CMMI process for:

APS – AutoPilot cars for roads in Serbia

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| CMMI level | Project areas | Specific goal | Specific rules | Artefact | Description of applying rules in current project, possible improvements, references on other papers, … |
| 1 | Requests initialization |  |  | Idea of solutions | This project is about modifying autopilot software for road in Serbia. In Serbia, the driving of motor vehicles is extremely difficult due to the numerous holes on the roads, inadequate marking, road signs and poor lighting of individual sections. This greatly complicates the use of autopilot vehicles. This can provide a possibility to a large number of people to use autopilot vehicles, and also provide a possibility to people incapable of driving to use vehicles at all. This idea may also be a stimulus for other countries to follow this example. |
| 2 | Requirements  Management | Requirements  Management | Uspostaviti sporazum o zahtevima |  | Collect all requests from different parties of interest. Categorize based on possibilities and importance. |
| Uspostaviti obaveze ka zahtevima |  | Achieve all success criteria and milestones for each request accepted. |
| Upravljati promenama zahteva |  | For each change in requests, try to be as flexible as possible. |
| Održavati bidirekciono preslikavanje zahteva |  | Achieve regular and meaningful communication between all parties part of project, especially:  Administration, management, project architects  And  Developers, users, … |
| Identifikovati protivurečnosti između  projektnih aktivnosti i zahteva |  | Detect all contradictions between project development and requests, on time, and handle them properly. |
| Standardize management process | Uspostaviti organizaciona pravila |  | Design a detailed plan for every step of project and guidelines for better following of that plan. |
| Isplanirati proces |  | Design a detailed plan of project in Trello. |
| Obezbediti resurse | Projektni plan | Provide vehicles, autopilot software, equipment for developers, environment for test drives |
| Dodeliti odgovornosti | Projektni plan | Share responsibilities on all partners, as equal as possible, by using their expertise as guideline. |
| Obučiti osoblje | Plan treninga ili  projektni plan (ako  postoji u njemu) | Improve knowledge of specifics on autopilot software we plan to modify, on all levels of developing, and some of management. |
| Upravljati konfiguracijama | Plan upravljanja  konfiguracijama | Scheduling regular meetings to discuss configurations of parties based on current objectives of project. |
| Identifikovati i uključiti bitne učesnike |  | Scheduling short but regular meetings that will serve as progress reports and invite all representatives of participant groups, regardless of their role in the project. Consider all ideas proposed. |
| Kontrolisati i pratiti proces |  | Keep track of functional demands in project, and in witch period they should be enabled. Make mini-tests that will confirm the fullfilling of them. Handle all possible problems and latency. |
| Objektivno proceniti idejna zastupanja |  | Schedule meeting for all partners in which they will present their ideas about how the see the future project development. Consider all ideas equally. |
| Izvršiti reviziju statusa sa menadžmentom  višeg nivoa |  | Make progress reports regularly and present them to management.  Management must determine the validity of task success. |
| Project planning | Utvriditi procene | Definisati domen projekta |  | Main domain is Serbia, but big picture suggest widening on all poorly developed counties of Europe. |
| Definisati procene radnih proizvoda i  zadataka |  | Define estimations of costs and contributions, for each part of project: tasks, products, management, |
| Definisati životni vek projekta |  | Unlimited (developing for two years, and maintaining as long as needed) |
| Definisati procene potrebnih napora i cene |  | Define estimations of costs and contribution of the entire project |
| Razviti projektni plan | Utvriditi budžet i raspored |  | Make a small global project fund, with certain amount used for unexpected expenses. Define budget for each phase of project. Make sure it is sufficient and returned to fund if unspent. |
| Identifikovati projektne rizike |  | 1. Tesla and Korean partners declining collaboration 2. Unsafe software, doesn’t pass testing phase 3. Not enough money for all phases |
| Plan za menadžment podataka |  | Making database for detailed analysis of roads. Make it accessible to all relevant parties and designed to improve understanding and getting data quickly. |
