# Planning and Management of Scientific Drilling Projects









## Lifecycle of a Scientific Drilling Project



## "Project Planning and Management is stupid, boring and time consuming work"

## So why do we need?







#### King Gustav II Adolph of Sweden







Admiral Clas Fleming







Sweden was in war with Poland and required new war ships

January 1625	The King directed his Admiral to sign a contract for building four ships in four years
Summer 1625	Shipbuilders laid keel for a 108 ft one gun deck warship that later became the Vasa

Schedule Pressure: the ships were build under strong time constrains to meet a pressing need







November 1625 Order was modified to a 120 ft ship

# Due to the tight schedule, the keel of the 108 ft ship was simply enlarged but modifications were not documented.









Early 1626

The King was told that Denmark build a ship with two gun decks. Hence order was changed again to a 135 ft two gun deck ship. Requirements for armaments were changed repeatedly.

Moving Target: existing keel was enlarged again. Modifications were not documented. Shipbuilder had never built a ship with two enclosed gun decks before. Second gun deck causes much higher center of gravity (instability).









1626 - 1627 The principle shipbuilder became ill and died

Lack of documentation caused poor communication between the old and the new shipbuilder.

1627

Stability test conducted before launching showed that the Vasa was not seaworthy

Results of the stability test were not communicated to the King and ignored due to the tight time schedule.







August 1628Vasa maiden voyage

After sailing 1300m, a light gust of wind caused the Vasa to sink in Stockholm harbour with a loss of 53 lives









## **Lessons-Learned**

#### **Project "Vasa" failed due to**

- Excessive schedule pressure
- Moving target, changing needs during construction
- Excessive innovations, lack of know-how
- Lack of project planning, poor documentation/communication
- Ignoring the obvious







## **The Project Management Tetrahedron**



#### No topic can be changed without affecting the others







The basis of a good project management is the precise definition of the project goals in detail.

# "Only he who knows his destination will find the way" (Lao-Tse)









Comment the timing, frequency, and am G. orbital- to millennial-scale char in the YYY region. DRILLING?







## The "Top Down" Approach



#### **2. Level Concrete Scientific Questions**

. . . . . . . . .

The XXX lake drilling project aims to reconstruct the

- Paleoclimate development in the last yyy ka
- Dynamics of lake level fluctuations
- Formation and age of the lake
- History of volcanism and volcanic activity
- Variations of the earthmagnetic field
- Tectonic, paleoseismic and earthquake activity







#### 2. Level

3.

Level

The XXX lake drilling project aims to reconstruct the

- Paleoclimate development in the last yyy ka
- **Climate proxy studies from undisturbed lake sediment record** 1.
- Noble gas studies in pore waters from lake sediments 2.
- **Organic matter content and composition of lake sediments** 3.
- Modelling 4.
- 5.







#### 3. Level

Climate proxy data from an undisturbed lake sediment record 4. Level • Drill Core • Continuous Coring

- Core catcher samples
- Pore water samples
- Deep Biosphere samples
- .....

- Core overlapping and depth matching through downhole logging + on-site core logging/scanning
- Drilling of several holes at one site

.....







### Combined Scheme (Drilling, Sampling, Logging)









## Time Plan

Subproject A Subproject B Subproject C Subproject D Subproject F Subproject G Subproject H









## **Budget Plan**

Γ	Preliminary Budget		VELL XY										
	Rig 170 t		46										
	Tripping speed	300	m/h										
1	Phase		Mob/Den	16 1	2	12 1	/4"	8 1/	2	61	12	Comple	TOTAL
2	Casing OD		I	13 3	378-	9 7	778	7					
3				Drilling	Others	Drilling	Others	Drilling	Others	Drilling	Others		
4	Starting depth			0	[	50		800	1	2400	l		
5	Final depth		0	50	50	800	800	2400	2400	3000	3000	3000	
6	Casing Lenght				50		800		2400				
7	Meter drilled			50	[	750		1600		600	[		
8	Penetration rate			5	[	8		4,5		4			
9	Drilling duration			1		4		15		7			
10	Number of bit			1	[	2		4		2			
11	Tripping			1		1		3		2			
12	Drilling phase duration	1		2	l	5		18		9	<b> </b>		
13	Casing , cementing, V	OC			2		2		3		<b></b>		
14	Others (testing loggir	a)							1		2	2	
15	Phase duration	<b></b>			4		7		22		11	2	
16	Progress Days		0	2	4	9	11	29	33	42	44	46	46
	Vell Site		100.000			<b>.</b>							100.000
	Pre-set 20 <sup>•</sup>		10.000			<b>.</b>							10.000
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	Rig Mob/Demob					<b>_</b>							0
	Water Supply	L	10.000			<b>_</b>							10.000
	Vaste Treatment/Disp	osal	20.000			<b>_</b>							20.000
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	Tubolar Inspection												0
	Transport/Cranes		10.000										10.000
	Whipstock												0
	mud logging												0
	Coring equipment					Ι				15.0	00		15.000
	Fishing (Operator+Ma	t)				I							0
	ESP Services					Ι							0
	Testing Contractor					Ι							0
	Liner Service					Ι							0
	Other Services					Γ							0
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#### Work Schedule

