

Project created on 08.09.2016 13:53.

# Report for project Senior Design Electronic book

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Task created on 10.11.2016 02:18.

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## Design Specs

*No due date*

*No description*

Task tags: *No tags*

Completed by Utsav Malla on 10.11.2016 02:56.

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### **Step 1:** Design Specs

Worked on some tentative design sketches for our prototype splint. These sketches will form the foundation of our design process from here on forth. I have also included the design specs within the sketch.

### Activity of task Design Specs

10.11.2016 02:18 *Utsav Malla* created task **Design Specs**.  
 10.11.2016 02:33 *Utsav Malla* created Step 1 **Design Specs**.  
 10.11.2016 02:34 *Utsav Malla* commented on Step 1 **Design Specs**.  
 10.11.2016 02:37 *Utsav Malla* edited Step 1 **Design Specs**.  
 10.11.2016 02:37 *Utsav Malla* edited Step 1 **Design Specs**.  
 10.11.2016 02:55 *Utsav Malla* edited Step 1 **Design Specs**.  
 10.11.2016 02:56 *Utsav Malla* completed Step 1 **Design Specs** (1/1 completed).

### Samples of task Design Specs

*No samples*

Task created on 10.11.2016 02:06.

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## Literature Review

*No due date*

*No description*

Task tags: *No tags*

Completed by Shirshak Aryal on 11.11.2016 03:16.

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### ➔ Step 5: Paper 5- Shirshak

Esselman, Peter C., et al. "Burn rehabilitation: state of the science." American Journal of Physical Medicine & Rehabilitation 85.4 (2006): 383-413. Relevant Information: Hand burn rehabilitation 50% of hand burns in America occurs in work environment. Treatment of burns to the hands includes early excision and grafting, range of motion, splinting, pressure garments and reconstruction. Individuals affected by severe hand burns can be healed with aggressive treatment and reconstructive surgery, with these they will have better chance of regaining good functional use of their hand. Rehabilitation also has same basic principles described for treatments (above). Additionally, edema management is important for rehabilitation, due to dependent position of the hands. 1) Use of Coban wraps with other standard gauzing and dressings helps to decrease edema in hands. 2) Jobst Intermittent Compression pumps also somewhat helps to reduce edema. 3) Standard pressure garment gloves help to improve the ability of hands to perform functional tasks better compared to pressure garment work glove. 4) Splinting also helps in rehabilitation of hand burns by maintain functional position and function. 4) Reconstructive surgery is another important technique for rehabilitation from hand deformities and contractures. 5) Joshi External Stabilizing system helps to treat and rehabilitate from claw deformity, palmar contracture, and webspace deformity caused by hypertrophic scarring, after initially removing the scarring via surgery.

Completed by Shirshak Aryal on 11.11.2016 02:05.

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### ➔ Step 2: Paper 2- Utsav

Edgar, Dale, and Megan Brereton. "Rehabilitation after burn injury." BMJ329.7461 (2004): 343-345. Pressure garments are the primary intervention in scar management. Applying pressure to a burn is thought to reduce scarring by hastening scar maturation and encouraging reorientation of collagen fibres into uniform, parallel patterns as opposed to the whorled pattern seen in untreated scars. Garments need to be tailored to patients' requirements and are often influenced by the type of surgery completed. Patients should generally be measured for garments at five to seven days after grafting surgery, and these should be fitted as soon as they are available. A pressure garment lasts for about three months; after that time it is helpful to re-measure patients frequently to accommodate the changing dimensions of the scar. If people have moderate to severe burns around the neck or face, an acrylic face mask must be considered. This provides conforming pressure over the face and neck. Material masks can also be made for patients to wear at night. For areas of persistent scarring that have not responded well to pressure garments, further scar management techniques must be considered. These include the use of massage, moisturising creams, and contact media.

Completed by Shirshak Aryal on 11.11.2016 01:53.