| Plan za projektne resurse |  | Make plan for providing all resources described above. |
| Plan za potrebna znanja i veštine |  | Make detailed plans of time and subjects of meetings, where will be performed: consulting with experts from Tesla and Korean partners |
| Isplanirati učešća |  | Make detailed plans for all project phases, about which partners will be involved and what their duties will be. |
| Ustanoviti projektni plan |  | Use all plans described above to make a project plan, on very high level of detailing. |
| Pridržavati se plana | Izvršiti reviziju projektnog plana |  | Make a reviewed project plan after every short meeting where ideas are discussed, that will include ways to cover those ideas, if accepted. |
| Pomiriti radne aktivnosti i dostupne resurse |  | Make sure that all funding of the project is equally divided to all teams, scaled to needs of phase. Make sure that money is returned in global project fund if unspent. |
| Isticati obaveze propisane planom |  | Track and control all project plan activities and make sure that all are fullfilled with maximum degree. |
| Kontrola i praćenje  projekta  (Project Monitoring and Control) | Praćenje projekta  upoređivanjem sa planom | Pratiti parameter projektnog plana |  | Keep track of project plan activities, so project plan can be changed if needed. |
| Pratiti obaveze |  | Keep tracking of every task, using Trello tool |
| Pratiti projektne rizike |  | Track all risks mentioned above, design possible solutions in case of issues and inform higher instances of status. |
| Pratiti upravljanje podacima |  | Maintain data base in state of consistency. |
| Pratiti angažovanje bitnih učesnika |  | Keep track of every participants enrolment and task status in Trello |
| Sprovoditi revizije zbog procene napretka |  | Do progress reports of regular bases, design algorithms for problem handling if needed. |
| Sprovoditi revizije u ključnim tačkama |  | Do special progress reports at the end of each phase that will serve as checkpoints to establish if project plan needs to change. |
| Upravljati akcijama  korekcije | Analizirati probleme |  | All problems detected must be documented and passed to superior as soon as possible. |
| Preduzimati akcije korekcije |  | All problems during project’s life must be corrected in minimal time. |
| Upravljati akcijama korekcije |  | Management must be able to quickly: analyze issue passed to him and decide who to in charge of fixing. |
| Konfiguraciono upravljanje (Configuration Management) | Ustanoviti osnove | Identifikovati stavke konfiguracije |  | Incremental development |
| Ustanoviti sistem za konfiguraciono  upravljanje |  | Coordinator: must monitor collaboration between all teams. |
| Kreirati osnove za objavljivanje |  | Develop modules in each incremental phase that will be delivered for estimation. |
| Pratiti i kontrolisati  promene | Pratiti zahteve za promenama |  | Coordinator must keep track of all changes and inform relevant team leaders. |
| Kontrolisati stavke konfiguracija |  | Coordinator will use some tool to keep the track of every detail. |
| Formirati integritet | Formirati beleške za konfiguracioni  menadžment |  | Design notes based on results of tool mentioned above. |
| Izvršiti konfiguracione procene |  | Do estimations of given configuration, in detail, and pass it to all teams. |
| (Supplier Agreement  Management) | Uspostaviti sporazume | Odrediti tip nabavke |  | Vehicles: import + license  Software: license, documentation  Equipment: suitable for programmers  Environment: rented car tracks |
| Izabrati isporučioce |  | Partners (Tesla, Korean), Serbia road society |
| Uspostaviti sporazume sa isporučiocima |  | License for import and renting. Approval of received resources. |
| Pridržavati se sporazuma | Napraviti pregled COTS proizvoda |  |  |
| Pridržavati se sporazuma |  | Hire legal team. |
| Prihvatiti isporuku odgovarajućeg proizvoda |  | Ensure bill and confirmations needed. |
| Izvršiti transport proizvoda |  | Control import of cars and equipment transport. |
| Measurement and  Analysis | Sproveste aktivnosti  merenja i analiza | Odrediti ciljeve merenja i analiza |  | Detailed study of road conditions. |
| Precizno odrediti mere |  | Damages, marking, light |
| Precizno odrediti procedure za prikupljanje i  čuvanje podataka |  | Gathering: Questioners, test drives  Storage: database |
| Precizno odrediti analitičke procedure |  | Design measuring and statistical algorithms. |
| Obezbediti rezultate  merenja | Prikupiti rezultate merenja |  | Questioners, test drives |
