Global Software Engineering Assignment – Global Task Allocation

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FYI: FR is France, NZ is New Zealand, KH is Cambodia, VN is Vietnam and SZ is Switzerland.

Project Description

The main aim of the project is to develop a quality computer system for luxury sports car which include human user interface for recently established auto-manufacturer based in Italy (Turin). Our company head office is located in France (Paris), we have three offshore in-sourcing sites like Vietnam (Hanoi), New Zealand (Auckland), Cambodia (Phnom Penh) and one offshore out-sourcing site Switzerland (Geneva). Budget of the project is €6, 300, 000 and should be completed within 18 months, waterfall model is used for development.

Project phases and time taken for completion are as follows:

Project Phases (waterfall model)	Period(calendar months)
Analysis	3 months
Design	3 months
Development	6 months
Test Planning	3 months
Test Execution	6 months

Task Assignment Summary

The task allocation to sites is done and is represented in the table. The sites that are allocated to work are marked with an X.

	Analysis		Design				Development					Test Planning			Test Execution		
ID	**FR**	**NZ**	**FR**	**NZ**	**KH**	**SZ**	**FR**	**VN**	**NZ**	**KH**	**SZ**	**FR**	**NZ**	**VN**	**FR**	**VN**	**NZ**
1																	
1.a.																	

1.a.i.		**X**		**X**					**X**				**X**				**X**
1. a.ii.		**X**		**X**					**X**				**X**				**X**
1.a.iii.		**X**		**X**					**X**				**X**				**X**
1.a.iv.		**X**		**X**					**X**				**X**				**X**
1.b.																	
1.b.i.		**X**		**X**					**X**				**X**				**X**
1.b.ii.		**X**		**X**					**X**				**X**				**X**
1.b.iii.		**X**		**X**					**X**				**X**				**X**
1.b.iv.		**X**		**X**					**X**				**X**				**X**
1.c.																	
1.c.i.		**X**		**X**					**X**				**X**				**X**
1.c.ii.		**X**		**X**					**X**				**X**				**X**
1.c.iii.		**X**		**X**					**X**				**X**				**X**
1.c.iv.		**X**		**X**					**X**				**X**				**X**
1.c.v.		**X**		**X**					**X**				**X**				**X**
2																	
2.a.	**X**		**X**					**X**				**X**				**X**	
2.b.	**X**		**X**					**X**				**X**				**X**	
2.c.	**X**		**X**					**X**				**X**				**X**	
2.d.	**X**		**X**					**X**				**X**				**X**	

3																
3.a.	X		X				X					X			X	
3.b.	X		X				X					X			X	
3.c.	X		X				X					X			X	
4																
4.a.	X		X				X					X			X	
4.b.	X		X				X					X			X	
4.c.	X		X				X					X			X	

Task Distribution Strategy

This section describes why tasks were allocated to each site. The given project is globally distributed across three sites, the head office at Paris (France), subsidiary at Auckland (New Zealand) and the subsidiary at Hanoi (Vietnam). We have followed module based task distribution model for the given project. Modules are distributed among all sites as we have limited resources present at each site.

Analysis Phase

Analysis phase is divided among the sites France and New Zealand, as there are no analysts in other sites. The modules information, control and critical from safety are assigned to New Zealand and remaining modules are assigned to France. The entire module is given to single team in order to diminish the communication problems.

Safety-(Information, control and critical):

Safety is import for a sport car, so modules information, control and critical are assigned to New Zealand. This is because the analysts in New Zealand have vast experience in developing computer systems for cars in the Asia-Pacific region, including Japan and America. Also, the number of analysts in New Zealand are more when compared to France which increases the quality.

Entertainment, Satellite navigation and Comfort:

The modules control, entertainment and comfort are assigned to France site. This is because the software is developed for European cars and France site may find it clear to work on the modules satellite navigation, comfort and entertainment.

Design Phase

Design phase is divided among the sites France, New Zealand. In order to complete with time they can start modules simultaneously. We have given this module to two teams in order to decrease communication and coordination problems.

Safety-(Information, control and critical):

The modules information, control and critical are given to the New Zealand site. This is because that that the analysis phase is given to same site, so it may decrease the communication gap and is easy for the designers. This site also has good reputation in developing software for cars in Asia-Pacific region.

Entertainment, Satellite navigation and Comfort:

The modules satellite navigation, entertainment and comfort have gone through analysis phase in France site. So it is easy for the France team. These modules require customer interaction and is possible at the head office (France). These modules also require European conditions for designing the comfort level, entertainment (music system, radio) and local maps for navigation, which is possible in France. So France site is selected for designing these modules.

