasking between projects introduces additional efficiency waste!



Time management
Resource allocation

Maximum 2 major projects or 3 minor projects per developer

- 1 project / resource offers fastest option, but not always most optimum capacity (resource may sit idle waiting for teammates inputs)
- Large and complex projects allow for some internal level-loading of resources, while smaller projects must be externally level-loaded



Time management
Schedule optimization

Define and **communicate milestones** to help team focus on clear objectives

Save initial baseline in planning tool to monitor delays over time

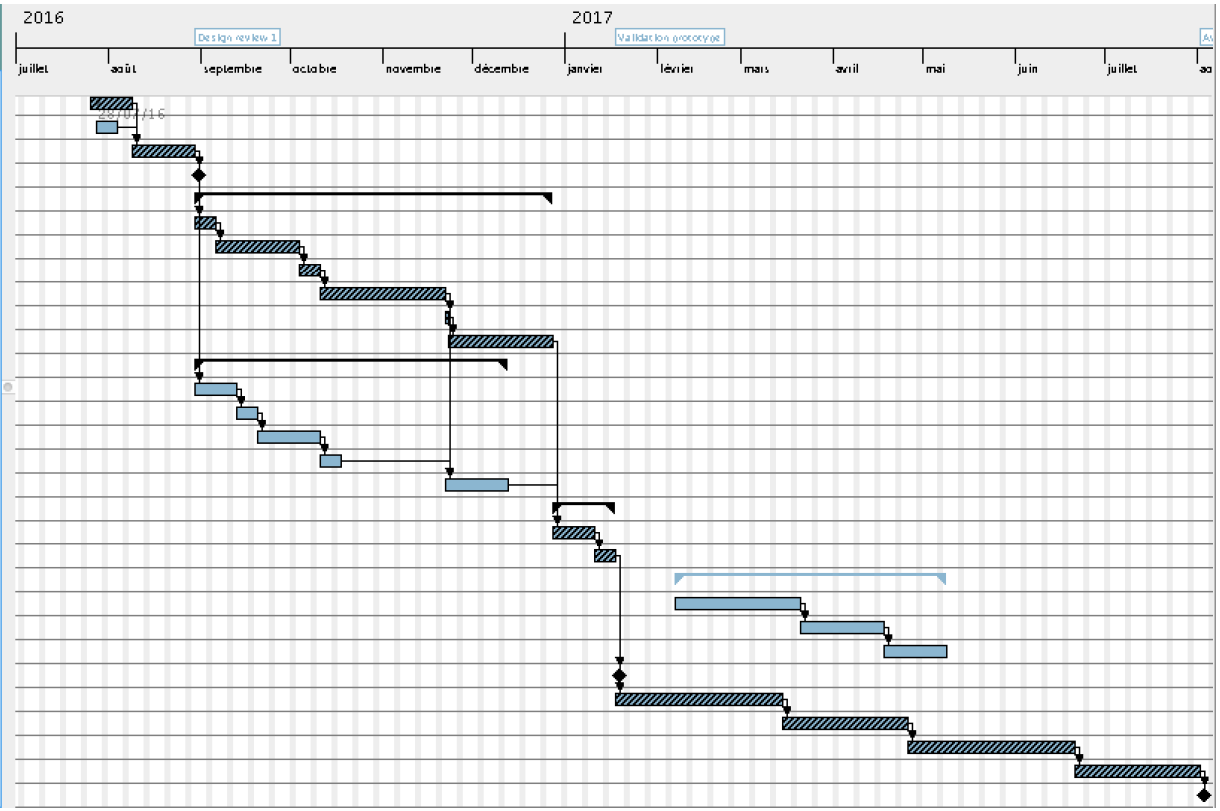
Perform frequent **resource leveling** to avoid peaks

Identify **critical path**, or sequence of activities that determines project duration. It is longest sequence of tasks in project plan that must be completed to meet deadline. Any delay on critical path will cause project to be delayed