| Analizirati rezultate merenja |  | Size, shape of damages,  How inappropriate is the marking and lighting |
| Čuvati podatke i rezultate |  | database |
| Povezati rezultate |  | For calculating statistical data |
| Process and Product  Quality Assurance | Izvršiti objektivnu  evaluaciju procesa i  radnih proizvoda | Objektivno evaluirati procese |  | Processes must match ones described in project plan. |
| Objektivno evaluirati proizvode i servise |  | Products must match specification of demands. |
| Obezbediti objektivan  uvid | Povezati i obezbediti rešenja problema usled  nekompatibilnosti |  | Make progress reports on time, and handle inconsistencies in early phases of project. |
| Obezbediti beleške |  | Document every phase. |
| 3 | Upravljanje rizicima  (Risk Management) | Izvršiti pripremu za  upravljanje rizicima | Odrediti izvore i kategorije rizika |  | 1. Tesla and Korean partners declining collaboration 2. Unsafe software, doesn’t pass testing phase 3. Not enough money for all phases |
| Definisati parametar rizika |  | 1. Success of project 2. time 3. quality |
| Definisati strategiju za upravljanje rizicima |  | 1. Use high level convincing techniques. 2. Small frequent tests during implementation 3. Hire an economic expert to design a good plan for spending. |
| Identifikovati i analizirati  rizike | Identifikovati rizike |  | 1. Project failure 2. Longer project 3. Quality decreases, project stop till money found |
| Izvršiti kategorizaciju i prioritiranje rizika |  | Risks are mentioned above in order based on priority. |
| Ublažiti posledice rizika | Razviti plan za ublažavanje posledica rizika |  | 1. Plan a different contract 2. Analyze errors and make plan to fix them 3. Plan dissemination |
| Primeniti plan za ublažavanje posledica rizika |  | 1. Try to make a different contract 2. Do fixing of errors 3. Do more dissemination in order to get more investors |
| Integrational Unification | Ustanoviti strukturu tima | Identifikovati zadatke |  | Split project into work packages, and each into tasks. |
| Identifikovati potrebna znanja i veštine |  | Analyze expertise of each partner. |
| Identifikovati članove tima |  | In charge team leader for tasks there are best to complete. |
| Upravljati radom tima | Ustanoviti zajedničko okruženje |  | Rent conference rooms for management meetings. |
| Ustanoviti okruženje za rad |  | Rent offices for programmers. |
| Definistai uloge i odgovornosti |  | Define responsibilities of each team. |
| Ustanoviti radne procedure |  | Define procedures that every team must follow. |
| Obezbediti saradnju sa interfejsnim timovima |  | Ensure collaboration between front-end and back-end. |
| Integrated Supplier Management | Analizirati i izabrati  snabdevače | Analizirati potencijalne snabdevače |  | / |
| Evaluirati i izabrati snabdevače |  | Tesla and Korean partners |
| Koordinisati rad sa  snabdevačima | Pratiti radne aktivnosti izabranih snabdevača |  | Ensure participating in regular meetings. |
| Evaluirati radne proizvode izabranih  snabdevača |  | / |
| Izvršiti reviziju sporazuma i odnosa |  | Check all licenses and agreements. |
| Integracija proizvoda  (Product Integration) | Izvršiti pripreme za  integraciju proizvoda | Odrediti tok integracije |  | Establish time frame for implementing each module, and combining them into whole. |
| Ustanoviti valjano okruženje za integraciju |  | All resources acquired. |
| Ustanoviti procedure i kriterijume integracije |  | All modules must be functional and well tested before integration. |
| Obezbediti  kompatibilnost interfejsa | Vršiti reviziju opisa samih interfejsa |  | / |
| Upravljati interfejsima |  | Keep compatibility with Tesla |
| Izvršiti sklapanje i  dostavljanje proizvoda | Potvrditi spremnost komponenti za  integraciju |  | Testing each component individually. |
| Sklopiti komponente |  | Integration procedures followed. |
| Izvršiti evaluaciju |  | Test whole integrated software. |
| Spakovati i dostaviti proizvod i komponente |  | Integrated software prepare for field tests. |
| Verifikacija  (Verification) | Izvršiti pripreme za  verifikaciju | Izabrati radne proizvode za verifikaciju |  | Whole software. |
| Ustanoviti okruženje za verifikaciju |  | Tracks (highways, mountain roads, city roads, …) |
| Ustanoviti procedure i kriterijume  verifikacije |  | Driving according to traffic laws and rules. |
| Izvršiti stručno  ocenjivanje | Izvršiti pripreme za stručno ocenjivanje |  | Form a team of expert drivers. |
| Sprovesti stručno ocenjivanje |  | Conduct test drives |