Development Phase

Development phase is divided among the sites France, New Zealand and Vietnam. The modules Information, control and critical are given to New Zealand site. Modules satellite navigation and comfort are given to France. Entertainment module is given to Vietnam.

Safety-(Information, control and critical):

The modules Information, control and critical are given to New Zealand site. This site has handled these modules in analysis phase and design phase, so they can easily develop the module with improved quality. Also they have reputation of building computer system for sports car.

Satellite navigation and Comfort:

The modules satellite navigation and comfort are given to France site. This site has handled these modules in analysis and design phase. So the developer team can develop the code with an ease.

Entertainment:

The Vietnam site has junior developer and has less experience in this project when compared to other sites. So we have decided to include this site in developing the module entertainment which is relatively less important when compared to others. Training is given by France and New Zealand experts to develop the project and it is calculated in the budget. This helps the junior developers get some experience and is used for future projects.

Test Planning Phase

Test planning phase is distributed among the sites New Zealand and France. Since there is no resources in other sites we have chosen New Zealand and France. Modules Information, control and critical are given to New Zealand and the modules entertainment, satellite navigation and comfort are given to France site.

Safety-(Information, control and critical):

The modules Information, control and critical were handled by New Zealand in the previous phases. So New Zealand site is selected for test planning of these modules, which decrease communication gap and reduces coordination problem for the teams

working in this phase. This site also has more number of experienced tester when compared to France, which increase the quality of the product.

Entertainment, Satellite navigation and Comfort:

The modules entertainment, safety and comfort are given to France site as these modules are relatively less important and require less man power when compared to other modules. Also France site has handled these modules in analysis and design phases, therefore we can save time in test planning phase and increase the stability of the modules.

Test Execution Phase

Test execution phase is distributed among New Zealand, France and Vietnam. The modules information, control and critical are given to New Zealand. Entertainment module is given to Vietnam site. Modules satellite navigation and comfort are given to France site.

Safety-(Information, control and critical):

These modules are handled by New Zealand site in all the phases and it is easy for them to work on the modules without any dependencies and communication problems. This will finish the modules with increased quality in less time.

Satellite navigation and Comfort:

The modules satellite navigation and comfort are handled by France site in all the phases and it makes ease for them to work on these modules. So that the communication and coordination problems are not present.

Entertainment:

This module is developed by the Vietnam site. As this site has junior testers, we could not provide them with important modules. We have provided them with entertainment module which is relatively less important. So that they can get training from the France and New Zealand experts and work on the module. This helps them to gain project experience and get prepared for the future projects.

Project Management Effort

The project management effort required in each phase is detailed for each site in Table 1. In each phase the project management effort is equal to approximately 10% of the budgeted work.

Table 1 Project Management Effort by Phase and Site (Person Months)

	Analysis		Design				Development					Test Planning			Test Execution		
ID	FR	NZ	FR	NZ	KH	SZ	FR	VN	NZ	KH	SZ	FR	VN	NZ	FR	VN	NZ
Estimated Effort – Budget	12.0	21.25	14.50	54	0	0	29.0	8.25	57.50	0.0	0.0	9.50	0	31.75	31.75	7.0	60.75
Project Mgmt Effort	1.2	2.1	1.4	5.4	0	0	2.9	0.8	5.2	0	0	0.9	0	3.0	3.1	0.7	6.0

Overall Project Responsibility

France site is responsible for the overall delivery of the project. At the end of each phase integration is done at the head office. Therefor France (head office) site has sufficient project management effort allocated for each phase to ensure satisfaction to the customer on final delivery of the project. As France site is in same time zone with the customer (Italy), it has direct interaction with the customer and is easy to gather requirements. The project management effort for each phase is used to monitor the performance properly. The individual effort is mentioned in table 1.

Analysis Phase

The project management effort allocated for this phase is summarised as:

Effort for phase	33.2 person months	(a)
PM effort for phase	3.3 person months	(b)
Percent PM Effort	10%	(b) / (a) * 100

France and New Zealand sites are involved in this phase as there are no analysts in the other sites. As analysis is the crucial phase in the software development, a minor change causes extra effort and cost. SO project management effort is required at both sites to mitigate redundancy, communication and improve coordination between sites. The project management for analysis phase is 3.3 person months.

Design Phase

The project management effort allocated for this phase is summarised as:

Effort for phase	68.0 person months	(a)
PM effort for phase	6.8 person months	(b)
Percent PM Effort	10%	(b) / (a) * 100

France and New Zealand sites are selected for this phase. The project management effort for this phase is more when compared to analysis phase, as the design phase is most important phase which helps to know the architecture of the project. This phase

requires more project management effort to make efficient design. The project management effort for this phase is 6.8 which is sufficient for the two sites.