Time management
Schedule optimization

Example of basic project schedule with critical path

Nom	Date de début	Date de fin
Product specification definition	26/07/16	08/08/16
Intellectual property analysis	28/07/16	03/08/16
Conceptual design	09/08/16	29/08/16
Design review 1	30/08/16	30/08/16
Electronic board	30/08/16	27/12/16
Electrical schematic	30/08/16	05/09/16
Routing PCB	06/09/16	03/10/16
Bill of Material definition	04/10/16	10/10/16
Procurement and assembly	11/10/16	21/11/16
Board testing	22/11/16	22/11/16
VHDL code and tests	23/11/16	27/12/16
Mechanical assembly	30/08/16	12/12/16
Design CAD	30/08/16	12/09/16
Bill of Material definition	13/09/16	19/09/16
Purchasing and procurement	20/09/16	10/10/16
Assembly casing	11/10/16	17/10/16
Assembly casing and board	22/11/16	12/12/16
Prototype testing	28/12/16	17/01/17
Functional testing	28/12/16	10/01/17
EMC testing	11/01/17	17/01/17
Product documentation	07/02/17	08/05/17
User documentation	07/02/17	20/03/17
Production documentation	21/03/17	17/04/17
Service documentation	18/04/17	08/05/17
Validation prototype	18/01/17	18/01/17
Industrialization	18/01/17	14/03/17
Pre-series procurement	15/03/17	25/04/17
Pre-series assembly and testing	26/04/17	20/06/17
Buffer	21/06/17	01/08/17
Availability pre-series for sale	02/08/17	02/08/17



Time management
Schedule optimization

Update project schedule on regular basis (e.g. monthly). Monitor deviations and correct them with **schedule compression techniques**. Major deviations, if unavoidable, shall be communicated to steering committee

- **Crashing**: add additional resources (internal or external) on an activity or allocate more experienced resources to make activity shorter
- **Fast tracking**: parallelize activities. It adds risk to project, as some work may have to be redone.
- **Descope** project by removing content, e.g. nice-to-have features
- **Outsource** activities or subproject to external supplier (cash out increase)
- **Plan overtime** or postpone vacation, but only on exceptional basis. Use it as a possible risk response

Reading recommandation

Read article "**Six Myths of Product Development**", by Stefan Thomke and Donald Reinertsen, Harvard Business Review, May 2012

https://hbr.org/2012/05/six-myths-of-product-development

COST MANAGEMENT

Cost management
Introduction

Orders of magnitude for development costs

- New prescription medicine, over 10 years development, cost about **$2.5 billion**, with out-of-pocket cost of $1.4 billion and time cost of $1.1 billion
- New VW Golf generation: about **$1.2 billion**. Sell about 900k units annually, 6 years per generation, about $250/unit
- BMW new 7 series: spent **$800 mio**, production of 50k units per year, on average 7 years per generation, about $2'300/unit
- Apple Newton: development cost of about **$500 mio**, sold 300k units in total or $1700/unit (sold $1000 each…)
- iPhone 1: development cost of about **$150 mio**, product discontinued in July 2008, sold 6 mio units, about $25/unit
- Sony's Gran Turismo video game: development cost of **$60 mio**
- BOBST quality control system: **3 mio CHF**, about 10 kCHF/unit
- BOBST new sensor: **1 mio CHF**, about 500 CHF/unit
- BOBST new electronic board: **0.1 mio CHF,** about 10 CHF/unit

Cost management
Introduction

Project cost management is difficult exercise

- A third of all projects were successfully completed on time and on budget over the past year (Standish Group)
- According to IBM study, only 40% of projects meet schedule, budget and quality goals (Harvard Business Review 2004)
- Average large IT project runs 45% over budget, 7% over time, and delivers 56% less value than expected (Project Management Institute: Pulse of the Profession 2015)
- One in six IT projects have an average cost overrun of 200% (Harvard Business Review 2004)

Cost management
Introduction

Most frequent pitfalls with cost and time estimations

- Lacked clear definition of scope, deliverables and product specs
- Lacked proper change management during project (scope creep)
- Erroneous project planning
- Accepted to start project knowing that allocated time-to-market or budget was too tight
- Underestimated impact of resource multitasking and time for project synchronization (status meetings, schedule updates, project-related emails, interactions with team members, brainstorming, …)

Cost management
Introduction

Additional unknowns impacting cost and time estimations

- Poor risk management, e.g. underestimate task difficulty or number of iterations, especially for projects with high innovation content
- Other project uncertainties not captured and addressed in risk analysis
- Unplanned interferences with other projects, change of project priorities
- Resources not available as planned (sickness, resignations, …)
- Delays induced by internal / external suppliers

Cost management
Introduction

Additional human factors impacting cost and time estimations. Extra safety buffers are introduced in planning…

- Extra padding (= comfort buffers) in task duration given by resources
- Additional padding added by project manager

… and later wasted!