| Analizirati stručno ocenjivanje i podatke |  | Gather and analyze data from test drives. |
| Izvršiti verifikaciju  izabranih radnih  proizvoda | Izvršiti verifikaciju |  | Confirm success or failure of each test. |
| Analizirati rezultate i identifikovati akcije  korekcije |  | Document all success/failure data and reasons (in case of failure) |
| Validacija  (Verification) | Izvršiti pripreme za  validaciju | Izabrati proizvode za validaciju |  | Choose one model of each producer from partners. |
| Ustanoviti okruženje za validaciju |  | Form a team of expert drivers. |
| Ustanoviti procedure i kriterijume validaciju |  | Conduct example drives that show all implemented abilities. |
| Izvršiti validaciju  proizvoda i njegovih  odabranih delova | Izvršiti validaciju |  | Do validation |
| Analizirati rezultate validacije |  | Document all satisfy/unsatisfied data and reasons (in case of unsatisfied) |
| Organizational training | Ustanoviti mogućnosti  organizacije za  sprovođenje procesa obuke | Ustanoviti potrebe za obukom |  | / |
| Odrediti potrebe u nadležnosti organizacije |  | / |
| Odrediti plan obuke |  | / |
| Ustanoviti mogućnost sprovođenja treninga |  | / |
| Izvršiti potrebno  treniranje | Izvršiti treniranje |  | / |
| Voditi zapise o treniranju |  | / |
| Proceniti efektivnost treniranja |  | / |
| Organizational Process Definition | Ustanoviti povoljne  okolnosti procesa na  nivou organizacije | Ustanoviti standardne procese |  | Dividing participants into teams and organizing internal structure of management organization. |
| Ustanoviti opise modela |  | Define a detailed model of management and responsibilities system. Organize hierarchy and superior-inferior communication forms. |
| Ustanoviti kriterijume i uputstva za krojenje |  | / |
| Ustanoviti skup merenja na nivou  organizacije |  | Define principles of good communication and relationship, and validate it during project duration. |
| Ustanoviti biblioteku povoljnih okolnosti |  | / |
| Organizational Process Focus | Odrediti mogućnosti za  poboljšanje procesa | Ustanoviti potrebe organizacionih procesa |  | Define meeting types and number of each type needed.  Apply SCRUM methodology to our project |
| Proceniti organizacione procese |  | / |
| Identifikovati poboljšanja |  | Document each idea elaborated on short-idea-meeting described above and process it properly. |
| Izvršiti planiranje i  implementaciju akcija za  poboljšanje organizacionih procesa | Ustanoviti planove za preduzimanje akcija |  | Make a detailed plan on online tools and report format used for process organization. |
| Implementirati planove |  | Use upper mentioned tools for organization process. |
| Koristiti poboljšanja/povoljne aktivnosti |  | / |
| Ugraditi stečena iskustva i poboljšanja |  | Share experiences with other teams, in order to avoid repeating same errors. |
| Integrated Project Management | Koristiti definisani process  za projekat | Ustanoviti definisan proces |  | Make an organization plan for management of entire project |
| Iskoristiti povoljne okolnosti za planiranje  projektnih aktivnosti |  | / |
| Integrisati planove |  | Make small detailed plans to explain better parts of organization not explained detail in big organization plan. |
| Upravljati projektom na osnovu planova |  | Follow the plan mentioned above. |
| Poboljšati skup povoljnih okolnosti |  | / |
| Sarađivati sa bitnim  ulagačima | Upravljati učešćem ulagača |  | Keep track of all investors in project and make detailed documentation on each investment. |
| Upravljati zavisnim vezama |  | Provide some commercial to sponsors (logos, …) |
| Rešavati koordinacione probleme |  | If a problem occurs in collaboration with sponsors, detect it, analyze it and work on solving it. |
| Koristiti zajedničko  razumevanje za IPPR | Definisati kontekst zajedničkog razumevanja |  | / |
| Uspostaviti zajedničko razumevanje |  | / |
| Organizovati integralne  timove za IPPR | Organizovati timsku strukturu u okviru  projekta |  | / |
| Obezbediti preliminarnu distribuciju zahteva  odgovarajućim timovima |  | / |
| Ustanoviti timove |  | / |
| Decision Analysis and Resolution | Izvršiti evaluaciju  alternativnih rešenja | Ustanoviti uputstva za analizu odluka |  | Design a plan to estimate properties of Tesla autopilot software. |
| Ustanoviti kriterijume evaluacije |  | Performances and safety. |
| Identifikovati alternative |  | / |
| Izabrati metode evaluacije |  | Testing |
| Izvršiti evaluaciju |  | Make estimation of properties of Tesla autopilot software. Detect flaws. |