Development Phase

The project management effort allocated for this phase is summarised as:

Effort for phase	94.75 person months	(a)
PM effort for phase	8.9 person months	(b)
Percent PM Effort	9.3%	(b) / (a) * 100

This phase is distributed among France, New Zealand and Vietnam. This is the important phase of the project as the functionality of the project depends on it. As there are three site each and every site should have individual management for development. Finally integration should be done by all managers at the head office France and check its functionality. The project management effort for this phase is 8.9, which is sufficient for the sites to develop.

Test Planning Phase

The project management effort allocated for this phase is summarised as:

Effort for phase	41.25 person months	(a)
PM effort for phase	3.9 person months	(b)
Percent PM Effort	9.45%	(b) / (a) * 100

France and New Zealand sites are selected for this phase. As the two sites already have worked these modules in the previous phases, so they can write effective test cases for the project. The project management effort for this phase is less when compared to previous phase as the modules are worked by the same teams in all the phases. For this phase project management effort is 3.9 person months which is sufficient for the sites.

Test Execution Phase

The project management effort allocated for this phase is summarised as:

Effort for phase	99.5 person months	(a)
PM effort for phase	9.8 person months	(b)
Percent PM Effort	9.8%	(b) / (a) * 100

France, New Zealand and Vietnam are selected for this phase. In this phase junior testers from Vietnam work with experts from New Zealand and France to check the quality of the product. This phase requires a lot of project management effort in order to complete the project without any problems. Project management effort in this phase is used to check whether the testers following proper plan or not. The project management effort for the phase is 9.8 person months which is sufficient for the sites.

Integration Effort

As the tasks will be completed by different people, and perhaps even in different sites some integration effort will be required in this project. Table 2 details the integration effort budgeted for each site and phase.

The integration effort is calculated as (number of day allocated for integration/22)*(number of persons allocated), which is the person months per site and phase. Here 22 is the number of working days in a month.

Table 2 Integration Effort (Person Months per Site and Phase)

	Analysis		Design				Development					Test Planning			Test Execution		
ID	FR	NZ	FR	NZ	KH	SZ	FR	VN	NZ	KH	SZ	FR	VN	NZ	FR	VN	NZ
Effort	0.1	0.1	0.1	0.1	-	-	0.6	0.6	0.6	-	-	0.1	0.1	-	0.4	0.4	0.4

Analysis Phase

The integration effort for analysis phase is done at France site. Since France is the head office and we can give phase end updates to the customer as planned in communication plan. In this phase an analyst from New Zealand site visit head office for integration and it takes for 2 days. The integration effort for a particular site is 0.1 person months. There -fore the work required for integration is less as both the analysts from France and New Zealand are accomplished.

Persons allocated for integration =2 (from France, 1 from New Zealand)

Days allocated for integration=2

Integration effort for analysis phase = (2/22)*2=0.2

Design Phase

The integration for this phase is done at France site. As it is mentioned earlier France is the head office and is near to the client, so we felt that this site is better for integration. In this phase a designer from New Zealand visit France for integrating the design phase. The integration effort required for the phase is less, as both the designers are expert in this tasks. The integration effort for this phase is 0.2 and 0.1 person months is sufficient for single site.

Persons allocated for integration =2(from France, 1 from New Zealand)

Days allocated for integration=2

Integration effort for design phase = (2/22)*2=0.2

Development Phase

Integration for this phase is done at France. As mentioned in the communication plan, each phase is updated to the client at the end of each phase. The code developed is integrated at the head office. Developer from New Zealand and Vietnam visit France site for integration. This event is carried for 15 days and developers are available to

clarifying any doubts in the code. The integration effort in this event is more when compared to other phases. This phase demands more integration effort as its important phase in the development of the software. The integration effort for this phase is 2.04 and 0.62 for each site.

Persons allocated for integration =3(from France, 1 from New Zealand, 1 from Vietnam)

Days allocated for integration=15

Integration effort for development phase = (15/22)*3=2.04

Test Planning Phase

The integration for test planning is done at France site. This is because France is the head office and is in the same time zone that of the customer. So it is easy to interact with the customer regarding any doubts. In this phase tester from New Zealand visit France for 2 days to integrate. This phase requires less integration effort, as both the testers are experts. The integration effort for this phase is 0.2 person months and 0.1 person months for a site is required.