- **Student syndrome** – Resource fully applies itself to task at last possible moment before deadline (“I have time since I put a buffer”)
- **Parkinson’s law** – “Work expands so as to fill the time available for its completion” (e.g. perfectionism, unnecessary features added)
- **Dependencies between tasks**: delays are passed to next activities, but early finish are not

Cost management
Activity estimation

For each work package, estimated effort in hours and cash-out.
Example with case study for one work package

Mechanical support 1.3

WP 1.3 Mechanical support ACTIVITY	MOYEN 50%	OPTIMISTE 20%	PESSIMISTE 80%	(4+1+1)/6	Cash-out	Fait par	Estimé par	Remarque
P3 sous-total P2								
Lighting module								
• Définir forme et composants mécanique Lighting Module	6	4	12	7		MTR	MLY/MTR	
• vérifier aspects dilatation thermique	6	4	12	7		FPI	MLY/MTR	
Miroirs & Vitre								
• Calculer la forme et les tolérances pour les miroirs	80	80	80	80		FPI	MLY/MTR	
• Définir fixation miroir	8	8	8	8		MTR	MLY/MTR	
• Rechercher fournisseurs injection & métallisation	16	4	32	17		MTR	MLY/MTR	
Thermal dissipation (air cooling)								
• Recherche partenaire et analyse concept global	12	8	24	13		FPI	MLY/MTR	
Définir forme du radiateur, débit wr circuit d'air après étude thermique du partenaire	12	8	24	13		FPI	MLY/MTR	
• Définir température de travail du radiateur	4	2	8	4		FPI	MLY/MTR	
• Choisir ventilateur et définir sa fixation	4	2	8	4		MTR	MLY/MTR	
• Design interface entre les deux PCBs et le radiateur	8	4	16	9		MTR	MLY/MTR	
Structure mécanique de base								
• Définir atructure mécanique de modules qui porte cartes, miroirs, glass, radiateurs	40	40	80	47		MTR	MLY/MTR	
• Réaliser étude pour miroirs	16	8	32	17		MTR	MLY/MTR	
• Réaliser étude pour refroidisseur	16	8	24	16		MTR	MLY/MTR	
• Créer dessins de détails	60	40	100	63		MTR	MLY/MTR	
P4 sous-total P4								
• Suivi fabrication pièces pour Lighting module	8	8	8	8		MTR	MLY/MTR	
• Suivi fabrication miroirs et vitre	8	8	8	8	CHF 10'000.00	MTR	MLY/MTR	Moule à réaliser
• Suivi fabrication refroidisseurs	8	8	8	8	CHF 2'000.00	MTR	MLY/MTR	
• Assemblage général	16	8	24	16		MTR	MLY/MTR	Assemblage d'un système à 10 modules
• Corriger les dessins (structure, miroirs et vitre, refroidisseurs)	20	15	40	23		MTR	MLY/MTR	
P5 sous-total P5								
• Suivi fabrication et corriger pièces pour Lighting module	8	4	16	9		MTR	MLY/MTR	
• Au besoin correction miroirs et vitre	6	4	12	7		MTR	MLY/MTR	
• Suivi fabrication et correction refroidisseurs	6	4	12	7		MTR	MLY/MTR	
• Assembler le tout	24	8	32	23	CHF 3'000.00	MTR	MLY/MTR	Prix des retouches
• Corriger les dessins (structure qui tient le tout, miroirs et vitre, refroidisseurs)	20	15	40	23		MTR	MLY/MTR	
Suivi première serie	20	15	40	23		MTR	MLY/MTR	
• Documentation & introduire dans SAP	24	16	40	25		MTR	MLY/MTR	
Total	456	333	740	**483**	**CHF 15'000.00**			

Cost management
Project cost estimation

As project progresses, cost estimation becomes more precise

- Project Scope Statement is preliminary: +/- 50%
- When requirements are well defined: +/- 25%
- When detailed specifications are approved: +/- 10%

Cost management
Project cost estimation

To determine project cost: aggregate cost of all work packages, without forgetting

- **Project management cost**, including time for meetings (e.g. 8-15 % of total effort)
- **Material cost** (e.g. new test equipment)
- **Travel cost** (e.g. to visit suppliers and first customers, visit trade fairs)
- **Supplier cost for outsourced work packages**, estimated based on budgetary or firm quotations
- **Fixture costs** (e.g. necessary during product production and testing)
- **Cost for prototypes and pre-series** (sold with lower margin)
- **Warranty cost**