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### ➔ Step 8: Paper 8- Shirshak

"Message Therapy Canada",  
<http://www.massagetherapycanada.com/technique/burn-rehabilitation-1411>  
 Relevant Information: There are three different types of burns: 1) Superficial 1st

degree burn, where epidermis is partially damaged, so skins heals itself overtime with no scar tissue formation usually. 2) Superficial partial thickness burn: destruction of epidermis layer and a moderate damage to upper dermis. Skin redness, localized swelling etc are the symptoms. Takes much longer time to heal. 3) Deep Partial Thickness burn, 2nd degree: complete destruction of epidermal layer and severe damage in dermal layer. Since dermal layer, sweat gland and sebaceous gland is damaged scar tissues are formed and healing process is very difficult and long. 4) Full thickness third degree burn: Full destruction of epidermis, dermal layers and subdermal layers. Phases of Healing: Two types of healing process, depending on skin layers that has been damaged: Epithelialization (occurs when only superficial damage takes place is epidermis) and scar tissue formation. For epithelialization, healthy epidermal cell will divide via mitosis and self heal without scar tissue formation. For scar tissue formation process, healing element is already damaged in epidermis due to deep burn. Thus dermal healing process involves the deposition of collagen, leading to the formation of a scar. The dermal healing process is longer (up to three years before the scar matures) and often results in pervasive scarring. There are three phases within scar formation: Exudative phase, granulation phase and remodeling phase. Scar Management is one of the main aspect of rehabilitation. In developed countries, team of therapists closely monitors the healing and maturation of the scar with the goal being the development of a good quality scar which is characterized as being flat, pale and pliable. Although, there is no definite science to prove the mechanism behind how muscle therapy helps, they have been found to be useful in reducing scar thickness, banding, adhesions, and increasing the mobility and pliability of the scar. Different massage techniques involves: frictions, s-bowing, skin rolling and stretching, useful for scar tissue treatment and management. the application of massage techniques may distort the collagen fibres and may also break up the bonds forming adhesions between layers of tissues or between the collagen fibres. This may account for the softening of restrictive fibrous bands, increase the inter-fibre movement not only in the scar tissue but also between soft tissue layers resulting in greater tissue mobility. Since collagen is characterized as being rather in-elastic, the idea of elongating or stretching the burn scar is questionable. Massage are also found to be helpful to reduce severe itching, edema, pain and skin hyper-sensitivity. Likewise, massage also helps to stimulate movement between the muscle fibres, resulting in more fluid muscle movement, this help prevents soft tissue dysfunction of compensatory structures, further it addresses spasms, tightness and adhesion issue faced by soft tissue post burn. Only downside is that the application of massage technique, may realign fibers in symmetrical way, rather than normal random manner, which might affect the overall appearance and pliability of scar tissue formation. However, there is insufficient scientific evidence on the effects or the effectiveness of massage therapy in the treatment of burn scar tissue.

Completed by Shirshak Aryal on 11.11.2016 02:05.

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#### ➔ Step 4: Paper 4- Utsav

Paudel, P. Dahal BR. "Pattern of Burn patients admitted in a Burn Unit of Bir Hospital Kathmandu." Post-Graduate Medical Journal of NAMS 10.02 (2010). The report revealed that burn commonly occurs due to domestic fire and women are found more vulnerable group for burn related injuries. The report also reveals that

due to current poor socioeconomic condition and lack of proper infrastructure, recovery is slow and hospital stay is prolonged. Outcome of the treatment and morbidity differs in patients. The total body surface area more than 40% has the higher mortality rate. Prevention and management of burn are the necessity of the developing countries. The report also presents a study that revealed that 69 % of cases are in the age group of 16 - 35 years. Females were affected more in the age group of 16-25 years. The involvement of females in domestic activities may be the main factor for burn injuries in female. The age distribution revealed by the present study is similar to that found in other studies.

Completed by Shirshak Aryal on 10.11.2016 21:52.