Persons allocated for integration =2(from France, 1 from New Zealand)

Days allocated for integration=2

Integration effort for Test planning phase = (2/22)*2=0.2

Test Execution Phase

The integration for the test execution phase is done at France site. As France is the head office and have the facility to direct contact with customer without any time zone differences. In this phase testers from New Zealand and Vietnam come to integrate the modules with France testers. This phase requires additional effort for integration, as it's a final phase of the project and should be handed over to the customer. The integration effort for this phase is 1.2 person months and 0.4 person months for a site is required.

Persons allocated for integration =3(from France, 1 from New Zealand, 1 from Vietnam)

Days allocated for integration=9

Integration effort for development phase = (27/22)*3=1.2

Communication Plan

This section describes events, meetings and training sessions held within the project.

The time differences between sites used are mentioned in order to get a better communication strategy.

- Vietnam is 5 hours ahead of France.
- New Zealand is 11 hours ahead of France.
- New Zealand is 6 hours ahead of Vietnam.

Time differences between Vietnam and France is 5 hours, so communication is carried out daily through voice/video conferences. Time differences between New Zealand and Vietnam is 6 hours, this can be managed by working in shifts in important phases to patch up time. Time difference between New Zealand and France is 11 hours, as both

sites previous experience in the global projects and have reputation in their development. So communication is carried through emails, documents and block on daily basis.

Event 1

Initial, we need to conduct project initiative event at head office France. In this event project managers from France, New Zealand and Vietnam take part in meeting. Customer and project director are also present in the meeting. The event is held in face to face meeting and conducted at the beginning of the project at head office. This helps the project managers to know the exact requirements the customer needs and delivery date of the project. This also helps in improving trust factor among sites and release friction between them. The project managers from other sites stays in hotel till the end of the event and leave to their sites. Dinner party is present in the event, this cost are budgeted in table 4. The travel and hotel costs are budgeted in table 3.

Event 2

In this event, kick-off meetings are held at the initial phase of the module at each site internally. This meeting are held as face-to-face. The project manager, team leader and team members of the site are participated in the meetings. This helps the project manager to assign roles and tasks to team members of the local site. There is no need for cost in this event.

Event 3

In this event, the status and updates of the module in each phase is reported to head office for every two weeks. This helps the project director to know the status of the project. This event is performed in emails, blogs and documents. The project managers send the updates of the module and work status to the head office through email. There is no cost required for the event.

Event 4

This event is carried out at the end of each phase. At the end of each phase the client gets updates about the project from head office. The client enlightens himself about the progress of the project by attending a meeting at the head office. The project director also participate in the meeting. This event helps to increase client's satisfaction level by showing him the progress of the project.

Event 5

In this event modules need to be integrated at the end of each phase to continue to the next phase. This event is conducted at the head office France. Experts from New Zealand show up after the completion of each and every phase. Junior developers and testers from Vietnam site also attend this event at the end of development and test execution phases. This event is held in face-to-face meeting. This event helps the participants to get better understanding of the work and can discuss about the next phase. The travel cost is budgeted in table 3.

Event 6

In this event, an expert from each site France and New Zealand visit Vietnam site to train junior developers and testers. This training is done for 20 days and is done at the

beginning of development phase and test execution phase. This helps the junior developers and tester to get exposure to the project and make them ready to the future project. The travel and other costs are budgeted in table 3.

Event 7

Video conferencing is done in this event. This event is done for once in a month. In this event we use skype to communicate with each other, as it has extra added options for communication. Every employee involved in the project is participated in the event. The schedule of the event is managed by taking the overlapped working hours of the employees. This event helps to develop trust and share knowledge among the employees and improve co-ordination between sites. This event doesn't require any cost.

Event 8

In this event final meeting is at head office. This event is held after the completion of the project. Project director, customer and project managers from New Zealand, Vietnam and France visit this meeting. This is a face-to-face meeting. The project demonstration is done to the customer. Customer also gets knowledge about the project to distribute for future use. The travel costs and expenditure costs are budgeted in table3.

Event 9

In this event party is given to each and every employee at their respective sites. Cost are bared by management. This event is celebrated after the completion of the project. This event shows the success of the teams. The costs are budgeted in table 3.

Additional Human Effort

Additional human effort is calculated and included in the budget excel sheet.

Activity 1

Training at Vietnam site for development phase:

This activity takes place in development phase at Vietnam. Expert developers from France come to Vietnam and train junior developers for 20 days. This activity runs in the development phase and helps the junior developer to get project exposure and knowledge about the project. The travel and hotel costs of the expert developer are budgeted in table 3.