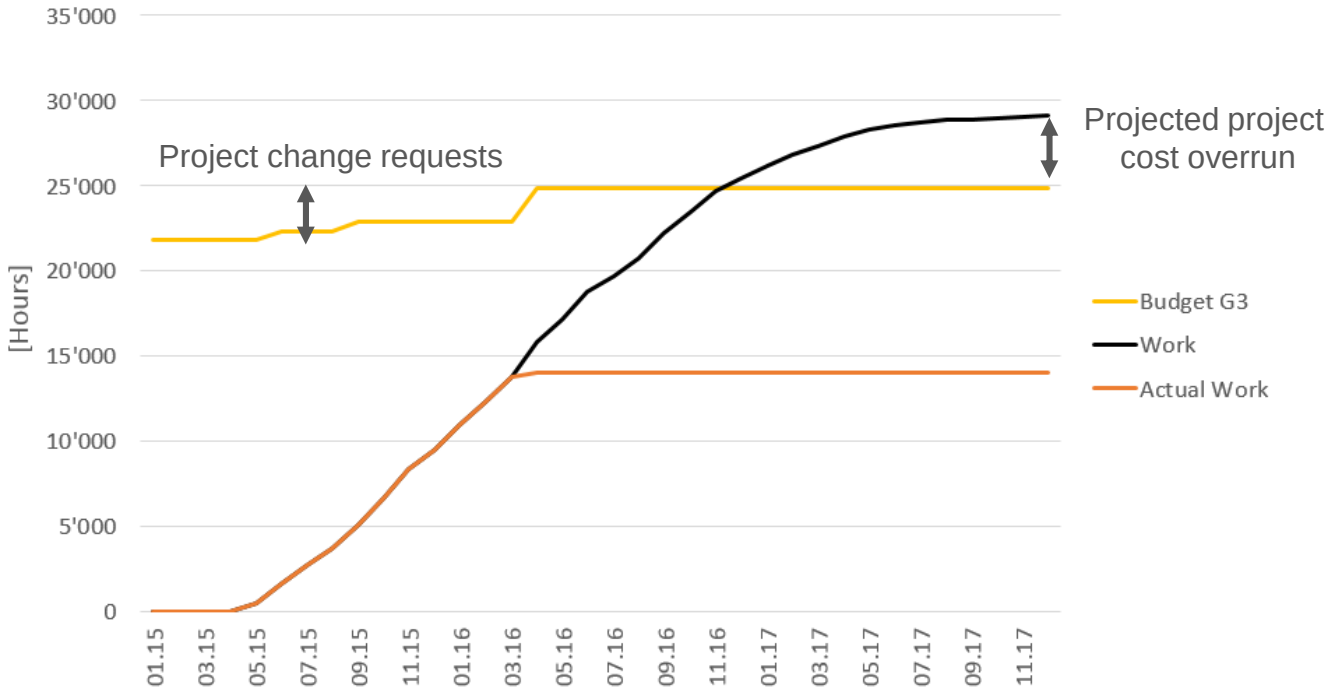
Cost management
Project cost estimation

Example with case study

		WP description	Labor (hrs)	Cash-out (SFr)	TOTAL (SFr)	Ratio (%)
WP 1.0		MasterLight	3293	38000	SFr. 350'819	16%
	WP 1.0	Lighting system	3293	SFr. 38'000	SFr. 350'819	
WP 2.0		GoldenLight	1640	17000	SFr. 172'768	8%
	WP 2.1	Lightingsystem	1640	SFr. 17'000	SFr. 172'768	
	WP 2.2	Main power supply	0	SFr. 0	SFr. 0	
WP 3.0		ScratchLight	0	0	SFr. 0	0%
	WP 3.1	Lighting module	0	SFr. 0	SFr. 0	
	WP 3.2	Main power supply	0	SFr. 0	SFr. 0	
WP 4.0		Acquisition Unit	2533	SFr. 1'500	SFr. 242'167	11%
	WP 4.1	Caméra - Qualification & choix	467	SFr. 0	SFr. 44'333	
	WP 4.2	Camera - Cooling	244	SFr. 1'000	SFr. 24'180	
	WP 4.3	Acquisition board 70 KHz	474	SFr. 500	SFr. 45'498	
	WP 4.4	System calibration	1349	SFr. 0	SFr. 128'155	
WP 5.0		Industrialization	1120	SFr. 73'000	SFr. 179'400	8%
	WP 5.1	Manuf. Documents	0	SFr. 0	SFr. 0	
	WP 5.2	Prod. tests bench, tooling's	0	SFr. 0	SFr. 0	
	WP 5.2.1	R&D Tests & bench (ML+GL)	83	SFr. 1'000	SFr. 8'917	
	WP 5.2.2	Production Test Bench Ctrl-CC	96	SFr. 2'000	SFr. 11'120	
	WP 5.3	Prod support / ramp-up	0	SFr. 0	SFr. 0	
WP 6.0		Vision Treatment	7053	SFr. 6'000	SFr. 676'035	30%
	WP 6.1	Vision software	4421	SFr. 2'000	SFr. 421'995	
	WP 6.2	MSS	2632	SFr. 4'000	SFr. 254'040	
WP 7.0		Trials, toolings & Doc	3164	SFr. 10'000	SFr. 310'548	14%
	WP 7.0	Divers et Gestion	60	fr. 0.00	5700.-	
	WP 7.1	Tests and validation (3 application	2144	fr. 0.00	203680.-	
	WP 7.2	Production simulators	292	fr. 10'000.00	37708.-	
	WP 7.3	CC & Field procedures	163	fr. 0.00	15517.-	
	WP 7.4	End user documentation	253	fr. 0.00	24067.-	
	WP 7.5	Training documentation	251	fr. 0.00	23877.-	
WP 8.0		System integration	1035	fr. 5'000.00	SFr. 103'357	5%
	WP 8.1	New machine				
	WP 8.1.1	Mechanic integration	557	fr. 0.00	52947.-	
	WP 8.1.2	Harness & Cables	277	fr. 3'000.00	29315.-	
	WP 8.1.3	Cabinet	0		.-	
	WP 8.1.4	Calibration tools	201	fr. 2'000.00	21095.-	
WP 9.0		Project Management	1984	SFr. 0	SFr. 188'459	8%
	WP 9.1	Gestion WP CORES (10%)	1984	SFr. 0	SFr. 188'459	
TOTAL			21822	SFr. 150'500	SFr. 2'223'554	100%
PROJECT BUDGET					SFr. 2'223'554	

Cost management
Project cost control

Cost control means comparing budgeted costs with actual costs at different stages of project. Shall be done on regular basis, e.g. monthly. Cost followed with S-curve displaying cost (e.g. project hours) vs time



Cost management