## PLANNING

Years		2007											2008													2009												
Months	1	2	3	4	5	6	7	8	9	10	11	12	. 1	2	3	84	5	6	7	8	9	10	11	12	2 1	2	3	4	5	6	7	8	9	10	11	12		
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Informal ICDP decision																																						
Supportive proposals submitted*														T																								
Formal ICDP decision																																						
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Equipment leaves to														T	T											T	T	T										
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Drilling																																						
Demobilization																																						
Equipment returns																																						
Core splitting and scanning														T	T	$\uparrow$	Γ										T											
Sampling parties																											Ĺ											

\*to DFG, NSF, NSERC, SNF and VR

Work schedule with milestones for the process of funding (black), a fast track option for drilling in 2008 (blue) and a slow track option for drilling in 2009 (red).







# PLANNING Drilling Proposal

Science Plan Detailed Technical Plan Budget Plan Work Schedule Management Plan Permitting Plan Authority, Safety and Environmental impact review Education and Outreach Plan







#### Management Plan: Pls and their roles and responsibilities









# Service Provisions trough ICDP-OSG

- Assists PIs during all project phases (planning and design of drilling, on-site management)
- Maintains the ICDP equipment
   pool
- Provides different training measures
- Helps organizing ICDP workshops









ICDP equipment pool organized by Operational Support Group

Online Gasmonitoring while drilling (OLGA) Data Management System (DIS)

SlimWave<sup>™</sup> Geophone Chain

Slimhole Sondes & Downhole Logging









## **ICDP** equipment: conditions of use

#### DIS, Core Scanning & Logging, OLGA

- Training of operators through the OSG few weeks before spud-in
- Assembly of equipment by operator plus OSG
- Operation and maintenance through on-site scientists (with OSG support)
- Project covers only shipping costs, no maintenance fees

#### Downhole logging, Fluid Sampling and Geophone Chain

- Conducted by OSG logging group
- Downhole logging data evaluation and interpretation is provided by OSG







#### **Scientific Drilling and Public Outreach**

















#### Why Public Outreach?

- Scientific Drilling projects are to a large degree, if not fully, financed by science funding agencies, which are publicity funded through tax money.
- Scientific Drilling serves to answer fundamental questions which are directly connected to themes of societal relevance, such as sustainable georesources, climate, and natural hazards.
- Continental drilling projects generally attract a great deal of attention from local communities. Acceptance by local politicians and landowners is a prerequisite for the successful project execution.
- Scientific Drilling Projects are a great opportunity for introducing applied Earth Science to teachers and students.









#### **Public Acceptance of Drilling**

Drilling projects may receive special attention due to the spectacular failure of some commercial drilling projects and the discussion about CCS and fracking



The Deepwater Horizon drilling rig in flames





Basel geothermal drilling triggers earthquake



Eruption of mud volcano Lusi: man-made through drilling?



Geothermal probe sinks German city Staufen







#### **Public Acceptance of Drilling**

It is important to emphasize the pure scientific aim, safety, and the societal benefit to the local community **prior** to any drilling activities in order to avoid this:







ASSOCIATION

# Tailored outreach for different communities From

DRILLING PROJECT

SUPPORTERS (ICDP, IODP, ...)

Conference actions (EGU, AGU, IGC) <ul> <li>Town Hall Meetings</li> <li>Scientific Drilling Session</li> <li>Booth</li> <li>Workshops</li> <li>Journal SCIENTIFIC DRILLING</li> <li>Announcements and calls (Web, EOS)</li> </ul>	Project-related Scientific Sessions Publication (including SD) Special Issues and books
ICDP Website Contact for media requests ICDP Videos, Youtube channel Brochures and Flyer SM, Twitter	Project Website Daily News on ICDP Website Talks in Schools and Universities Press Releases, Interviews Public Days Video documentation Geocenter







SCIENCE COMMUNITY

PUBLIC

#### **Outreach by ICDP Projects**



#### Video Documentation



#### **DisiNEr Continents: Drilling** / Alone FaultProact

Deep Fault Drilling Project (DFDP) - Alpine Fault The Geop Fault Differ Freier (DFDP) peaces to d'IL sample, and member the Alpha Fault in the Sarth balance to been understand the descended processes of teck deformation and sampleakes.

 
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Regulariting updates can be found in Reports Libp

#### **Project Website**



#### **Outreach for Students**

#### EARTH The Science Behind the Headline

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Gredit: Elfgygytgyn international Enlence Crew



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#### Press Releases



Public day

#### **Geo-Centre**







#### **Outreach by ICDP Projects: Video Documentation**



Several ICDP projects have produced videos from drilling and on-site activities, see

http://www.icdponline.org/media/video-archive/

ICDP can provide funding at different levels for producing a video documentation







#### **Outreach by ICDP Projects: Social Media**

- Social Media (SM), such as Facebook, Twitter and blogging, have potential to share information to a general audience with almost no monetary costs.
- Avoid content which is too complex for the average person, full of jargon or acronyms.
- Emphasize the project successes, not the drawbacks.
- Keep your SM updated, in particular during the operative phase of the project.