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### ➔ **Step 7:** Paper 7- Shirshak

Liu, E. H., et al. "A 3 year prospective audit of burns patients treated at the Western Regional Hospital of Nepal." Burns 24.2 (1998): 129-133. Relevant information: Report gives trends of burn patient in rural Western part of Nepal, collected for 3 years. Patient with more than 40% of total body burns didn't survive due to lack of proper rehabilitation after initial medical intervention, as burns are usually managed by untrained and non medical professional. Most people cannot afford medical care. Annual death reported in that area was 1700. Due to poverty and ignorance public education and awareness has not been conducted yet. Cold season in Nepal has increased burns than summer. 64% of the burns were flame burns. The common form of flame burn was due to house fire (about 55%) and traditional cooking method, about 40% (cooking stoves, lamps and firewood stoves) and 5% other form. Thus, it can be said that almost all the burns were from household origin and related to cooking. There were more female patient with burns than male, and also greater mortality and greater risk ratio 2.07: 1 compared to male. 61% of the patient with domestic burns were children under 15 years. Although accepted in 1997, report was fully published by 2000 upon some modification.

Completed by Shirshak Aryal on 10.11.2016 02:27.

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### ➔ **Step 9:** Bibliography

*No description*

### 📊 Activity of task Literature Review

10.11.2016 02:06 *Shirshak Aryal* created task **Literature Review**.  
 10.11.2016 02:13 *Shirshak Aryal* created Step 1 **Paper 1**.  
 10.11.2016 02:13 *Shirshak Aryal* created Step 2 **Paper 2**.  
 10.11.2016 02:13 *Shirshak Aryal* created Step 3 **Paper 3**.  
 10.11.2016 02:14 *Shirshak Aryal* created Step 4 **Paper 4**.  
 10.11.2016 02:14 *Shirshak Aryal* edited Step 2 **Paper 2**.  
 10.11.2016 02:14 *Shirshak Aryal* created Step 5 **Paper 5**.  
 10.11.2016 02:14 *Shirshak Aryal* created Step 6 **Paper 6**.  
 10.11.2016 02:15 *Shirshak Aryal* created Step 7 **Paper 7**.

10.11.2016 02:15 *Shirshak Aryal* created Step 8 **Paper 8**.

10.11.2016 02:26 *Shirshak Aryal* created Step 9 **Bibliography**.

10.11.2016 02:27 *Shirshak Aryal* completed Step 9 **Bibliography** (1/9 completed).

10.11.2016 02:33 *Nischal Khanal* edited Step 1 **Paper 1 - Nischal**.

10.11.2016 02:33 *Nischal Khanal* edited Step 2 **Paper 2 - Nischal**.

10.11.2016 02:34 *Nischal Khanal* edited Step 2 **Paper 2**.

10.11.2016 02:34 *Nischal Khanal* edited Step 3 **Paper 3 - Nischal**.

10.11.2016 02:38 *Nischal Khanal* edited Step 6 **Paper 6 - Nischal**.

10.11.2016 02:45 *Shirshak Aryal* edited Step 1 **Paper 1 - Nischal**.

10.11.2016 02:54 *Shirshak Aryal* edited Step 2 **Paper 2- Utsav**.

10.11.2016 02:54 *Shirshak Aryal* edited Step 4 **Paper 4- Utsav**.

10.11.2016 02:55 *Shirshak Aryal* edited Step 5 **Paper 5- Shirshak**.

10.11.2016 02:55 *Shirshak Aryal* edited Step 7 **Paper 7- Shirshak**.

10.11.2016 02:55 *Shirshak Aryal* edited Step 8 **Paper 8- Shirshak** .

10.11.2016 17:53 *Shirshak Aryal* edited Step 7 **Paper 7- Shirshak**.

10.11.2016 17:53 *Shirshak Aryal* edited Step 5 **Paper 5- Shirshak**.

10.11.2016 21:51 *Shirshak Aryal* edited Step 7 **Paper 7- Shirshak**.

10.11.2016 21:51 *Shirshak Aryal* edited Step 7 **Paper 7- Shirshak**.

10.11.2016 21:52 *Shirshak Aryal* edited Step 7 **Paper 7- Shirshak**.

10.11.2016 21:52 *Shirshak Aryal* completed Step 7 **Paper 7- Shirshak** (2/9 completed).

10.11.2016 22:58 *Utsav Malla* edited Step 2 **Paper 2- Utsav**.