Companies often focus attention on project cost and **neglect cost of time** !

Statistics indicate that following variations are equivalent in product development if one considers cumulated profit over product lifetime

- ± 50 % development cost
- ± 10 % product cost
- ± 4 % sales price
- ± 3 months product introduction date

Sensitivity analysis can be done to identify major drivers behind cumulated profit and to drive decisions during project (e.g. trade cost for time)

Cost management

"In a market with 20% annual growth and 12% price-drop per annum, technological products which **arrive on the market six months late but on budget generate 33% less profit over five years**, whereas **getting the product to market on time but 50% over budget only reduces profits by 4%“**

Study by Ali and al. in 1995

STAKEHOLDER MANAGEMENT

Stakeholder management

Early in project, project manager must identify stakeholders involved in project. With stakeholder analysis, he determines their interest, expectations, influence and authority level

- Key Project stakeholders are **individuals and organizations that are actively involved in the project**, or whose interests may be positively or negatively affected as a result of project execution or project completion. They may also exert influence over the project and its results.
- Stakeholders can have **positive (or negative) influence** if they see benefit from successful outcome (if they see negative outcome from project success, respectively). Negative stakeholders are often overlooked. All stakeholders have different (conflicting) interests and expectations

Stakeholder management

Identify key stakeholders

- Customers / product users
- Project sponsor, Project Manager, Steering committee members, project team
- Marketing, Sales, Purchasing, Production, Service, Finance, …
- Existing / new suppliers
- Functional managers
- Project Management Office (PMO), coordinates management of projects in company
- Regulation bodies
- Government, lobby groups or any influencing groups
- Competitiors

Stakeholder management

Examples

- Supplier management was major issue for Apple when one of its suppliers, Foxconn, suffered 18 suicides in 2010. It brought to the attention of the world the poor working conditions of suppliers employees

- Greenpeace and other agencies drew public attention on Apple's reliance on coal to power its servers (55%), along with its high and increasing electricity consumption