| Izabrati rešenja |  | Choose parts of Tesla’s autopilot software that will be improved and adjusted to roads in Serbia. |
| Organizational Integration Environment | Obezbediti IPPR  infrastrukturu | Ustanoviti deljeno razumevanje na nivou  organizacije |  | / |
| Ustanoviti radno okruženje za integraciju |  | / |
| Identifikovati jedinstvene veštine kao  podršku |  | / |
| Upravljati ljudima | Ustanoviti liderske mehanizme |  | Make a management structure and define responsibilities of each lieder. |
| Ustanoviti podstreke za integraciju |  | Develop strategies for motivating workers: wage bonuses, rewards for most valuable and hardworking, … |
| Ustanoviti mehanizme za balansiranje  odgovornosti |  | Develop a plan for responsibilities sharing that will be an equal burden for each participant. |
| 4 | Organizacione  performance procesa (Organizational Process Performance) | Uspostaviti bazne linije za  performanse i modele | Odabrati Procese |  | Make a list of all processes, whose performances have greatest impact on the entire system. |
| Uspostavljanje mera za performanse procesa |  | Define properties that show performances of those processes and their flaws in best way. |
| Uspostavljanje ciljeva za kvalitet i  performanse procesa |  | Define a frame of adequate values for performances of each of those processes. |
| Uspostaviti bazne linije za performanse  procesa |  | / |
| Uspostaviti modele za performanse procesa |  | / |
| Quantitative Project Management | Kvantitativni projektni  menadžment | Uspostaviti projektne ciljeve |  | Design a document that will list all goals of our project and elaborate them with details. |
| Komponovati definisani proces |  | Make a detailed plan on how to achieve those goals. |
| Odabrati podprocese na koje će se primeniti  statističko upravljanje |  | / |
| Upravljati performansama projekata |  | Design a detailed plan of achieving and maintaining desired performances of project (management, developing, and dissemination). |
| Statistički upravljati  performansama  podprocesa | Odabrati tehnike za analizu i merenja |  | / |
| Primeniti statističke metode kako bi se  razumele varijacije |  | / |
| Pratiti performanse odabranog podprocesa |  | / |
| Zabeležiti podatke specifičnog upravljanja |  | / |
| 5 | Causal Analysis and  Resolution | Odrediti uzroke defekata,  Specifična praksa | Odrediti uzroke defekata |  | Detect all possible defects and software flaws, by using documentation and testing. Determine causes of those failures. |
| Analizirati uzroke |  | Analyze all causes of bad software performance and determine importance and possible avoiding techniques. |
| Adresirati uzroke  defekata,  Specifična praksa | Implementirati akcione predloge |  | Implement techniques for avoiding causes of bad software performance. |
| Proceniti efekte promena |  | Analyze impact of changes mentioned above |
| Zabeležiti podatke |  | Make a detailed documentation on both causes, their appearance frequency and impact on software, as well as improvement level by using upper mentioned techniques. |
| Organizational Performance Management | Upravljati poslovnim  performansama | Održati poslovne ciljeve |  | Maintain and occasionally validate goals of the project and in what amount are they followed and fullfilled. |
| Identifikovati i analizirati inovacije |  | Document each idea elaborated on short-idea-meeting described above and process it properly. |
| Analizirati podatke za performanse procesa |  | Validate performance of software. |
| Odabrati poboljšanja | Otkriti predložena poboljšanja |  | Schedule several meetings in late phases of project, in which we will discuss possible improvements of the software and dissemination techniques. If needed, few can be organized for improving management system. |
| Analizirati predložena poboljšanja |  | Make a detailed analysis of suggestions elaborated on meetings mentioned above: through cost-benefit relations. |
| Validirati poboljšanja |  | Confirm that those improvements do not harm desired behavior defined by gathered participant and user requests. |
| Odabrati i implementirati poboljšanja za razmeštanje |  | Choose ideas which will be implemented from the set described above, and in charge teams which will conduct it. |
| Sprovesti poboljšanja | Planirati razmeštanje |  | Make a detailed plan on organization and conducting implementation of chosen improvements. |
| Upravljati razmeštanjem |  | Management must guide this as well as regular implementation. All changes must be documented. |
| Proceniti efekte poboljšanja |  | Determine contribution off each improvement. Is it, at the end, bigger than its cost? |