#### **Outreach by ICDP Projects: Press Release**

#### EARTH The Science Behind the Headlines

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Sunrise at the scientists' field camp on the western shore of Lake El'gygytgyn.

Credit: El'gygytgyn International Science Crew



Nearly 3.6 million years ago, a large asteroid slammed into Earth in what is today northeastern Russia. Within minutes, the impact formed an 18-kilometer-wide hole in the ground that then filled with water. The sediments that collected in the bottom of that lake since the impact may provide one of the best stratigraphic records of high-latitude climate change over the last 3.6 million years. Last year, we traveled to this remote region to drill into these sediments to see what we could learn about Arctic change.

#### The crater

The impact occurred in a region of rolling, low mountains; it left behind one of the best-preserved large impact structures on the planet. But the crater has hardly been studied because of its remote location: At 100 kilometers north of the Arctic Circle in central Chukotka, on the continental divide between the Arctic Ocean and the Bering Sea, El'gygytgyn (pronounced el ghee-git-gin) Crater — now Lake El'gygytgyn — is inaccessible by road.

But because it is so remote and well-preserved, Lake El'gygytgyn offers a unique opportunity to learn more about impact processes and past climate change. Large, deep lake systems are not uncommon throughout the world, but Lake El'gygytgyn holds untapped scientific potential principally because of the crater's age and strategic geographic location. A Press Release can be useful to generate public interest for your project in particular at the beginning of drilling operations.

Contact the press officer of your home affiliation (Institute, University) on how to prepare and publish a press release.







#### **Outreach by ICDP Projects: Public Day**



A public day is a great opportunity for the public not only to look "behind the curtains" but also to generate public and media interest for your project.









#### **Outreach by ICDP Projects: Public Day**

- Inform local and regional media (press, radio, TV), local politicians and landowners directly. Display leaflets at public places.
- Announce the "Public Day" on the ICDP project websites and on Social Media.
- Drill Sites are often located in remote areas. Provide information how to reach the drill site, about nearby service facilities and infrastructure and if mobile phone connection would be available.
- Prepare sufficient parking space for the visitor's cars at the drill site.
- Keep a sufficient number of hard hats and, if needed, also safety goggles and safety boots ready.









#### **Outreach by ICDP Projects: Public Day**

- Inform the drilling company as early as possible to make sure that any visit will not infer with drilling operations. Avoid risky drilling operations or fishing jobs.
- For visitors it is always exciting to see drilling in action (rotating drill string, circulating drilling mud etc). Check with the drilling company.
- A tour over the drill site requires guides familiar with drilling techniques. The operating drilling company may provide manpower, but make sure that such tour does not turn to a promotion event for the company.
- If you have hired an external consultant for project control and supervision, ask if he/she would be willing and able to guide a tour.



Explanation on the scientific target of the drilling should be conducted by project Pl's.







#### **Outreach by ICDP Projects: Students and Teachers**



School students and teachers are an important target group for science outreach. Inviting groups of school students for a one-day visit of a drill site can be very informative for them. Display information material, e.g. project flyer.









#### **The KTB Geo-Center**

Consider the use of your drill site as a visitor's center when drilling is completed









#### **ICDP YouTube Channel**

#### Channel was launched in late 2013









# Tailored outreach for different communities From

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#### **Brochures & Flyer**

The brochure "the thrill to drill" (p. 24) presents selected projects from the ICDP key topics

Target audience is the geoscience community and the interested public











## **Conference Actions: Scientific Drilling Session (EGU)**

Since 2008: "Major achievements and perspectives in scientific ocean and continental drilling" (IODP/ECORD – ICDP)"





#### EGU 2015: 41 contributions, two oral blocks







#### **Conference Actions: Townhall Meetings**

Since 2005: ICDP-IODP/ECORD Townhall Meeting at EGU Since 2006: ICDP Townhall Meeting at AGU (with various partners)





Reports on upcoming projects, recent achivements and program developments Generally 100-200 attendees







#### **Conference Actions: ECORD/IODP – ICDP booth**









#### Scientific Drilling: The Open Access ICDP and IODP Program Journal



Publishes peer-reviewed science reports, progress reports, articles on technical and program developements, workshop reports and "news and views" items

Designed to enhance communication between and among IODP and ICDP and other scientific drilling communities

Published by Copernicus Publication on behalf of ICDP

Editorial Board: Ulrich Harms (Editor in Chief), Thomas Wiersberg (Managing Editor), Gilbert Camoin (Editor), Tomoaki Morishita (Editor) & James Natland (Editor)







### **ICDP Training Courses**

ICDP organizes training courses for scientists and engineers from upcoming continental scientific drilling projects





Last ICDP Training September 14-16, 2015, at Lake Ohrid (Macedonia): Scientific Drilling of lacustrine sediments Next ICDP Training October 19-21, 2015, at the KTB Geocenter in Windischeschenbach (Germany): Managing and execution of continental scientific drilling projects









http://www.icdp-online.org/media/icdp-best-practice-brochure-primer/