Stakeholder management

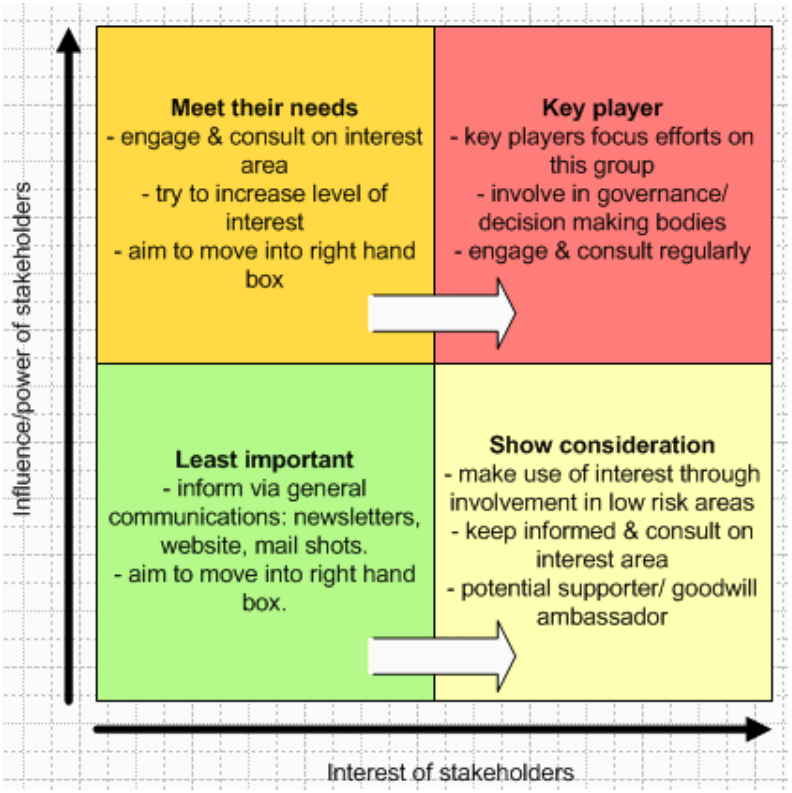
Poor stakeholder management is a frequent source of project failure. Good communication from project manager is crucial

- **Influence of stakeholders is greatest at project beginning** (mainly because the cost of change increases as project progresses). To better serve stakeholder's interests, important to **involve stakeholders as early as possible**. Address concerns and issues of stakeholders as soon as they arise

- But **project manager is also in charge of protecting project objectives** (scope, time, costs, quality) from impact of unnecessary changes

Stakeholder management

Project manager shall define communication strategy for important stakeholders



Stakeholder management

Stakeholder register is used to identify stakeholders, their power, interest and influence levels. The project manager shall define a communication strategy to maximize positive benefits and minimize negative benefits for the project

Name	Power level	Relation	Interest	Influence	Knowledge	Strategy
Leer Berti	Director	Sponsor	High	Project sponsor	High-level	Manage closely and involve frequently
Tim Leedherr	Manager	Neutral	Medium	Provide resources	No	Contract resource allocation and share resource usage plan
Kon Trohler	Manager	Neutral	Medium	Control finances	No	Inform about contracts & provide payment release notes
Chan Gehall	Manager	Opposed	High	Tried to impose another solution	Detailed	Neutralized
Future users	Members	Resistor	High	Will use the system	Medium	Get requirements, inform, train and involve when testing

CHANGE MANAGEMENT

Scope management
Scope evolution

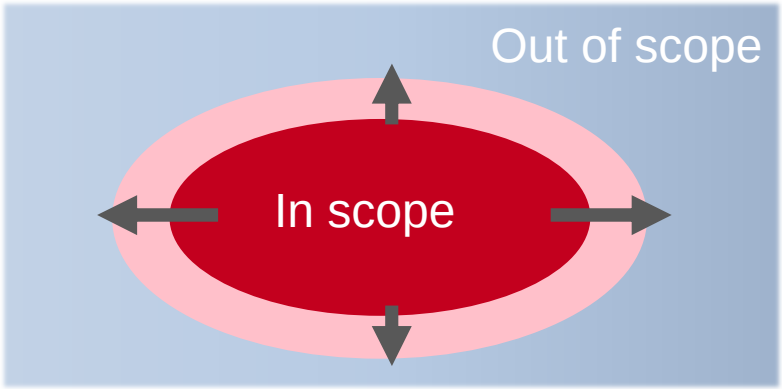
Some **changes to product requirements during development phase are unavoidable**, e.g. due to