11.11.2016 01:18 *Utsav Malla* edited Step 4 **Paper 4- Utsav**.

11.11.2016 01:24 *Shirshak Aryal* edited Step 8 **Paper 8- Shirshak** .

11.11.2016 01:25 *Shirshak Aryal* edited Step 8 **Paper 8- Shirshak** .

11.11.2016 01:52 *Shirshak Aryal* edited Step 8 **Paper 8- Shirshak** .

11.11.2016 01:53 *Shirshak Aryal* completed Step 8 **Paper 8- Shirshak** (3/9 completed).

11.11.2016 01:56 *Shirshak Aryal* edited Step 8 **Paper 8- Shirshak** .

11.11.2016 01:59 *Shirshak Aryal* edited Step 7 **Paper 7- Shirshak**.

11.11.2016 02:05 *Shirshak Aryal* edited Step 5 **Paper 5- Shirshak**.

11.11.2016 02:05 *Shirshak Aryal* completed Step 4 **Paper 4- Utsav** (4/9 completed).

11.11.2016 02:05 *Shirshak Aryal* completed Step 2 **Paper 2- Utsav** (5/9 completed).

11.11.2016 02:05 *Shirshak Aryal* completed Step 2 **Paper 2- Utsav** (5/9 completed).

11.11.2016 02:05 *Shirshak Aryal* completed Step 2 **Paper 2- Utsav** (5/9 completed).

11.11.2016 02:05 *Shirshak Aryal* completed Step 2 **Paper 2- Utsav** (5/9 completed).

11.11.2016 02:05 *Shirshak Aryal* completed Step 2 **Paper 2- Utsav** (5/9 completed).

11.11.2016 03:14 *Shirshak Aryal* edited Step 5 **Paper 5- Shirshak**.

11.11.2016 03:15 *Shirshak Aryal* edited Step 5 **Paper 5- Shirshak**.

11.11.2016 03:15 *Shirshak Aryal* edited Step 5 **Paper 5- Shirshak**.  
 11.11.2016 03:16 *Shirshak Aryal* completed Step 5 **Paper 5- Shirshak** (6/9 completed).

💧 Samples of task Literature Review

*No samples*

Task created on 14.11.2016 03:32.

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## 📅 Meeting 11/13/2016

*No due date*

*No description*

Task tags: *No tags*

Completed by Nischal Khanal on 14.11.2016 03:42.

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### ➡ **Step 1:** Meeting at 9:25 PM over hangouts

Discussed upcoming meeting with Dr. Klaesner. We will present our new proposal and design specs to him and see his response. We will continue to review literature and look at other possible solutions and see how we can incorporate them into our solution. The next meeting time for the group is set for Tuesday night at 7PM. We plan to come to the meeting with two alternate solutions to our project.

### 🗄️ Activity of task Meeting 11/13/2016

14.11.2016 03:32 *Nischal Khanal* created task **Meeting 11/13/2016**.  
 14.11.2016 03:42 *Nischal Khanal* created Step 1 **Meeting at 9:25 PM over hangouts**.  
 14.11.2016 03:42 *Nischal Khanal* completed Step 1 **Meeting at 9:25 PM over hangouts** (1/1 completed).

💧 Samples of task Meeting 11/13/2016

*No samples*

Task created on 16.11.2016 01:26.

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## 📅 Non-Splint Related Solution

*No due date*

*No description*

Task tags: *No tags*

Completed by Shirshak Aryal on 16.11.2016 02:50.

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### ➡ **Step 2:** Other solutions

Found other existing solutions for burn rehabilitation. List includes: 1) Use of Coban wraps, 2) Jobst Intermittent Compression pumps, 3) Standard pressure

garment gloves, 4) Joshi External Stabilizing system. Further indepth research on these solutions will be done.

Completed by Utsav Malla on 16.11.2016 01:30.

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### ➔ **Step 1:** Non Splint Solution

Researched on various solutions for burn scar contracture management. Came up with multiple solutions that does not include physical rehabilitation using a splint. The most prominent one was use of "contact media" namely hypafix, elastofix, and silicon gel. Presssure/Retention Garments, Massage Therapy, and Moisturizing cream were a few others that I came across. Next agenda research more in depth on all of these techniques.