Activity 2

Training at Vietnam site for test execution phase:

In this activity testers from France visit Vietnam site for training. This activity runs in the beginning of the test execution phase. Expert testers from France give training to the junior testers to exposure to the project and gain knowledge about the project. The travel and hotel costs are listed in table 3.

Additional Costs

This section details cost other than human capital. All costs are in Euro (EUR). This section descries about the travel, hotel and food costs. At the beginning of the project, a project initiative meeting is held at the head office. All Managers from Vietnam and New Zealand visit the head office France. The flight costs and hotel costs are listed in the table 3. Integration for all the phases is done at the head office France. Each phase is integrated at the head office. So the managers from New Zealand and Vietnam visit the head office at the end of each phase for integration. The travel and hotel costs are listed in table3. The expert developers and tester from France visit Vietnam for training. Flight and hotel costs are list in the table. The final meeting at the head office is also budgeted in table 3.

Table 3 Travel Costs

Item	Comment	Unit Cost	Quantity	Total
Flight: New Zealand to Vietnam	1 person, return	742	2	1484
Flight: France to Vietnam	1 person, return	600	2	1200
Hotel: Vietnam	1 person, 1 night	80	2	160
Flight: Vietnam to New Zealand	1 person, return	742	0	0
Hotel: New Zealand	1 person, 1 night	90	2	180
Flight: France to New Zealand	1 person, return	950	2	1900
Flight: New Zealand to France	1 person, return	950	9	8550
Flight: Vietnam to France	1 person, return	700	7	4900
Hotel: France	1 person, 1 night	120	16	1920
			GRAND TOTAL	**20294**

Other costs are summarised in Table 4

Table 4.

Table 4 Other Costs

Phase	Item	Unit Cost	Quantity	Total
Start of the project	Big dinner party at the head office	30	10	300
Analysis phase	Analysis software	180	2	180
Design phase	Design tools (Rational rose)	200	2	200
Development phase	Development tools	170	3	170
Testing phase	Testing tools	300	3	300
End of the project	Dinner party at the head office	40	10	400
All phases	Communication tools hardware and software's	400	4	1600
			GRAND TOTAL	**3150**

Budget

A summary of the budget is presented in Table 5.

Table 5 Budget Summary

Item	Amount (EUR)
Human Capital (From Excel)	4739869
Travel Costs	20294
Other Costs	3150
Grand Total	***4763313***

Risks

The total budge utilized for the project (grand total) is € 4763313. We assume 10% variance to the utilized budget which is +10% € 5239644 or -10% € 4286981. The increase in budget is due to the variance in flight charges, hotel costs and other costs. After the incremental variance the budget of the project doesn't exceed 6300000. After all the extra costs there is profit for the management. There is no threat in budget, as we have a profit of 10 million euros after variance in the costs. The total budget and profits are shown in table below:

Table: total profit after variance

Total budget	€ 6300000
Grand total after 10% variance	€ 5239644
Total net profit after 10% variance	€ 1060366

Risks

The major risks faced by this project are listed in Table 6.

Table 6 Major Project Risks

Risks	Likelihood	Impact	Mitigation/Reduction Strategy
Trust factor	High	High	• Regular face to face meeting are conducted among team members to gain trust. • Informal meeting are held to improve the trust factor and reduce communication gap. • Motivation should be given to

Risks	Likelihood	Impact	Mitigation/Reduction Strategy
			the team members about trust factors. • Communication tools are used to know the status of the project and gain trust factor
Communication factor	High	High	• Face to face interactions among Project manager should be held through video conferencing. • Creating blogs for active participation in discussion
Lack of expert in Vietnam site	low	High	• Effective training should be given to the junior developers and testers for 20 days by experts from France. So they can get knowledge and exposure to the project.
Cost over-load	Medium	High	• Proper planning should be done by the project director to utilize the resources and plan to improve quality simultaneously.
Failure of database	Low	High	• Day to day backup should be done in separate database. Date should be kept redundant and stored in separate media.
Stress among employees	Medium	High	• Management should take care of this issue by providing free hours for sports, coffee break to relax for some time.
Customer satisfaction	High	High	• Customer should be involved for phase end meeting, such that review is given to the teams for further improvement.
Adaptability of junior developers and testers	Medium	High	• Proper orientation should be given. • Motivation should be given

Risks	Likelihood	Impact	Mitigation/Reduction Strategy
			by experts to adapt in the field.
Missing deadlines	Medium	Medium	• Project manager of the particular site should make the work completed within time.
Modification of requirements	Medium	High	• Change in requirements is avoided after the completion of requirement specification document.
Problems in hard/software for communication	Medium	High	• Every site should have same version of software and similar hardware for communication to mitigate this risk.