- New ideas (e.g. from marketing, R&D, beta customers, suppliers)
- Changes in competitive landscape (e.g. new function on competing product)
- New regulations
- Issues with supply chain or suppliers (e.g. obsolescence announcement)

Example: Apple switched from plastic touchscreen to glass display after Steve Jobs confronted the team with his own iPhone screen, scratched by keys in his pocket. They called up Corning and convinced them to jump back into their abandoned Gorilla Glass efforts shortly before the iPhone was announced - a great pivot at the last minute.

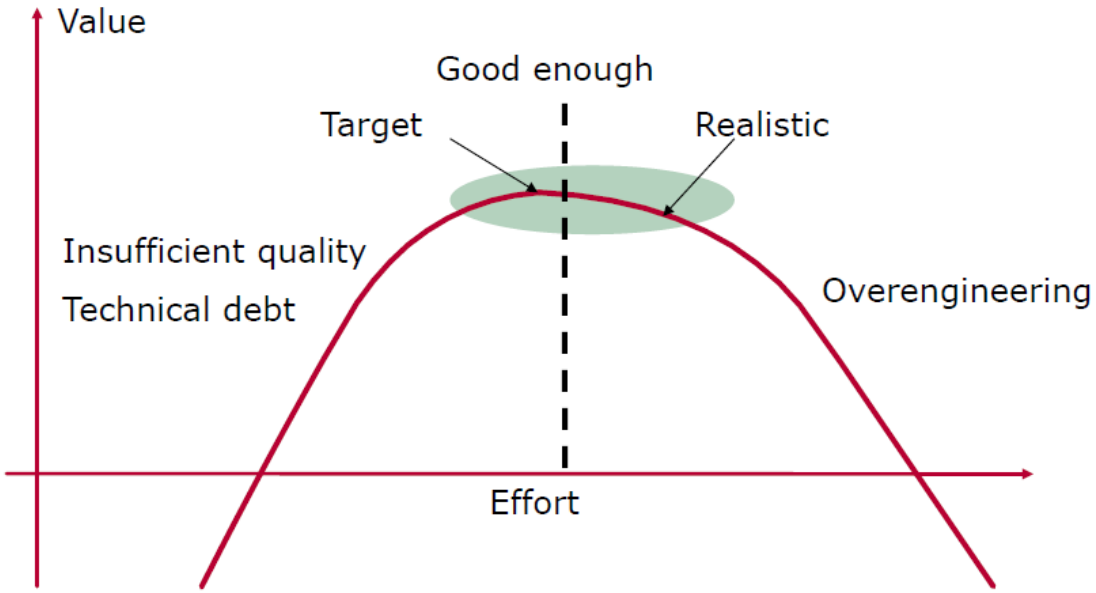
Scope management
Scope evolution

Beware of scope creep (also called requirement / function / feature creep): uncontrolled changes or continuous growth in project scope. This can occur when the scope of a project is not properly defined, documented and controlled. Project manager must formalize demands using change requests



Scope management
Scope evolution

Deliver only useful functions that customers are ready to pay for. Avoid cluttering product with unnecessary features. Over engineering, most often from internal origin (Marketing and R&D), shall be avoided!



Change management
Scope evolution

During project lifecycle, stakeholders will come with legitimate (and also useless) change requests. **Project manager must assess them and quantify their impact on**

- Scope
- Schedule
- Quality
- Project risk
- Product cost
- Project cost

Project manager must then validate impacts with internal customers or project steering committee

Scope management
Scope evolution

Example with case study

PROJECT CHANGE REQUEST

Project Title: MultiLight **Date Prepared:** 20.04.2016

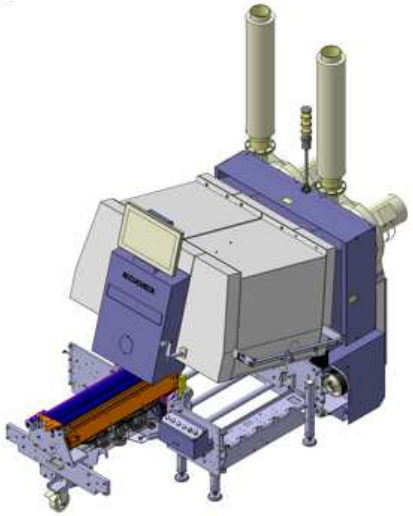
Person Requesting Change Project manager **Change ID:** ML_0000007

Detailed Description of Proposed Change

In the initial scope of the project, the iQ 500 module was installed in the machine as per the iQ 400. After the first trials several problems have been highlighted :

- The casing reduces the accessibility to the iQ 500 module when the upper part is opened. This is due in part to the low opening angle of the upper part.
- The vacuum tubes / cleaning system decreased the accessibility to the iQ 500 module.