### 🗄 Activity of task Non-Splint Related Solution

16.11.2016 01:26 *Utsav Malla* created task **Non-Splint Related Solution**.  
 16.11.2016 01:30 *Utsav Malla* created Step 1 **Non Splint Solution**.  
 16.11.2016 01:30 *Utsav Malla* completed Step 1 **Non Splint Solution** (1/1 completed).  
 16.11.2016 02:49 *Shirshak Aryal* created Step 2 **Other solutions**.  
 16.11.2016 02:50 *Shirshak Aryal* edited Step 2 **Other solutions**.  
 16.11.2016 02:50 *Shirshak Aryal* completed Step 2 **Other solutions** (2/2 completed).

### 💧 Samples of task Non-Splint Related Solution

*No samples*

Task created on 16.11.2016 01:28.

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### 📅 Meetings for Week of 11/14-11/18/16

*No due date*

*No description*

Task tags: *No tags*

Completed by Nischal Khanal on 16.11.2016 01:40.

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### ➔ **Step 1:** Meeting with Dr. Klaesner 11/14/2016

We met as a group with Dr. Klaesner to discuss changes required in our approach for this project and this class. We now realize that we should be analyzing as many solutions as possible to solve our problem instead of focusing on and being set on one solution from the beginning. Within the next two weeks we plan to analyze as many unique solutions as possible and formulate our own list of 10-15 possible solutions that could be used for our problem. We will then pick and argue for one of these solutions and use that approach for our prototype.

Completed by Nischal Khanal on 16.11.2016 01:40.

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➔ **Step 2:** Group meeting on 11/16/2016

Shirshak was not able to attend due to a phone interview but Utsav and I informed him of the minutes after the meeting. We have set a deadline of Sat. 11/19/20 to come up with at least one alternate treatment each with journals/articles as support/sources. We will meet as a group and analyze our findings and come up with unique solutions from this information and begin compiling our progress report. We will present this information to Dr. Klaesner for feedback on Monday.

☰ Activity of task Meetings for Week of 11/14-11/18/16

16.11.2016 01:28 *Nischal Khanal* created task **Meetings for Week of 11/14-11/18/16**.

16.11.2016 01:32 *Nischal Khanal* created Step 1 **Meeting with Dr. Klaesner**.

16.11.2016 01:32 *Nischal Khanal* completed Step 1 **Meeting with Dr. Klaesner** (1/1 completed).

16.11.2016 01:33 *Nischal Khanal* uncompleted Step 1 **Meeting with Dr. Klaesner** (0/1 completed).

16.11.2016 01:40 *Nischal Khanal* created Step 2 **Group meeting on 11/16/2016**.

16.11.2016 01:40 *Nischal Khanal* edited Step 1 **Meeting with Dr. Klaesner 11/14/2016**.

16.11.2016 01:40 *Nischal Khanal* completed Step 1 **Meeting with Dr. Klaesner 11/14/2016** (1/2 completed).

16.11.2016 01:40 *Nischal Khanal* completed Step 2 **Group meeting on 11/16/2016** (2/2 completed).

16.11.2016 01:40 *Nischal Khanal* completed Step 2 **Group meeting on 11/16/2016** (2/2 completed).

💧 Samples of task Meetings for Week of 11/14-11/18/16

*No samples*

Task created on 01.11.2016 04:18.

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📁 Upload: PDF copies of Weekly Reports

*No due date*

*No description*

Task tags: *No tags*

Completed by Shirshak Aryal on 11.11.2016 20:42.

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➔ **Step 11:** Weekly Report 10

*No description*

Completed by Shirshak Aryal on 10.11.2016 02:19.

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➔ **Step 10:** weekly Report 9



*No description*

Completed by Shirshak Aryal on 01.11.2016 04:36.

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➔ **Step 9:** Weekly Report 8

*No description*

Completed by Shirshak Aryal on 01.11.2016 04:42.