It was agreed that the maintenance of the system is not possible in these conditions. Consequently, it has been proposed to modify the system (machine and iQ 500 module) to allow the reading unit of the iQ 500 to be pulled off from the machine.



PROJECT CHANGE REQUEST

Justification for Proposed Change

The request is justified to improve access for maintenance and the installation of the iQ 500 module onto the machine.

Impacts of Proposed Change (as evaluated for CORES deliverables)

Scope	☐ No change	☒ Increase	☐ Decrease
Description: • The iQ 500 CC frame must be adapted to allow the reading unit to be slipped out of the module open side. • Electrical wires and hydraulic tubes must be guided to withstand the stresses of the in-and-out movement of the reading unit. • Investigations and calculations must be performed to estimate the potential twist of the reading unit when placed on the ground. This is very important to ensure that calibration settings applied outside the machine stay valid when the reading unit returns to normal position inside the machine. • The safety of the maintenance personnel must be guaranteed. This point is more critical if the reading unit must be operated while it is pulled out of the machine.			
Quality	☒ No change	☐ Increase	☐ Decrease
Description: It is mandatory that the position of the reading unit into the machine is perfectly repeatable.			
Requirements	☒ No change	☐ Increase	☐ Decrease
Description: nothing to highlight			
Project risk	☐ No change	☒ Increase of 10kCHF	☐ Decrease
Description: We must ensure that the reading unit is not twisted when it is pulled out of the machine. This can distort all calibrations performed outside the machine when the unit is re-installed in the machine.			

Scope management
Scope evolution

PROJECT CHANGE REQUEST

Project cost	☐ No change	☒ Increase of 53kCHF	☐ Decrease of x CHF
Description: - Pré-étude : 13h - Modification bâtis luminaire : 13h - Modification bâtis caméra : 13h - Modification de la pièce de liaison inter-bâtis : 13h - Évaluation de la déformation de l'unité de lecteur hors machine : 38h - Inverser l'alimentation : 25h - Étudier les chaines à câble : 25h - Mise à jours des études et dessins : 75h - Calibration : Adaptation module hors machine : 125h - Modification software de sécurité : 80h - Tests and teaching : 80h - Suivi projet: 25h The integration of this modification for first βeta site will eliminate the need for a later update, thus reducing the overall cost.			
Product cost	☒ No change for 50/75/80	☒ Increase of ~1kCHF for 110 machine	☐ Decrease of x CHF
Description: For machines 50/75/80, the reading unit PRE is not impacted. If wires guides are included in the iQ500 BOM this could have a little impact. A more important change is for 110 machine: in order to standardize a unique mechanical solution for all machine widths, it has been decided to keep a full width lighting unit while the inspection width remains 800mm. PRE impact for 110 machine is around 1'500 CHF.			
Schedule	☐ No change	☒ Increase of 2 weeks for Beta site ; 4 weeks for series	☐ Decrease of x days
Description: The teams will be focused on integrating this Change Request for the Beta site. Consequently, the remaining work for the series machine is shifted.			
Documents	☐ No change	☒ Increase	☐ Decrease
Description: Update production documents. Adapt mounting and maintenance procedures.			

PROJECT CHANGE REQUEST

Decision CORES ☒ Approve ☐ Defer ☐ Reject

Justification:

The update of the existing installations are not part of this Change Request.

Change Control Board Signatures:

Name	Role	Signature
xx	*Project manager CORES*	
xx	*Project manager Folder-Gluers*	

Date: 22.04.2016

Exercice

Using GanttProject, **create planning for design, procurement, assembly and test of the first prototype**. Focus only on mechanical parts, assume that the battery, motors, charging station, electronics, firmware and software bricks are available. You have maximal 3 mechanical engineers available to work on project. How long does your team need to demo the first realistic-looking working prototype? What will it cost to the company (hours and cash-out)?