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➔ **Step 8:** Weekly Report 7

*No description*

Completed by Shirshak Aryal on 01.11.2016 04:36.

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➔ **Step 7:** Weekly Report 6

*No description*

Completed by Shirshak Aryal on 01.11.2016 04:42.

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➔ **Step 6:** Weekly Report 5

*No description*

Completed by Shirshak Aryal on 01.11.2016 04:27.

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➔ **Step 4:** Weekly Report 3

*No description*

Completed by Shirshak Aryal on 01.11.2016 04:26.

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➔ **Step 3:** Weekly Report 2

*No description*

Completed by Shirshak Aryal on 01.11.2016 04:25.

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➔ **Step 2:** Weekly Report 1

*No description*

Completed by Shirshak Aryal on 01.11.2016 04:19.

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➔ **Step 1:** Weekly Reports

This page will be used to upload a copy of all the weekly reports.

01.11.2016 04:18 *Shirshak Aryal* created task **Upload: PDF copies of Weekly Reports.**

01.11.2016 04:19 *Shirshak Aryal* created Step 1 **Weekly Reports.**

01.11.2016 04:19 *Shirshak Aryal* completed Step 1 **Weekly Reports** (1/1 completed).

01.11.2016 04:25 *Shirshak Aryal* created Step 2 **Weekly Report 1.**

01.11.2016 04:25 *Shirshak Aryal* completed Step 2 **Weekly Report 1** (2/2 completed).

01.11.2016 04:25 *Shirshak Aryal* edited Step 2 **Weekly Report 1.**

01.11.2016 04:26 *Shirshak Aryal* created Step 3 **Weekly Report 2.**

01.11.2016 04:26 *Shirshak Aryal* completed Step 3 **Weekly Report 2** (3/3 completed).

01.11.2016 04:27 *Shirshak Aryal* created Step 4 **Weekly Report 3.**

01.11.2016 04:27 *Shirshak Aryal* completed Step 4 **Weekly Report 3** (4/4 completed).

01.11.2016 04:29 *Shirshak Aryal* created Step 5 **Weekly Report 4.**

01.11.2016 04:29 *Shirshak Aryal* created Step 6 **Weekly Report 5.**

01.11.2016 04:29 *Shirshak Aryal* created Step 7 **Weekly Report 6.**

01.11.2016 04:30 *Shirshak Aryal* created Step 8 **Weekly Report 7.**

01.11.2016 04:30 *Shirshak Aryal* created Step 9 **Weekly Report 8.**

01.11.2016 04:32 *Shirshak Aryal* edited Step 9 **Weekly Report 8.**

01.11.2016 04:32 *Shirshak Aryal* edited Step 9 **Weekly Report 8.**

01.11.2016 04:33 *Shirshak Aryal* edited Step 7 **Weekly Report 6.**

01.11.2016 04:36 *Shirshak Aryal* completed Step 9 **Weekly Report 8** (5/9 completed).

01.11.2016 04:36 *Shirshak Aryal* completed Step 9 **Weekly Report 8** (5/9 completed).

01.11.2016 04:36 *Shirshak Aryal* completed Step 7 **Weekly Report 6** (6/9 completed).

01.11.2016 04:40 *Shirshak Aryal* edited Step 6 **Weekly Report 5.**

01.11.2016 04:42 *Shirshak Aryal* edited Step 8 **Weekly Report 7.**

01.11.2016 04:42 *Shirshak Aryal* completed Step 8 **Weekly Report 7** (7/9 completed).

01.11.2016 04:42 *Shirshak Aryal* completed Step 6 **Weekly Report 5** (8/9 completed).

10.11.2016 02:19 *Shirshak Aryal* created Step 10 **weekly Report 9.**

10.11.2016 02:19 *Shirshak Aryal* completed Step 10 **weekly Report 9** (9/10 completed).

11.11.2016 20:42 *Shirshak Aryal* created Step 11 **Weekly Report 10.**

11.11.2016 20:42 *Shirshak Aryal* completed Step 11 **Weekly Report 10** (10/11 completed).

📌 Samples of task Upload: PDF copies of Weekly Reports

*No samples*

